

University of Illinois

BUDGET REQUEST FOR OPERATING AND CAPITAL FUNDS

Fiscal Year 1988



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INTRODUCTION TO THE FISCAL YEAR 1988 OPERATING AND
CAPITAL BUDGET REQUEST

GENERAL PERSPECTIVES FOR THE DEVELOPMENT OF THE FY 1988
OPERATING BUDGET REQUEST

The FY 1987 legislative process concluded with an operating budget which will permit the University of Illinois to sustain the momentum which it has built for the past four years. Combined with significant advances in capital funding which will provide vitally important new facilities to house expanding academic programs, the FY 1987 operating budget will make it possible for the University to continue strengthening academic initiatives to a degree unmatched during most of the 1970's and early 1980's.

For the past two years a great deal of attention has been focussed on Illinois' attempts to strengthen education at all levels, from enriched preschool opportunities to sophisticated graduate study at the threshold of current technology. Advances in a wide range of programs in higher education, combined with significant reforms and curricular changes at the elementary/secondary level, were initiated a year ago with the knowledge that multi-year funding improvements were required if meaningful educational improvements were to be realized.

Illinois' overall revenue growth for FY 1987 is not projected to develop as robustly as that of certain other areas of the country. As a result, preliminary plans on the part of both the Governor and the General Assembly to boost educational support at all levels had to be somewhat reduced in scope at the end of the FY 1987 legislative process. While reductions in planned expenditures and activities are never easy to absorb, particularly when they come relatively late in the process, the State's FY 1987 budget continues to reflect an overall commitment to education which is reassuring to those who know the effort to strengthen education requires a long-term commitment extending beyond a single year.

As can be seen in Table 1, Illinois' revenue growth was sufficient to boost total FY 1987 appropriations from General Revenue and Common School Funds (GRF) by only one-half of one percent above the past year. In that overall context of limited growth, higher education appropriations rose by 6.3%, while elementary/secondary appropriations grew by 6.9%. To meet these significant increases with very restricted new revenues, appropria-

TABLE 1
 GENERAL REVENUE AND COMMON SCHOOL FUNDS APPROPRIATIONS
 FY 1985 - FY 1987
 (Dollars In Millions)

	<u>FY 1985*</u>	<u>FY 1986*</u>	<u>FY 1987**</u>	<u>FY 1987 Over FY 1986</u>	<u>FY 1987 Over FY 1985</u>
Higher Education	\$1,122.1	\$ 1,247.4	\$ 1,325.9	6.3%	18.2%
Elementary/Secondary Education	2,334.3	2,637.2	2,818.0	6.9%	20.7%
All Other Agencies	<u>6,104.7</u>	<u>6,494.5</u>	<u>6,283.8</u>	-3.2%	2.9%
TOTAL	\$9,561.1	\$10,379.1	\$10,427.7	0.5%	9.1%
Higher Education as a Percent of Total	11.7%	12.0%	12.7%		

Source: *FY 1985 and FY1986 from Illinois State Budget, FY 1987.

**FY 1987 from Illinois Bureau of the Budget.

tions to all other State agencies and departments were reduced by more than three percent for FY 1987.

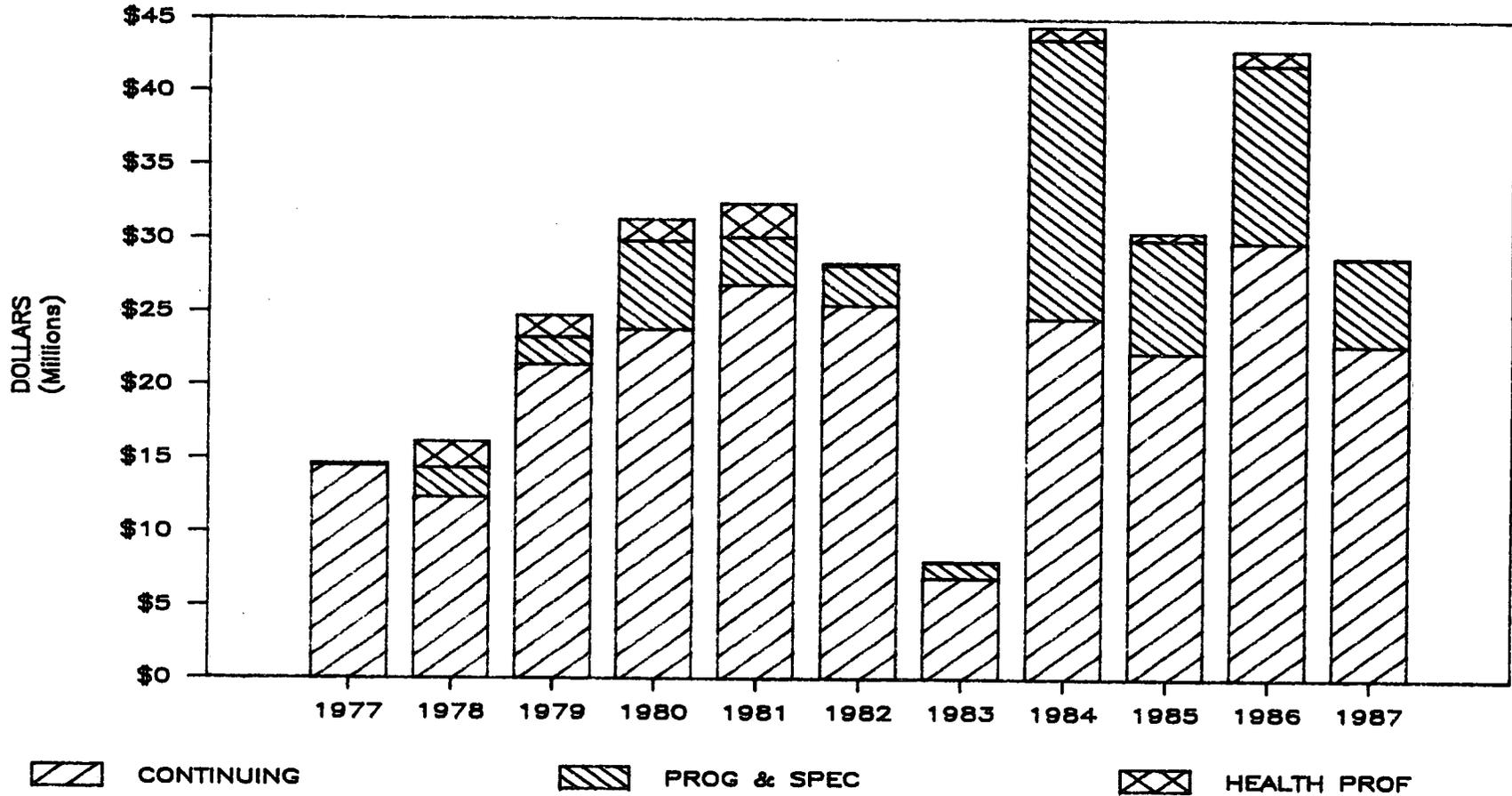
Taken in a three year context (FY 1985 to FY 1987), the appropriations data are even more dramatic. Higher education appropriations have grown at a rate twice that for the State as a whole, and more than six times the rate for all agencies and departments other than education. The data for elementary/secondary education reveal even sharper growth, indicating that all of education has received a significant budget priority. From a longer range perspective the key issue to emerge, once the FY 1987 revenue picture became clear enough to see that early growth projections were overly optimistic, is whether the State's revenue pattern in future years will be sufficiently strong to continue the revitalization of education at all levels, even if education's budget priority remains high.

As can be seen in Figure 1, funding available for University of Illinois academic program improvements in FY 1987 continues a recent pattern of growth. Key operating advances for FY 1987 include:

- Faculty and staff salary increases which will surpass inflation for the second year in a row, and which should permit at least a modest closing of the comparative salary gaps for some employee groups.
- Continued advancement in a variety of academic programs. As in the past several years, science and technology programs, especially those which hold potential for expanding or diversifying Illinois' economic base, receive direct attention for FY 1987. Those science and technology initiatives are combined with a second year of support for strengthening undergraduate education, particularly in the liberal arts and sciences; a second year of increased support for minority student recruitment and retention; continuation of multi-year efforts to expand and enhance programs in commerce and business administration, veterinary medicine, and the health professions; and in programs aimed at improving elementary and secondary education.
- Further progress in revitalizing engineering education at both campuses, primarily through the addition of new faculty members, allowing for continued enrollment growth to meet the high demand for engineering education. Modest expansion of off-campus professional education opportunities for practicing engineers will also continue.
- Provision of the second of four \$1 million increments to support program activities in the National Center for Supercomputing Applications.

FIGURE 1
 FY 1977-87 STATE INCREMENTAL FUNDS RECEIVED BY THE UNIVERSITY OF ILLINOIS
 (GENERAL REVENUE, INCOME AND SPECIAL FUNDS EXCLUDING RETIREMENT, IBA AND CAPITAL GRF)
 (DOLLARS IN THOUSANDS)

	FY 1977	FY 1978	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987
PREVIOUS YEAR'S BASE	\$235,375.1	\$250,019.4	\$265,925.8	\$290,681.4	\$321,158.3	\$353,550.3	\$381,884.9	\$389,861.2	\$434,289.0	\$464,718.2	\$507,575.5
NET INCREMENT	14,644.3	16,140.0	24,755.6	31,279.3	32,391.9	28,334.6	7,976.3	44,427.8	30,429.3	42,857.3	28,151.9
NET INCREMENT AS A PERCENT OF PREVIOUS YEAR'S BASE	6.2%	6.5%	9.3%	10.8%	10.1%	8.0%	2.1%	11.4%	7.0%	9.2%	5.5%
CONTINUING COMPONENTS	14,488.0	12,347.1	21,422.9	23,803.4	26,840.1	25,461.0	6,913.0	24,579.1	22,248.7	29,782.3	22,792.2
PERCENT OF TOTAL INCREMENT	98.9%	76.5%	86.5%	76.1%	82.9%	89.9%	86.7%	55.3%	73.1%	69.5%	81.0%
PROGRAMS & SPECIAL COMPONENTS	156.3	2,001.4	1,859.7	6,008.4	3,242.0	2,733.2	1,138.3	18,998.7	7,680.6	12,095.0	5,931.9
PERCENT OF TOTAL INCREMENT	1.1%	16.2%	8.7%	25.2%	12.1%	10.7%	16.5%	77.3%	34.5%	40.6%	26.0%
HEALTH PROFESSIONS		1,791.5	1,473.0	1,467.5	2,309.8	140.4	(75.0)	850.0	500.0	980.0	60.0
PERCENT OF TOTAL INCREMENT	0.0%	11.1%	6.0%	4.7%	7.1%	0.5%	-0.9%	1.9%	1.6%	2.3%	0.2%



While overall budget growth for FY 1987 was possible in these key areas, reductions from earlier planned operating levels were required to accommodate amendatory veto actions. Funds available for salary increases were reduced by 1% for all employee groups. Program increments were reduced, especially for the Chicago campus, whereas cost increase funding was severely reduced at Urbana-Champaign. University-wide increments for equipment and for utilities price increases were also eliminated. Given the State's sluggish revenue growth, a budget reduction was inevitable. While it slowed advances which otherwise would have been possible, forward momentum continues, with a clear signal that education remains a significant priority for Illinois.

As will be discussed in greater detail in the Capital Budget section, FY 1987 capital appropriations for the University include construction funds for three major new facilities. Planning activities are already underway for each facility: an addition to the Digital Computer Laboratory in Urbana-Champaign; a new engineering research facility in Chicago; and a addition to the Animal and Dairy Sciences building in Urbana-Champaign. Each of these facilities support science and technology initiatives which have been at the forefront of recent operating budget advances, and all of which require additional space if those program advances are to continue. Thus, FY 1987 capital budget funding will aid future operating budget opportunities in significant ways for several important academic programs.

Priorities for FY 1988

While the FY 1987 operating budget will permit progress to continue, both the General Assembly and the Governor fully intended to do more for higher education than ultimately it was possible to achieve. Final FY 1987 appropriations for the University of Illinois are \$13.5 million below the level included in the Governor's original budget, and \$9.9 million below the level passed by the General Assembly. Although support of this magnitude could not be achieved for FY 1987, the intentions of the General Assembly and the Governor lay the ground work for redoubled efforts for FY 1988. As strong as higher education's FY 1987 support is when compared to other agencies and departments within the State, the fact remains that FY 1987 needs exceeded the final budget by a wide margin--a margin which

must be reduced if Illinois is to maintain its competitive advantage over other states.

Illinois was not alone in recognizing the need to strengthen education at all levels among its top budget priorities for FY 1987. Nor was Illinois alone in stressing the need to improve and diversify the economic base upon which all State services rest. The National Governor's Association recently asked state chief executives to identify the top three priorities on their FY 1987 budget planning agendas. Education was by far the most frequently identified priority, mentioned by 35 Governors. Economic development was clearly the next priority, mentioned by nearly half, 24 of the Governors, and well ahead of the third-place priority area of "other human resource programs" (15 mentions). The report indicates that if Illinois is to retain its competitive position among the states, it must at least match the education and economic development efforts of others. If Illinois' competitive position is to improve, it must go beyond the efforts of others.

The fiscal and programmatic progress which has been achieved in the past four years has enabled the University of Illinois to strengthen programs and to address financial needs in several key areas affecting both individual faculty and staff and a wide range of academic initiatives. Those funding improvements, combined with the clear priority which has been assigned to support for education at all levels in both good budget years and lean ones, has done much to boost the morale and vigor of faculty and staff at the University. The need to maintain and improve the University's competitive position among the nation's strongest public and private institutions has not diminished, however, especially in view of the increased priority for education across the country. Nor has Illinois' need to strengthen and reshape its economy diminished. Indeed, recent weaknesses in the agricultural sector have pointed out again the need to renew efforts for economic diversification.

If the University of Illinois is to continue to contribute to the economic development of the State, while at the same time strengthening basic instructional programs and research efforts, and if the University's competitive position among America's front-ranking institutions is to be improved, several vital budget requirements must be met in FY 1988:

- The program themes of scientific and technological advances and of professional and economic development must still play an important role. Engineering, the sciences, and technology remain areas of special strength at both University of Illinois campuses, and they are the areas of UI strength most directly associated with the State's economic advancement.
- The area of academic computing has become one of central importance for instructional application across nearly every discipline, as well as one of the extremely competitive areas affecting medium and long-range economic development. The computer has become a basic educational and research tool, and instructional programs and research efforts which fail to maintain adequate computer support will quickly fall behind those which do so.
- New developments in biotechnology are having a rapid and pervasive impact on virtually all program areas in the life sciences, in the health professions, in agriculture and veterinary medicine, and many others. Again this impact produces a dramatic need to reshape instructional programs to accommodate an explosion of knowledge and technology. It produces a parallel need to find new mixes of interdisciplinary activity to carry on the search for new knowledge, as well as to develop the results of these new research thrusts in ways which can bolster economic growth.
- Requirements to expand the University's efforts in science and technology, engineering, and economic development are matched with an equally pressing need to continue to strengthen the core of undergraduate instructional activity. The long term vitality of Illinois' economic, social, and political systems depends on the presence of an educated population of persons who can think clearly, reason soundly, communicate effectively, and recognize and appreciate the diversity of their own cultures and history as well as those of others. Continued enhancement of instructional programs in the basic disciplines, along with efforts to help with the improvement of elementary and secondary education must be provided. Equally important, Illinois must recognize continuing changes in the very nature of its population. Illinois must be prepared to deal with an aging populace in which fundamental changes will likely occur in many aspects of day-to-day life. The State must extend current efforts to ensure that all of its citizens become and remain effective, productive members of society. Special efforts are needed to make certain that minority members of society receive the educational opportunities which have eluded them in the past.
- While program advances are important in any year, they must not overshadow the need for attention to budget areas which affect faculty and staff in every segment of the University. Attracting and retaining top quality faculty and staff must be the central goal of every annual budget. Providing a competitive compensation program for faculty and staff has long been the paramount priority in reaching that goal. While the competitive strength of salary

levels for faculty and staff remains an obvious concern, increasing attention continues to focus upon the other benefits which make up a total compensation package for faculty and staff. The current UI benefits program ranks demonstrably below those of most peer institutions, and steps must be taken to reverse that situation. The FY 1988 budget request includes a renewed effort to provide compensation increases which will directly address the competitiveness of both salary and benefit programs for all faculty and staff.

- Providing adequate levels of support services will also be a part of the FY 1988 budget request. Although inflation levels have dropped recently, many areas of the University's support service structure remain seriously deficient. Additional support must be found to restore adequate maintenance standards in University facilities, and to meet special needs in the area of security and environmental health and safety.
- Providing adequate equipment support for both new and existing academic programs remains an especially important area of attention. The rapid technological obsolescence of much of the University's sophisticated instructional and research equipment is compounded by the equipment intensive nature of many expanded academic programs, by the flood of requests from every discipline for access to computers of all types, and by the University's long-standing equipment replacement deficiency which has made it impossible to replace all existing obsolete equipment, let alone to upgrade to new technologies. The intense competition for top-quality new faculty members frequently includes the requirement to upgrade laboratory or computer workstation equipment when a new faculty member is hired.
- The urgency to secure equipment support has increased for FY 1988, since a substantial amount of funding (nearly \$2.0 million) anticipated for FY 1987 was cut from the budget in order to meet budget reduction requirements. This loss must be recovered as rapidly as possible, simply to return the University to a level which has been achieved in the initial FY 1987 budget.
- The University of Illinois has been successful in attracting significant funds from industrial donors and other sources for equipment gifts, especially for computing equipment for both instructional and research uses. Those gifts carry corresponding needs to support and maintain the equipment provided. With gifts totaling well over \$20 million excluding supercomputing, the support and maintenance of gift equipment carries a multi-million dollar requirement.
- Finally, the FY 1988 budget request carries an addendum addressing the special funding needs of the University of Illinois Hospital (UIH). Like a large number of other major teaching hospitals, UIH is confronted by fiscal difficulties associated with serving a substantial number of patients who have no resources to

pay for their medical care, and by changes in health care financing mechanisms which make it impossible for hospitals to utilize traditional sources to cover a portion of the costs of care provided to medically indigent persons.

Table 2 outlines each element of the FY 1988 Operating Budget Request, which has been constructed around the major themes and priorities just discussed. Table 3 presents a detailed display of each of the academic programs included within the Programmatic Components category. As outlined in these two tables and as discussed in detail in the body of this document, the FY 1988 Operating Budget Request includes the following highlights:

- Compensation increases totalling 9% which includes a salary component of 7% and an additional 2% to improve fringe benefits. Additional funds are also included in the overall compensation package to meet the employer's share of Federal Medicare costs for new employees.
- Cost increases of 4.5% for most goods and services, excluding energy and library acquisitions.
- Utilities increases which total 9.45% to cover anticipated cost increases, especially in electricity at both campuses and to cover the costs of consumption increases related to the growing use of energy-intensive equipment, sophisticated laboratories which have been recently remodeled, etc.
- Cost increases of 12% for library acquisitions, reflecting in part the impact of recent price increases related to purchase of foreign books, journals, and other materials.
- Approximately \$3.5 million to provide increased support service funding. Approximately \$1.5 million is required to provide operations and maintenance support for a variety of new facilities at both campuses. Preventive maintenance needs, derived from long-standing deficiencies in operations and maintenance funding, require \$1.0 million for FY 1988. An additional \$1 million is targeted toward expanded and improved services in environmental health and safety and security areas.
- Academic program initiatives totalling \$14.7 million, organized around five major themes: scientific and technological advances; economic and professional development; promoting instructional excellence; engineering revitalization; and minority recruitment and retention.
- Equipment replacement funding totalling \$2 million.
- Special programmatic funding to bolster library collections in academic areas which have increased sharply in recent years without commensurate funding for library support.

TABLE 2
 FY 1988 OPERATING BUDGET REQUEST
 (Dollars in Thousands)

I. Continuing Components		
A. Compensation Improvement		\$33,682.0
1. Annualization of FY 1987 Increases	(\$ 3,336.7)	
2. FY 1988 Increment (7.0%)	(23,189.7)	
3. Fringe Benefits Improvements (2%)	(6,625.6)	
4. Medicare Costs	(530.0)	
B. General Price Increases (4.5%)		3,257.7
C. Utilities Price Increases (9.45%)		3,264.8
D. Library Price Increases (12.0%)		853.6
E. Support Unit Funding		3,566.4
1. O&M for New Areas	(\$ 1,566.4)	
2. O&M Preventive Maintenance	(1,000.0)	
3. Other Support Unit Improvements	(1,000.0)	
Subtotal, Continuing Components		\$44,624.5
% of FY 1987 Base*		(8.33%)
II. Programmatic Components		
A. Expanded/Improved Academic Programs		\$14,690.0
B. Equipment Replacement		2,000.0
C. Library Program Support		<u>600.0</u>
Subtotal, Programmatic Components		\$17,290.0
% of FY 1987 Base		(3.22%)
III. Resource Matching Requirements		\$ 2,120.0
% of FY 1987 Base		(0.40%)
IV. Special Services Funding		
A. County Board Matching		\$ 100.0
B. Fire Services Institute		49.3
C. Division of Services to Crippled Children		<u>250.0</u>
Subtotal, Special Service Funding		\$ 399.3
V. Subtotal		\$64,433.8
% of FY 1987 Base		(12.03%)
VI. Special Addendum, University of Illinois Hospital		\$10,000.0
VII. Grand Total		\$74,433.8
% of FY 1987 Base		(13.89%)

*FY 1987 Base = \$535,735.3

TABLE 3
 FY 1988 PROGRAM BUDGET REQUEST
 (Dollars in Thousands)

	<u>UIC</u>	<u>UIUC</u>	<u>CA</u>	<u>Total</u>
I. Scientific and Technological Advances				
1. Biotechnology	\$1,085.0	\$ 500.0		\$ 1,585.0
2. Artificial Intelligence/Cognitive Science		500.0		500.0
3. Surface Chemistry and Catalysis		160.0		160.0
4. Population Genetics		200.0		200.0
5. Biological and Medical Magnetic Resonance		250.0		250.0
6. Rehabilitation Engineering		100.0		100.0
7. Human Factors in Complex System Design		100.0		100.0
8. Environmental Toxicology		100.0		100.0
9. Responding to the Impact of an Aging Society	320.0			320.0
10. College of Medicine Clinical Program at Urbana-Champaign	125.0			125.0
11. Anatomical Sciences at the College of Medicine at Urbana-Champaign	90.0			90.0
Subtotal	\$1,620.0	\$1,910.0		\$ 3,530.0
II. Economic and Professional Development				
1. Commerce and Business Administration	\$ 600.0	\$ 315.0		\$ 915.0
2. Health Administration	150.0			150.0
3. Pacific/Asian Research Center	175.0			175.0
4. Imported Swine Genetic Research		250.0		250.0
5. College of Veterinary Medicine		750.0		750.0
6. College of Communications		100.0		100.0
7. Arms Control, Disarmament, and International Security		100.0		100.0
8. West European Studies		100.0		100.0
9. University Outreach			500.0	500.0
10. Institute for Government and Public Affairs			350.0	350.0
Subtotal	\$ 925.0	\$1,615.0	\$ 850.0	\$ 3,390.0
III. Promoting Instructional Excellence				
1. Undergraduate Education	\$1,050.0	\$1,000.0		\$ 2,050.0
2. Academic Computing	750.0	300.0		1,050.0
3. Campus Honors Program		140.0		140.0
4. Business, Technology and Society		200.0		200.0
5. Services to Elementary and Secondary Schools	190.0	100.0		290.0
Subtotal	\$1,990.0	\$1,740.0		\$ 3,730.0
IV. Engineering Revitalization	\$1,500.0	\$1,700.0		\$ 3,200.0
V. Minority Recruitment and Retention	\$ 305.0	\$ 535.0		\$ 840.0
VI. Equipment Replacement	\$1,000.0	\$1,000.0		\$ 2,000.0
VII. Library Improvements	\$ 300.0	\$ 300.0		\$ 600.0
TOTAL	\$7,640.0	\$8,800.0	\$ 850.0	\$17,290.0

- A total of \$2.1 million to provide maintenance and support for major computer gifts, along with the third of four required \$1 million increments for the National Center for Supercomputing Applications.
- Funding from special non-General Revenue Fund sources for the Cooperative Extension Service, and the Fire Services Institute, along with additional support for the Division of Services for Crippled Children.
- A special request for \$10 million in incremental support for the University of Illinois Hospital to recognize its continuing contributions to the health care needs of the medically indigent in Illinois and to assure the Hospital's continued ability to serve as a clinical setting for the education and training of health professionals.

Together, the regular components of the FY 1988 operating budget require incremental funding totaling \$64,433,800 or a 12% increase above the FY 1987 total operating budget from State funds of \$535,735,400. The special request for the University Hospital adds \$10 million to the FY 1988 incremental request. If all segments of the FY 1988 request were approved and funded, the University's FY 1988 operating budget would reach \$610,169,200--a 13.89 percent increase above FY 1987.

The Revenue Outlook for FY 1988

Making long-term revenue projections is difficult at any time. With prospective major changes in the Federal tax structure, strong efforts to begin to control Federal budget deficits, significant changes in major segments of the international economy such as the recent dramatic drop in oil prices, and a variety of other complex factors, forecasting potential FY 1988 revenues for Illinois is doubly difficult. Based on the FY 1987 experience, it is clear that Illinois' economy is not growing as rapidly as those in other parts of the nation. Weakness in the agricultural segment--a major component of Illinois' economic base--appears likely to continue, offsetting at least to some extent the growth experienced in other areas. While the risk of a serious downturn seems small at this point, continued slow growth appears more likely.

If a relatively slow growth pattern emerges for FY 1988, the State will once again be faced with difficult decisions about competing funding needs for a host of important social service programs. The commitment to educational improvement in Illinois remains strong and clear. It is

equally clear that additional funding must be found to continue the educational improvements now in progress. Yet it is seriously short-sighted to fund advances in one segment of Illinois human and social services at the expense of reductions in other segments of service. Illinois policymakers must find a way to provide sufficient revenue in FY 1988 to give fiscal support to the full range of social services which Illinois citizens deserve and expect, and which are necessary if Illinois is to maintain and improve its attractiveness to new businesses and industries.

The Enrollment Picture

As the number of high school graduates in Illinois continues its pattern of decline, concerns arise about corresponding enrollment decreases in higher education. On a statewide basis Illinois Board of Higher Education data show that headcount enrollment in all of Illinois higher education declined 6.5% between its peak in the fall of 1981, and the most current year for which data are available, the fall of 1985. Public university enrollments declined by about 1.5% and public community colleges by 12.5%, while private universities showed a 1.8% increase. University of Illinois enrollments were virtually constant, declining by .2% during the same period.

Overall, University of Illinois enrollments are expected to remain relatively stable over the next five years, as outlined in Table 4. Declines in the size of high school graduating classes in the City of Chicago do present some cause for concern about enrollment levels at the Chicago campus. Recent experience shows that while headcount enrollments remain relatively stable, some decline in the number of full-time equivalent students has taken place. That campus continues to attract a sizeable portion of its enrollment from a somewhat older age-group than the traditional 18-21 year old population, providing a broader range of potential students; but at the same time it is a group of students more likely to pursue an education on a part-time basis. Recent program funding improvements in the areas of engineering and business administration have enabled the campus to relax earlier enrollment restrictions in these areas, and strengthened efforts to recruit and retain minority students should also help to keep overall enrollment levels relatively stable.

TABLE 4
FALL TERM ON-CAMPUS HEADCOUNT ENROLLMENT
UNIVERSITY OF ILLINOIS

	Actual			Projected				
	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991
	HDCT	HDCT	HDCT	HDCT	HDCT	HDCT	HDCT	HDCT
<u>Chicago</u>								
Lower Division	7,889	7,762	7,932	7,850	7,850	7,850	7,850	7,850
Upper Division	8,020	8,459	8,232	8,150	8,150	8,150	8,150	8,150
Total Undergraduate	15,909	16,221	16,164	16,000	16,000	16,000	16,000	16,000
GI	2,858	2,735	2,833	2,850	2,850	2,850	2,850	2,850
GII	1,054	1,126	1,185	1,150	1,150	1,150	1,150	1,150
Total Graduate	3,912	3,861	4,018	4,000	4,000	4,000	4,000	4,000
<u>Total - Chicago</u>	19,821	20,082	20,182	20,000	20,000	20,000	20,000	20,000
<u>Health Sciences Center</u>								
Lower Division	225	138	104	90	90	90	90	90
Upper Division*	1,116	920	761	620	620	620	620	620
Total Undergraduate	1,341	1,058	865	710	710	710	710	710
Medicine	1,319	1,317	1,304	1,310	1,310	1,310	1,310	1,310
Dentistry	537	507	489	490	490	490	490	490
Dental Post Graduates	43	42	45	45	45	45	45	45
Pharm.D.								
Undergraduate Professional	0	129	244	355	475	475	475	475
Post-Graduate	14	25	18	45	45	45	45	45
Total Professional	1,913	2,020	2,100	2,245	2,365	2,365	2,365	2,365
GI*	591	629	629	630	630	630	630	630
GII	283	278	268	265	265	265	265	265
Total Graduate	874	907	897	895	895	895	895	895
Residents and Interns	586	621	723	750	750	750	750	750
Total (Excludes residents & interns)	4,128	3,985	3,862	3,850	3,970	3,970	3,970	3,970
<u>Total - Health Sciences Center</u>	4,714	4,606	4,585	4,600	4,720	4,720	4,720	4,720
<u>Urbana-Champaign</u>								
Lower Division	12,465	12,632	13,527	13,325	13,175	13,025	12,900	12,800
Upper Division	13,524	13,480	13,705	13,650	13,550	13,375	13,250	13,200
Total Undergraduate	25,989	26,112	27,232	26,975	26,725	26,400	26,150	26,000
Law	648	630	626	625	625	625	625	625
Veterinary Medicine	328	312	300	310	310	310	310	310
Total Professional	976	942	926	935	935	935	935	935
GI	3,421	3,374	3,582	3,550	3,500	3,500	3,500	3,500
GII	4,246	4,332	4,257	4,250	4,250	4,250	4,250	4,250
Total Graduate	7,667	7,706	7,839	7,800	7,750	7,750	7,750	7,750
<u>Total - Urbana-Champaign</u>	34,632	34,760	35,997	35,710	35,410	35,085	34,835	34,685
<u>GRAND TOTAL</u> - University of Illinois (Excludes residents and interns)	58,581	58,827	60,041	59,560	59,380	59,055	58,805	58,655
<u>GRAND TOTAL</u> - University of Illinois	59,167	59,448	60,764	60,310	60,130	59,805	59,555	59,405

*Excludes off-campus nursing students.

Enrollment for most programs at the Health Sciences Center has long been limited primarily by the amount of fiscal resources available, rather than by a lack of applicants for admission. Health professions enrollments are therefore likely to remain stable over the next five years. The Health Sciences Center data on Table 4 show a technical change in accounting for pharmacy students who now pursue the Doctor of Pharmacy degree and who had previously been classified as undergraduates.

Demand for admission to programs at the Urbana-Champaign campus continues to be very high. Enrollment levels have been constrained far more by resource limitations than by declines in well-qualified applicants. New efforts aimed at enhancing the diversity of the undergraduate student body by adding a slightly higher number of exceptionally well qualified students from outside the State are underway. A substantial enrollment increase (approximately 1,000) in undergraduate enrollment in FY 1986 is a temporary increase, and will be reduced over the course of the next several years. As at Chicago, recent funding improvements in engineering and commerce and business administration have made it possible to offset the effects of forced enrollment reductions required in these areas.

Overall headcount enrollments over the next five years are projected to be at 20,000 at the Chicago campus, excluding approximately 5,000 at the Health Sciences Center, and to gradually drop to approximately 34,500 at Urbana-Champaign.

General Background for the Development of the
FY 1988 Capital Budget Request

The need to address critical facilities deficiencies has grown during the past several years to the point that it is now near the very top of the University's overall budget priorities. Growth in academic programs supported with increasing amounts of State funds--particularly in engineering and the sciences--along with significant growth in research activity at both campuses has produced a substantial amount of program-related expansion over the past four years. In addition, well more than a decade of underfunding of capital projects supporting renovation, repair, and remodeling activities has brought the level of accumulated facility deficiency, for the University as a whole, to \$600 million in FY 1986.

The nature and scope of the University's facilities problems derive principally from two separate but related areas: on the one hand, the structural integrity of existing facilities including the campus-wide utilities systems which support them, must be assured. On the other hand, the capacity and configuration of academic facilities must be adequate to support a changing mix of academic programs as well as constantly changing emphases within existing programs. New knowledge and technology is evolving at an accelerating pace, particularly in laboratory sciences and engineering. To remain current with instructional and research activities, let alone to work at the forefront of knowledge development, requires frequent modification or upgrading of facilities and of support systems. The use of sophisticated equipment for teaching and research, often requiring specialized environmental controls, also demands space renovation. And those programs which are not faced with rapid changes in the state-of-the-art technologies are confronted with the inevitable need for refurbishing aging facilities. The cumulative effects of more than a decade of operating budget deficiencies have produced a significant backlog of deferred maintenance projects.

Activity is underway at both campuses to not only satisfy the immediate critical needs for additional or upgraded space but to generate a plan that will solve the longer term needs for remodeled or additional facilities. The Building Condition Audit, completed a year ago for both campuses, provides an invaluable tool that helps determine which facilities can be renovated and which need to be replaced. Furthermore, when space

FISCAL YEAR 1988 OPERATING BUDGET REQUEST

realignment is required to meet changing academic program needs, the Audit also helps to determine what structural deficiencies should be corrected at the same time.

During the past year, the Urbana-Champaign campus has begun a major long-term capital master planning and land use study which will serve the campus into the next century. Preliminary work for a similar effort is underway for the Chicago campus as well.

While these building condition study and planning efforts are critical to any effective upgrading of the facilities which support the University's academic programs, the most exciting and encouraging signs that progress is being made revolves around a substantial increase in facilities funding from State, Federal, and private sources. On the State side, FY 1986 brought capital appropriations of nearly \$47 million and was hailed as the best year for facilities improvements in two decades. Yet FY 1987 capital appropriations reached more than \$75 million for the Chicago and Urbana-Champaign campuses, and provided another \$3.56 million as part of a major construction effort at Willard Airport. Most significant of all, the University's FY 1987 capital appropriations provide construction funds for three new facilities: additions to the Digital Computer Laboratory and the Animal and Dairy Science Laboratory at Urbana-Champaign, and a new engineering research laboratory at Chicago. Together these three major new facilities will provide approximately 160,000 assignable square feet of critically needed space for growing academic programs.

Total State appropriations for the University's capital projects for FY 1987 include the following:

FY 1987 State Appropriations For Capital Projects

<u>Project</u>	<u>Campus</u>	<u>Amount</u> <u>(\$Thousands)</u>
Engineering Research Facility	Chicago	\$22,499.9
Energy Conservation	Chicago	286.4
DCL Addition	Urbana	17,417.7
Utilities Upgrade	Urbana	9,410.0
Motor Pool Relocation	Urbana	1,990.0
R & R Program, Year 2	Both	7,834.0
Animal & Dairy Sciences Addn.	Urbana	14,500.0
Incinerator Pollution Control	Urbana	800.0
Willard Airport	Urbana	<u>3,560.0</u>
TOTAL		\$78,307.7

Two projects, the Animal and Dairy Science Addition and the second year of the R & R Program, are included in the Build Illinois program, which has yet to be formally acted upon by the Governor. Since both projects were included in the Governor's original budget, it is expected that he will approve them. All other appropriations have been signed by the Governor.

In addition to these significant State appropriations the Urbana-Champaign campus attracted major resources for facilities from other sources during the past year. The Federal government has announced plans to construct a \$30 million USDA Biotechnology facility at Urbana-Champaign, and has already provided \$3 million to begin planning activities: The remaining \$27 million is currently included in the Federal FY 1987 budget that is still under review in the Congress.

In a truly remarkable act of generosity, the University received a gift of \$40 million from Dr. and Mrs. Arnold M. Beckman to construct the Beckman Institute for Advanced Science and Technology. Matched by a \$10 million appropriation from the State of Illinois in the fall of 1985, planning activities for the Beckman Institute have been pursued vigorously, to the point that construction is set to begin late in 1986.

Together, these capital resources provide for a truly significant amount of activity--yet that total represents only about one-third of the deficiency amount identified in the Building Condition Audit. As exciting and encouraging as the recent flurry of facilities activity has been, the University's overall capital requirements must be viewed in a long-term context. Major building deficiencies continue to exist, especially for the laboratory sciences: the clinical sciences at Chicago, the life and environmental sciences at Urbana-Champaign; and chemistry at both campuses, to name only the most prominent. Serious deficiencies remain in key utilities support structures at both campuses; major remodeling projects at both locations require multiple phases to complete; and new land acquisition needs have emerged from the long-range work of campus master planners.

Table 5 provides a detailed listing of the University's most important capital projects for FY 1988 in priority order. The list totals \$57.8 million in regular capital projects--almost precisely what the University

received in FY 1986 when the matching funds for the Beckman Institute are added to the regular capital budget approved earlier--and well below the FY 1987 amount. The Capital Budget section of this document outlines each project in detail.

Meeting the full range of the University's comprehensive capital needs will require sustained support for perhaps a decade. Recent initiatives such as the repair and renovation program supported through Build Illinois, the major construction projects which can be undertaken with FY 1987 State appropriations, private gifts, and projected Federal funding all provide encouraging opportunities to begin the attack on crucial facilities needs at both campuses. Continuing that progress for FY 1988, especially by including planning funds to assure multi-year attention to those long-standing and severe needs is near the top of the University's most critical budget requirements for FY 1988.

TABLE 5
UNIVERSITY OF ILLINOIS
FY 1988 CAPITAL REQUEST
PRIORITY LIST
(Dollars in Thousands)

Priority	Campus	Project	Budget Category	FY 1988 Request	Cumulative Cost		
					University	Chicago	Urbana
1	C	Clinical Sciences Building	REMD	\$ 7,883.0	\$ 7,883.0	\$ 7,883.0	
2	U	Life Sciences Research Lab	PLAN	1,800.0	9,683.0		\$ 1,800.0
3	U	Utility Infrastructure Upgrade	UTIL	3,689.0	13,372.0		5,489.0
4	C	Art and Architecture Building Addition	PLAN	667.0	14,039.0	8,550.0	
5	U	Campus Land Acquisition	LAND	1,500.0	15,539.0		6,989.0
6	U	Environmental Sciences Building	REMD/EQUIP	4,250.0	19,789.0		11,239.0
7	C	Alumni Hall (Phase 2)	REMD	4,024.0	23,813.0	12,574.0	
8	U	Noyes Lab Remodeling	PLAN	200.0	24,013.0		11,439.0
9	U	English Building Remodeling (Phase 3)	REMD	3,360.0	27,373.0		14,799.0
10	C/U*	Administrative Computing Elec. Improvements	UTIL	1,919.0	29,292.0	14,493.0	
11	C	Associated Health Professions	REMD	3,900.0	33,192.0	18,393.0	
12	U	WILL Radio & TV Building	BLDG	10,350.0	43,542.0		25,149.0
13	C	Engineering Science Library Addition	PLAN	425.0	43,967.0	18,818.0	
14	U	Federal Research Facility	SITE/EQUIP	1,275.0	45,242.0		26,424.0
15	C	Remodel College of Medicine West (Phase 1)	PLAN	414.0	45,656.0	19,232.0	
16	U	New Commerce Building	PLAN	1,500.0	47,156.0		27,924.0
17	C	HSC Campus Emergency Distribution	UTIL	1,190.0	48,346.0	20,422.0	
18	U	Vet Med Basic Sciences Building Remodeling	PLAN	250.0	48,596.0		28,174.0
19	U	Campus Landscape Improvements	SITE	150.0	48,746.0		28,324.0
20	U	Sanitary Sewer System Upgrade	PLAN	90.0	48,836.0		28,414.0
21	C	Remodel Pharmacy Building	REMD	2,111.0	50,947.0	22,533.0	
22	U	Art Painting and Pottery Lab	BLDG	662.0	51,609.0		29,076.0
23	U	Nuclear Physics Lab Addition	PLAN	350.0	51,959.0		29,426.0
24	C	Upgrade Campus Fire Alarm System	UTIL	794.0	52,753.0	23,327.0	
25	U	Mechanical Engineering Building Remodeling	REMD	2,950.0	55,703.0		32,376.0
26	C	College of Business & Continuing Educ. Bldg.	PLAN	850.0	56,553.0	24,177.0	
27	U	Main Library Remodeling	PLAN	160.0	56,713.0		32,536.0
28	U	Outdoor Instructional/Rec. Facilities	SITE	85.0	56,798.0		32,621.0
29	U	Pilot Training Facility	BLDG/UTIL	932.8	57,730.8		33,553.8
30	U	Campus Police Building	PLAN	90.0	57,820.8		33,643.8
Build Illinois Requests							
**	C/U	Repair & Renovation Program (Phase 3)	REMD	7,834.0			
**	U	Completion, Animal/Dairy Science	BLDG/REMD	1,998.1			

*Because this project serves the needs of both the Chicago and Urbana-Champaign campuses, the cost may be applied on an equal basis to both. For the purpose of this table, the entire project cost will be included under Chicago.

**Build Illinois projects are non-prioritized.

INTRODUCTION

Table 6 presents an historical summary of Board of Trustees Operating Budget Requests from FY 1975 through FY 1987. As discussed in the previous section, FY 1987's increment of \$28.2 million will permit the progress achieved in recent years to continue, but it nevertheless is appreciably below the funding level the University would have achieved if the Governor's Budget or General Assembly approved amounts could have been sustained. Even with the reduced level of funding achieved in FY 1987, the average annual growth rate for operating budget appropriations since FY 1984 has been nearly 8.5%--a strong measure of support for the University.

The FY 1988 Operating Budget Request includes four major sections: Continuing Components -- those activities necessary to maintain the University's current level of operations; Programmatic Components -- those new, expanded or improved academic initiatives which will enable the University to better respond to the demands for its services; Resource Matching Requirements -- funding required to support and maintain equipment which the University has received from Federal or private sources; and Special Services/Special Funding -- those activities carried out at the University through special mandate from the State of Illinois, often with special funding provisions. For FY 1988, a special request for incremental support for the University of Illinois Hospital is also included.

In addition, two appendices are included. One discusses FY 1988 retirement funding requirements while the other provides technical information used to compute specific incremental amounts for continuing component categories. Tables 7 and 8 outline the entire FY 1988 request.

TABLE 6
UNIVERSITY OF ILLINOIS
History of the Operating Budget Action FY 1975 - FY 1987
(Dollars in Thousands)

Fiscal Year	Previous Year's Base ¹	University Request	IBHE Recommend.	Allocation of Gov. Budget	Legislative Action	Governor's Action	Final	% Final of Prev. Year's Base	% Final of Univ. Request
FY 1975	\$198,381.5	\$22,800.2	\$16,743.0	\$ 0.0	\$27,523.0	\$20,043.0	\$20,043.1	10.1	87.9
FY 1976	218,424.5	32,343.5	23,899.4	0.0	29,375.8	16,950.7	16,950.7	7.8	52.4
FY 1977	235,375.5	26,780.3	21,233.3	10,064.5	15,950.7	10,172.5	14,644.3	6.2	54.7
FY 1978	250,019.4	31,036.0	23,305.4	16,551.6	17,423.0	15,906.3	15,906.3	6.4	51.3
FY 1979	265,925.8	34,106.6	26,415.5	24,568.1	24,799.6	24,755.6	24,755.6	9.3	72.6
FY 1980	290,681.4	37,473.3	28,320.4	27,550.8	31,279.3	31,279.3	32,188.6 ²	11.1 ²	85.9
FY 1981	321,158.3 ³	41,086.4 ⁴	33,830.6	32,391.9	34,688.3	32,391.9	32,391.9	10.1	78.8
FY 1982	353,550.3	47,995.7	41,307.8	28,164.6 ⁵	28,164.6	28,164.6	28,334.6 ⁶	8.0	59.0
FY 1983	381,884.9	48,733.5	34,627.5	3,935.7	9,622.5 ⁷	7,976.2 ⁷	7,976.2 ⁷	2.1	16.4
FY 1984	389,861.2	61,587.8	43,695.0	(1,941.6)	43,427.8	43,427.8	44,427.8 ⁸	11.4	72.1
FY 1985	433,288.9 ⁹	58,580.2	35,675.4	24,989.3	30,429.3	30,429.3	31,074.3 ¹⁰	7.2	53.0
FY 1986	464,718.2 ¹¹	52,088.7	48,269.0	43,936.2	42,857.3	42,857.3	42,857.3	9.2	82.3
FY 1987	507,575.5	63,573.2	51,235.1	41,681.8	38,089.5	28,151.9	28,151.9 ¹²	5.5	44.2

¹Excludes Retirement and IBA.

²Includes non-recurring funds of \$401.0 for flood damages and \$508.3 for the Division of Services for Crippled Children override; percentage without these funds is 10.8%.

³Excludes non-recurring funds of \$401.0 for flood damage and \$508.3 for DSCC override. FY 1981 funding no longer includes an appropriation of \$802.4 for Refunds.

⁴BOT printed request of \$40,445.4 plus DSCC price and salary increases of \$641.0

⁵Represents amount in Governor's Revised Budget. Governor's original recommendation was \$28,563.3.

⁶Includes and additional \$170.0 appropriated to the University from Real Estate and Education Fund in HB 774.

⁷Excludes \$1,000.0 for lease/purchase of Chicago Medical School facility.

⁸Excludes \$1,000.0 for operation of Chicago research and technology facility.

⁹Base does not include \$1,000.0 for operation of Chicago technology facility, since it was non-recurring.

¹⁰Includes non-recurring funds of \$645.0 for fire damage.

¹¹Includes non-recurring funds of \$645.0 for fire damage. Includes \$1,000.0 for Supercomputing Research.

¹²Includes \$500.0 for the Prairie State Games and \$620.0 for Medicare Costs.

TABLE 7
 FY 1988 OPERATING BUDGET REQUEST
 (Dollars in Thousands)

I.	Continuing Components		
	A. Compensation Improvement		\$33,682.0
	1. Annualization of FY 1987 Increases	(\$ 3,336.7)	
	2. FY 1988 Increment (7.0%)	(23,189.7)	
	3. Fringe Benefits Improvements (2%)	(6,625.6)	
	4. Medicare Costs	(530.0)	
	B. General Price Increases (4.5%)		3,257.7
	C. Utilities Price Increases (9.45%)		3,264.8
	D. Library Price Increases (12.0%)		853.6
	E. Support Unit Funding		3,566.4
	1. O&M for New Areas	(\$ 1,566.4)	
	2. O&M Preventive Maintenance	(1,000.0)	
	3. Other Support Unit Improvements	(1,000.0)	
	Subtotal, Continuing Components		\$44,624.5
	% of FY 1987 Base*		(8.33%)
II.	Programmatic Components		
	A. Expanded/Improved Academic Programs		\$14,690.0
	B. Equipment Replacement		2,000.0
	C. Library Program Support		<u>600.0</u>
	Subtotal, Programmatic Components		\$17,290.0
	% of FY 1987 Base		(3.22%)
III.	Resource Matching Requirements		\$ 2,120.0
	% of FY 1987 Base		(0.40%)
IV.	Special Services Funding		
	A. County Board Matching		\$ 100.0
	B. Fire Services Institute		49.3
	C. Division of Services to Crippled Children		<u>250.0</u>
	Subtotal, Special Service Funding		\$ 399.3
V.	Subtotal		\$64,433.8
	% of FY 1987 Base		(12.03%)
VI.	Special Addendum, University of Illinois Hospital		\$10,000.0
VII.	Grand Total		\$74,433.8
	% of FY 1987 Base		(13.89%)

*FY 1987 Base = \$535,735.3

TABLE 8
 FY 1988 PROGRAM BUDGET REQUEST
 (Dollars in Thousands)

	<u>UIC</u>	<u>UIUC</u>	<u>CA</u>	<u>Total</u>
I. Scientific and Technological Advances				
1. Biotechnology	\$1,085.0	\$ 500.0		\$ 1,585.0
2. Artificial Intelligence/Cognitive Science		500.0		500.0
3. Surface Chemistry and Catalysis		160.0		160.0
4. Population Genetics		200.0		200.0
5. Biological and Medical Magnetic Resonance		250.0		250.0
6. Rehabilitation Engineering		100.0		100.0
7. Human Factors in Complex System Design		100.0		100.0
8. Environmental Toxicology		100.0		100.0
9. Responding to the Impact of an Aging Society	320.0			320.0
10. College of Medicine Clinical Program at Urbana-Champaign	125.0			125.0
11. Anatomical Sciences at the College of Medicine at Urbana-Champaign	90.0			90.0
Subtotal	\$1,620.0	\$1,910.0		\$ 3,530.0
II. Economic and Professional Development				
1. Commerce and Business Administration	\$ 600.0	\$ 315.0		\$ 915.0
2. Health Administration	150.0			150.0
3. Pacific/Asian Research Center	175.0			175.0
4. Imported Swine Genetic Research		250.0		250.0
5. College of Veterinary Medicine		750.0		750.0
6. College of Communications		100.0		100.0
7. Arms Control, Disarmament, and International Security		100.0		100.0
8. West European Studies		100.0		100.0
9. University Outreach			500.0	500.0
10. Institute for Government and Public Affairs			350.0	350.0
Subtotal	\$ 925.0	\$1,615.0	\$ 850.0	\$ 3,390.0
III. Promoting Instructional Excellence				
1. Undergraduate Education	\$1,050.0	\$1,000.0		\$ 2,050.0
2. Academic Computing	750.0	300.0		1,050.0
3. Campus Honors Program		140.0		140.0
4. Business, Technology and Society		200.0		200.0
5. Services to Elementary and Secondary Schools	190.0	100.0		290.0
Subtotal	\$1,990.0	\$1,740.0		\$ 3,730.0
IV. Engineering Revitalization	\$1,500.0	\$1,700.0		\$ 3,200.0
V. Minority Recruitment and Retention	\$ 305.0	\$ 535.0		\$ 840.0
VI. Equipment Replacement	\$1,000.0	\$1,000.0		\$ 2,000.0
VII. Library Improvements	\$ 300.0	\$ 300.0		\$ 600.0
TOTAL	\$7,640.0	\$8,800.0	\$ 850.0	\$17,290.0

CONTINUING COMPONENTS

SALARY AND BENEFIT INCREASES
(\$33,682,000)

The salary and fringe benefits program of the University of Illinois has a direct impact on the University's ability to attract, retain, and reward highly qualified faculty and staff. To compete successfully in the external markets for academic and nonacademic employees, the University must support the quality of its academic programs, as well as ensure that the University maintains a competitive position relative to peer institutions who seek equally well qualified faculty and staff. Erosion in the competitiveness of salaries, or of fringe benefits, can increase the number of talented employees who accept more attractive offers at other institutions or in the private sector; it can reduce the ability of the University to attract the best qualified candidates to new or vacant positions; and it can reduce the productivity and morale of current staff.

The overall quality of the University's academic programs, as measured by several national assessments, place it among the top three Big Ten institutions; and the University has set that target as a minimum objective for its faculty compensation program. The quality and accomplishments of University of Illinois faculty and staff are widely acknowledged and the University must work diligently to sustain this reputation. Similarly, the University must work to improve its nonacademic salary and benefits programs to achieve a competitive position in the local markets for nonacademic employees.

To evaluate the compensation program available to faculty and staff, compensation must be viewed as a package consisting of both direct cash salary and fringe benefits components. Clearly, those employees who the University seeks to attract and retain view the competitiveness of the University's compensation program in terms of both components. Although direct cash salary is the central, most visible element within the compensation program, fringe benefits are essential in completing the compensation package. As the competition for top-ranked faculty and staff has intensified over the past several years, all elements of the compensation package have come under close scrutiny.

While the University participates in various comparative analyses to evaluate its ranking in terms of cash salaries, the competitiveness of the fringe benefits program is more difficult to assess. The adequacy of the fringe benefits program varies based somewhat on each individual's unique financial situation and personal need for benefits. Employees assess the competitiveness of the fringe benefits program on the basis of both the amount of the employer's contribution to the cost of fringe benefits and the benefit coverage provided. The adequacy of the employer's contribution is judged not only on the amount contributed by the employer, but also the amount which the employee must contribute to purchase the provided coverage. Benefit coverage is assessed through comparisons of various benefit limits including allowable services, maximum benefits, deductibles, and required out-of-pocket expenses. To maintain a competitive benefits program, the University must give sufficient attention to all of these program elements.

In general, fringe benefits programs vary between employers in the specific coverages offered, and it is difficult to quantitatively assess the value of these coverages. Consequently, the amount of the employer's contribution to fringe benefits is most often used to measure differences among programs. Fringe benefit comparisons are commonly made among the basic elements of the fringe benefits package. While most market competitors offer a variety of supplemental benefits, a core of basic coverages is generally offered in all university benefits plans. It is this core of basic coverages which is most often used for comparison purposes. The fringe benefits most often included in comparative analyses are the employer's contribution to life, health, dental, and disability insurance and contributions to the institution's employee retirement plan.

To assess the University's competitive standing, numerous salary and compensation analyses are performed annually to determine the University's overall ranking among its peers. Due to the varied nature of the University workforce, separate analyses are performed for academic and nonacademic staffs. Cash salary and employer contributions to fringe benefits for academic employees are assessed through comparisons with Big Ten and other peer institutions, while nonacademic salary and benefits comparisons are made with appropriate employee groups outside the University. Compensation analyses are conducted separately for the central

element of salaries, and for overall compensation, as described in the following sections.

Faculty Salaries

In recent years, the University of Illinois has made progress toward achieving the goal of third place among Big Ten institutions in average cash salary. The following table displays the University's average cash salary relative to third place in the Big Ten for FY 1979 through FY 1986. Salaries displayed represent nine-month salaries for full-time budgeted faculty, and are for all academic ranks combined, weighted to the University of Illinois' distribution of faculty by rank and term of appointment.

University Average Salary Relative
To Third Place In The Big Ten

<u>Fiscal Year</u>	<u>Illinois</u>	<u>Third Place</u>	<u>Dollar Difference</u>	<u>Percent Difference</u>
FY 1979	\$23,249	\$23,676	\$ 427	1.8%
FY 1980	25,187	25,485	298	1.2
FY 1981	27,592	28,018	426	1.5
FY 1982	30,171	31,021	850	2.8
FY 1983	31,640	33,733	2,093	6.6
FY 1984	34,563	36,048	1,485	4.3
FY 1985	37,050	38,654	1,604	4.3
FY 1986	40,235	41,262	1,027	2.6

(It should be noted that the average salaries shown above for FY 1982 and FY 1983 have been adjusted to represent rate increases in effect during those years rather than actual cash increases. Due to a mandated reduction of \$8 million in the University's budget base in FY 1983, staff reductions and a delay in the implementation of the annual salary increase were required. Although the average salary rate for budgeted full-time faculty increased by 4.9% in that year, the actual cash increase received by University employees amounted to only 1.2%.)

In FY 1986, the University of Illinois continued to lag behind third place by 2.6%, an improvement over the 4.3% gap experienced in FY 1985. While a substantial gain over the FY 1983 gap of 6.6%, the University continues to find itself farther behind third place than in the years preceding FY 1982 when the percent gap was less than 2%.

Figure 2 displays the FY 1986 ranking of Big Ten faculty salaries graphically. Note that while the top three institutions are rather closely clustered, the University of Illinois' fourth place position lags below the top cluster. It is critically important for the University to close the salary gap to the top institutions, as well as to achieve a specific ranking within the Big Ten. Should the top two institutions move significantly above the rest, the University's competitive position would be damaged, regardless of whether a third place ranking had been achieved. In recent years, the University has been successful in its efforts to improve faculty salaries. Yet those institutions with which the University must compete have also been successful in increasing their salaries as well, intensifying the pressure for maintaining competitive faculty salaries.

Table 9 displays average salaries of faculty at the Big Ten institutions for FY 1985 and FY 1986. All salaries are displayed on a nine-month basis for all ranks combined, and are weighted to the distribution of faculty rank and term of appointment at the University of Illinois. Additionally, the relative ranking of each Big Ten institution is displayed, as well as the percent increase in weighted average cash salary.

As mentioned above, the University of Illinois continued to rank in fourth place in FY 1986. While the University received an overall increase in average salary of 8.6%, the other Big Ten institutions averaged a 7.0% increase in that year. Salary increases at the top three institutions averaged 7.2%, allowing the University of Illinois to close the gap to third place by approximately two percent. The University's 8.6% increase included incremental state funds for salary increases of 8.0% (calculated on 95% of the Personal Services base). Also a special salary increment was provided from Special Engineering Program funds for faculty in the Colleges of Engineering, and those funds resulted in increases averaging an additional 2% for Engineering faculty.

The FY 1987 appropriation provides for a general salary increase program which will include a 5.5% increment (calculated on 92.5% of the Personal Services Base). This increase should result in an overall salary increase of about 5% for most disciplines. The FY 1987 appropriation also includes funding for the fourth year of the Special Engineering Program. Within these funds are salary enhancement dollars which will permit the Colleges of Engineering to supplement annual salary increases so as to

FIGURE 2

FY 1986 AVERAGE SALARY AMONG BIG TEN UNIVERSITIES

WEIGHTED AVERAGE SALARY

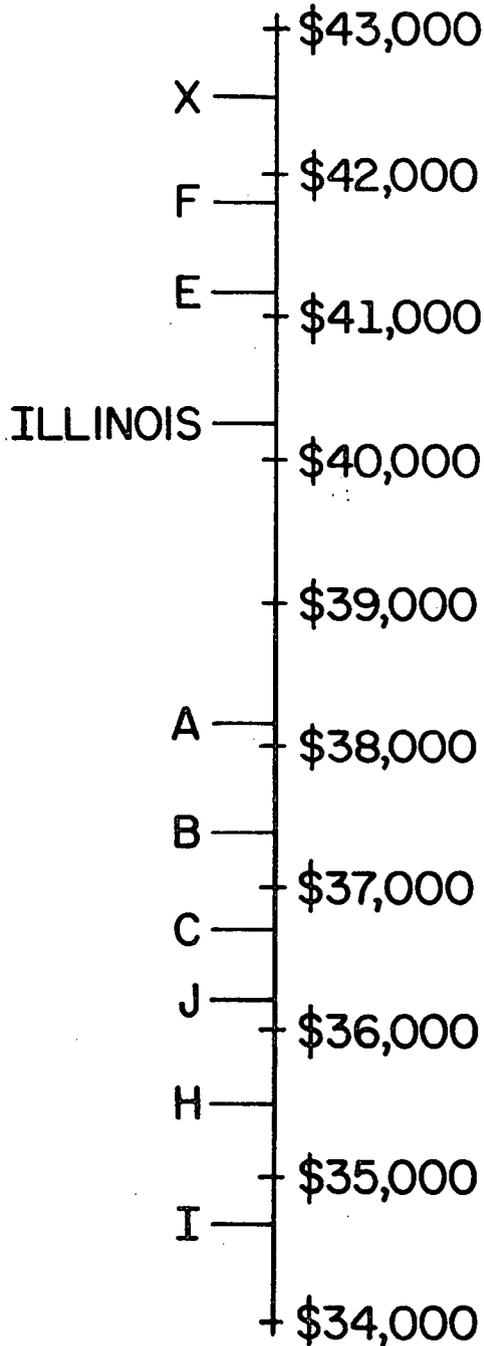


TABLE 9
AVERAGE SALARIES FY 1985 - FY 1986
BIG TEN INSTITUTIONS

(9-month basis)

<u>Institution</u>	<u>FY 1985 Weighted Average Salary</u>	<u>Rank</u>	<u>FY 1986 Weighted Average Salary</u>	<u>Rank</u>	<u>Percent Increase</u>
ILLINOIS	\$37,050	4	\$40,235	4	8.6%
I	31,922	10	34,683	10	8.6
C	36,085	5	36,697	7	1.7
F	38,862	2	41,819	2	7.6
H	33,428	8	35,496	9	6.2
A	35,434	6	38,168	5	7.7
X	39,584	1	42,531	1	7.4
E	38,654	3	41,262	3	6.7
B	35,389	7	37,388	6	5.6
J	32,304	9	36,245	8	12.2
MEAN	\$35,871		\$38,452		7.2%
MEAN LESS ILLINOIS	\$35,740		\$38,254		7.0%

Source: University of Minnesota Comparison of Average Salaries and Fringe Benefits.

Data represents total institutions' full-time faculty, excluding clinical departments, whose primary responsibilities are teaching, research or public service. Weighted to the distribution of faculty rank and term of appointment at the University of Illinois.

Distances to 3rd Place--Average Salaries

	<u>FY 1985</u>	<u>FY 1986</u>
ILLINOIS	\$37,050	\$40,235
3rd Place	\$38,654	\$41,262
\$ Difference	\$ 1,604	\$ 1,027
% Difference	4.3%	2.6%

maintain a competitive position in the specialized markets in which they must compete.

Current information indicates that FY 1987 salary increases at the other Big Ten institutions will average approximately 6%, and, based on preliminary data, the University's salary ranking is not expected to change from fourth place. The gap to third place could well be reduced, although the precise size of the gap cannot be calculated until further information on FY 1987 salaries by faculty rank is received from the other Big Ten institutions.

Salary increases tied to inflation projections of 5% represent the best current estimate of FY 1988 salary increases for the other Big Ten institutions. An increment of this magnitude plus an additional 2% to reduce the gap to third place represents the University of Illinois' assessment of the salary increase funding needs for FY 1988.

Faculty Fringe Benefits

While the University has made progress toward closing the gap to third place in terms of average cash salary, the distance to third place is greater in terms of total compensation. Table 10 compares the University's ranking among Big Ten institutions for FY 1986 based on weighted average salary and weighted average compensation. Weighted average compensation is calculated by adding the dollar value of the employer's contribution to fringe benefits to weighted average cash salary. The employer's contribution to fringe benefits is also displayed as a percent of average salary.

Although the University ranked fourth among Big Ten institutions in average cash salary in FY 1986, its average faculty compensation ranked eighth. The gap to third place in total compensation was 9.6%. In the years from FY 1979 through FY 1986, the University of Illinois has continually ranked poorly compared to other Big Ten institutions, ranking no higher than seventh place in total compensation. Some progress was made towards improving its position in the years from FY 1980 to FY 1982, moving from ninth place in FY 1980 to seventh place in FY 1982. This progress was accomplished solely through improvements to the cash salary component, rather than any changes to the fringe benefits program. However, due to the State's fiscal crisis in FY 1983, the University's ranking fell sharply

TABLE 10
 AVERAGE COMPENSATION FY 1986
 BIG TEN INSTITUTIONS

(9-month basis)

<u>Institution</u>	<u>FY 1986 Weighted Average Salary</u>	<u>Rank</u>	<u>FY 1986 Weighted Average Compensation</u>	<u>Rank</u>	<u>Benefits as a Percent of Average Salary</u>
ILLINOIS	\$40,235	4	\$44,678	8	11.0%
I	34,683	10	43,973	9	26.8
C	36,697	7	44,764	7	22.0
F	41,819	2	50,937	1	21.8
H	35,496	9	43,910	10	23.7
A	38,168	5	47,788	4	25.2
X	42,531	1	50,778	2	19.5
E	41,262	3	48,983	3	18.7
B	37,388	6	46,817	5	25.2
J	36,245	8	45,379	6	25.2
MEAN	\$38,452		\$46,801		21.7%
MEAN LESS ILLINOIS	\$38,254		\$47,036		23.0%

Source: University of Minnesota Comparison of Average Salaries and Fringe Benefits.

Data represents total institutions' full-time faculty, excluding clinical departments, whose primary responsibilities are teaching, research and public service. Weighted to the distribution of faculty rank and term of appointment at the University of Illinois.

Distances to 3rd Place--Average Compensation

	<u>FY 1985</u>	<u>FY 1986</u>
ILLINOIS	\$41,793	\$44,678
3rd Place	45,512	48,983
\$ Difference	3,719	4,305
% Difference	8.9%	9.6%

to fifth place in average cash salary and tenth place in total compensation. Increased efforts in the years from FY 1984 to FY 1986 to improve faculty salaries helped to improve the University's total compensation position, and its ranking moved from tenth place in FY 1983 to eighth place in FY 1984 and seventh place in FY 1985. In FY 1986, the University's ranking again fell to eighth place as a result of substantial improvements in the average cash salary at one of the lower ranked institutions.

Figure 3 displays the University's relative position in both average cash salary and total compensation for faculty members. Note that while most other institutions retain the same competitive position in the total compensation comparisons as in the salary comparisons, the University of Illinois' position drops dramatically. In the compensation comparisons, it is clear that the top two institutions are significantly ahead of the others. It is equally clear that the University of Illinois is clustered near the bottom of the rankings, rather than in the lower range of the top ranked institutions, as in the salary comparisons. The University's low ranking in the amount of its employer contribution to fringe benefits substantially weakens its competitive standing in terms of total compensation.

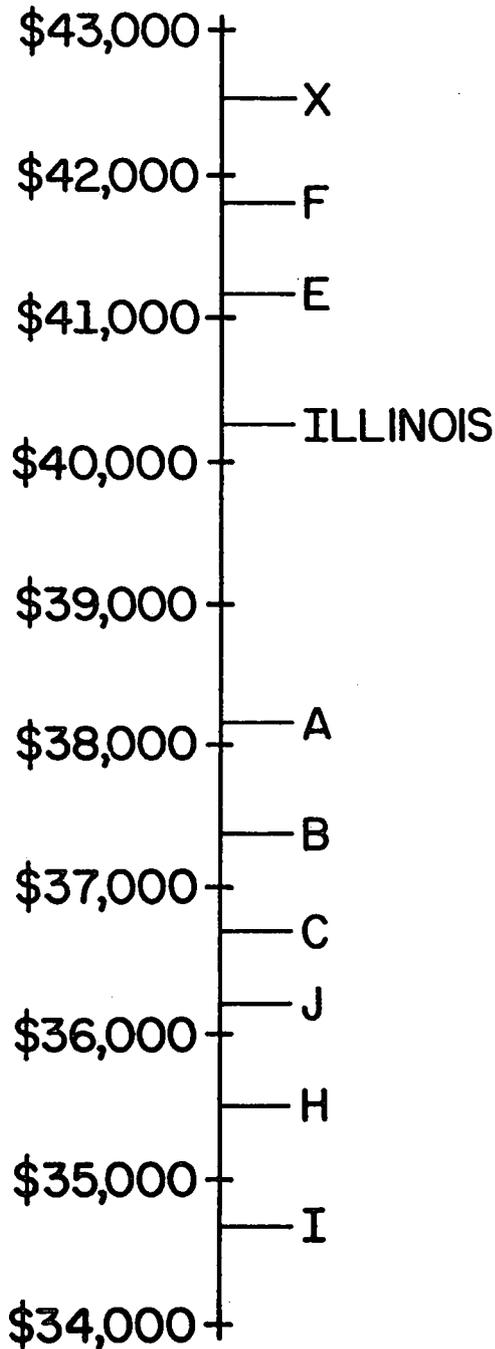
Again, the total compensation figures in Table 10 and Figure 3 represent the combination of average cash salaries and employer contributions to a set of common fringe benefits. When the latter category is separated from salaries, and fringe benefit contributions are reviewed on their own, the University of Illinois data are even more dismal. For FY 1986, the University ranked last in the percent of average salary contributed to fringe benefits, contributing only 11% compared to employer contributions averaging over 22% for other Big Ten institutions. While some of this difference is attributable to the fact the University does not participate in Social Security, the University also lags behind other Big Ten institutions in the amount paid for other elements of the fringe benefits package.

A recent comparison of FY 1986 employer contributions to fringe benefits in the Big Ten yielded the following information.

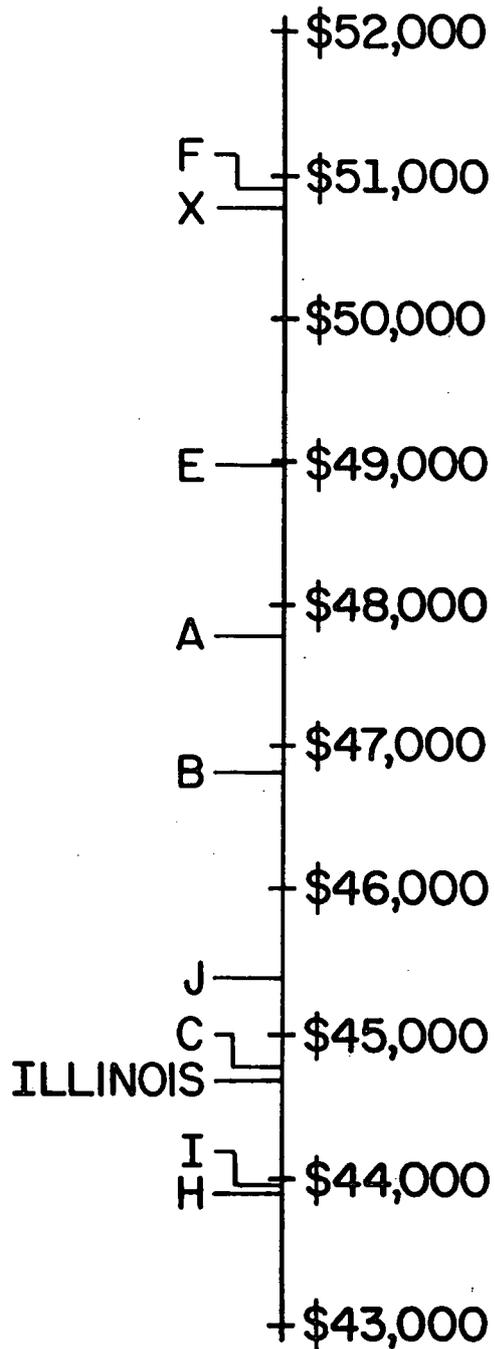
FIGURE 3

FY 1986 AVERAGE SALARY & COMPENSATION AMONG BIG TEN UNIVERSITIES

WEIGHTED AVERAGE SALARY



WEIGHTED AVERAGE COMPENSATION



1. The University of Illinois is one of two Big Ten institutions not participating in Social Security and ranks last in overall employer contributions to dependent health insurance.
2. The University of Illinois is competitive in regard to employer contributions to employee health insurance, but ranks last in employer contributions to dependent health insurance.
3. The University of Illinois ranks last in the amount of employer-paid life insurance.
4. The University of Illinois ranks last in the percent of salary ensured under the long term disability plan.
5. Six of the Big Ten institutions pay some portion of the premium cost of dental insurance for employees and dependents. The University of Illinois currently offers no employer-paid dental coverage to its employees.
6. Five of the Big Ten institutions grant a partial reduction in tuition and fees to staff dependents. The University of Illinois offers no tuition waiver of any kind for dependents of employees.

The University's low ranking in the amount of its employer contribution to fringe benefits substantially weakens its competitive standing in terms of faculty compensation. To be competitive, the fringe benefits package offered by the University must not detract from the salary component which is beginning to reach an appropriate level. A recent survey of University faculty and staff indicated that they do indeed recognize that the University's fringe benefits program is deficient, compared with fringe benefits offered by peer institutions. The widely held perception that the fringe benefits program at the University of Illinois is deficient in certain basic but essential areas is borne out by the comparative data just cited. It has become clear that the University must address the adequacy of its fringe benefit program if it is to continue to compete successfully for top faculty members.

Nonacademic Salary Comparisons

For nonacademic staff, annual salary comparisons are normally made with employers outside the University who are most competitive for the services of that staff. In some cases, comparisons are made with local employers; in other cases, broader comparisons are made if the market for particular employee skills is statewide or greater. The composite survey

of the market, which compares the salary range midpoints for comparable employment levels, is incomplete at this time. However, preliminary market data show increases ranging from three to six percent depending upon the assumed markets for the wide range of employee groups.

The data in the table below compare selected University of Illinois grade midpoints with estimated market midpoints.

University Of Illinois Grade Midpoints
Compared To Market Midpoints

<u>Grade/ Location</u>	<u>UI FY 1986 Midpoint</u>	<u>Projected Market as of 9/1/86</u>	<u>UI FY 1987 Grade Midpoint</u>	<u>% Behind Market</u>
5 Chicago	\$11,223	\$12,496	\$11,560	8.1%
5 Urbana	10,370	11,634	10,683	8.9
14 (both)	16,664	19,171	17,163	11.7
19 (both)	21,551	25,151	22,199	13.3
33 (both)	44,560	52,873	45,897	15.2

(Salaries displayed represent University and market midpoints for employees within each pay grade. Actual average salaries are substantially lower.)

In addition to market comparisons among competing employers, salary comparisons between nonacademic employees and State of Illinois Code Departments are reviewed annually to gain a general impression of relative equity among University of Illinois employees and their counterparts in State government. Based upon data compiled by the Board of Higher Education, the following comparison can be made.

Salary Deficiencies Between University Of Illinois
Nonacademic Employees And State Of Illinois
Code Department Employees, FY 1981 - FY 1986

	<u>FY 1981</u>	<u>FY 1982</u>	<u>FY 1983</u>	<u>FY 1984</u>	<u>FY 1985</u>	<u>FY 1986</u>
Chicago Campus			-8.57%	-5.58%	-5.11%	-6.4%
University Center	-5.09%	-7.52%				
Health Sciences	-2.69%	-2.83%				
Urbana-Champaign	-20.41%	-20.44%	-20.99%	-17.40%	-14.83%	-14.3%

(FY 1983 comparison data includes the University's delayed FY 1983 increase of 3% granted in March, 1983)

These comparisons make no attempt to adjust salaries for regional differences in the cost of living, nor for regional differences in market competition. Thus, they are most useful to gauge changes over time, rather than absolute differences. However, regardless of which measure is employed, it is clear that the University's nonacademic salary levels significantly lag behind those of other comparable employers.

For FY 1987, the overall salary increase for nonacademic employees on the step plan will roughly match the increase for academic salaries of 5%. This increase will be comprised of a 2% "market movement" increase, a 4% step increase for eligible employees (approximately 80% of those on the Step Plan) and additional funds for superior performance raises.

For FY 1988, salary increase funding is requested to keep pace with the projected level of inflation and to reduce a portion of the gap between salaries of the University's nonacademic employees and external market salaries.

Nonacademic Fringe Benefits

The previous discussion of fringe benefits compared the University of Illinois' fringe benefits program to fringe benefit programs offered by other Big Ten institution. However, the University recognizes that the fringe benefits offered to its nonacademic employees are perhaps more appropriately compared to the benefits provided to employees in the private sector. To assess its competitive standing in the market for nonacademic employees, the University participates in several benefit surveys of the local market. Results of these studies indicate that while benefits for University nonacademic staff are generally equal to or greater than other Big Ten and local employers for "time-off" related benefits (holidays, vacation, sick leave), University benefits are less competitive than other employers for employee life insurance, dependent health insurance, dental insurance, and retirement.

Due to the diverse nature of the University's nonacademic workforce, it is difficult to draw specific conclusions concerning nonacademic compensation. The competitiveness of the University's compensation program varies for the wide range of nonacademic employee classifications and salary levels. The University is more competitive in the markets for some employee classifications as compared to others. However, salary

comparisons with both local and State markets indicate that the University of Illinois lags behind the market at all salary levels.

The University's fringe benefits program for nonacademic employees, while perhaps more competitive, is still deficient in some areas of the package, particularly insurance-related benefits. When fringe benefits are combined with salaries for nonacademic employees, it is clear that the University's compensation program is also deficient for nonacademic employees. Further analyses are underway to attempt to determine more precisely the extent to which the University's fringe benefits program for nonacademic employees lags behind benefit programs for appropriate comparison groups.

FY 1988 Benefits Improvement Request

FY 1986 compensation data indicate that the University of Illinois' compensation program is seriously deficient in comparison to the compensation programs offered by peer competitors. While the cash salary component of the University's faculty compensation program is beginning to reach a competitive level, the University's contribution to the cost of fringe benefits is far less than the contributions made by other Big Ten institutions. Whereas past efforts to improve the University's compensation program have focused on improvements to cash salary, current comparisons indicate a strong necessity to also direct the University's efforts toward increasing its contributions to fringe benefits as well.

In its FY 1987 budget request, the University of Illinois initiated efforts to improve the fringe benefits program by proposing a multi-year funding program to strengthen this element of compensation. The FY 1987 request included a request for approximately two percent of the Personal Services base, to be used to finance benefit improvements. This request was in addition to a 7.5% request for funds to increase cash salaries. Upon review of the University's request, the Illinois Board of Higher Education recognized the need to improve fringe benefits and recommended an 8% "compensation" increment to be used by the University to improve salaries and fringe benefits. However, the University's appropriation, as approved by the Governor, was reduced to 5.5% (computed on 92.5% of the Personal Services base), equivalent to an "effective" increment of roughly 5%. The University will be forced by market competition to allocate the

entire 5% to cash salary increases for faculty and staff for FY 1987. The University's FY 1988 request for funding again proposes a multi-year phased program for the improvement of fringe benefits.

The University's overall objective for FY 1988 is to enhance its salary and fringe benefits programs to become more competitive with its peers. Although the external labor market is different for academic and nonacademic employees, the University recognizes that salary and compensation deficiencies exist for both. To address the needs of all employees, the University seeks an additional two percent in incremental FY 1988 funds to target its compensation improvement program toward resolving the most pressing deficiencies of each employee group.

Current information indicates no significant changes in the fringe benefits packages offered at other Big Ten institutions. Thus, an addition of \$6.6 million to the funds which the University of Illinois is able to provide for fringe benefits would begin the improvement of the University's competitive position with respect to total compensation. If the University is unable to secure funds to address specific improvements in the fringe benefits program available to its employees, the only alternative is to secure more substantial improvements in cash salaries, improving its competitive position in total compensation through only one component of the total compensation program.

Medicare Contributions

Public Law 99-272 which was signed by the President on April 7, 1986 requires mandatory participation in Medicare by all State and local government employees in positions not covered for Social Security beginning employment after March 31, 1986. These employees and their employers are liable for equal portions of the FICA Medicare Tax. The University's FY 1988 preliminary request includes an increment of \$530,000 to provide for the University's liability for Medicare contributions.

State Universities Retirement System (SURS)

Among the benefit comparisons cited above, the health of the State Universities Retirement System (SURS), as well as the University's relative competitiveness among peer institutions with respect to retirement benefits, has been a matter of prime concern for several years for both

individual employees and for leaders within higher education institutions and the SURS system. Any discussion of fringe benefit improvements for higher education in Illinois must include a strong call for adequate funding of the existing SURS program to ensure that existing benefits will remain secure. Appendix I contains a more complete discussion of the SURS funding situation.

It should also be understood, however, that while achieving adequate funding for SURS remains a key concern for FY 1988 and for future years, funding improvements for SURS will not, in and of themselves, improve either the benefits available to University employees or the University's competitive position among peer institutions. It is urgent that the University move forward on both fronts. The adequacy of SURS fiscal support must be assured. So, too, must improvements in the University's competitive position in total compensation be achieved.

FY 1986 Improvements to Fringe Benefits

Public Act 84-0167 permits State employees to enter into agreements with their employers to elect to receive, in lieu of salary or wages, benefits which are not taxable under the Federal Internal Revenue Code. Premium amounts previously paid by the individual with after-tax dollars, are now paid by the employer, thus reducing the individual employee's taxable income. University benefits eligible for tax exemption include dependent health insurance, dental insurance, and a portion of the optional State life insurance. Individuals enrolled in these options benefit from a "tax savings", and thus an increase in "take-home" pay. Whereas implementation of this plan benefitted individual employees to varying degrees, dependent upon their benefit participation and individual tax status, it did not increase the University's competitive standing in terms of its employer contribution to fringe benefits.

FY 1987 Improvements to Fringe Benefits

In FY 1987, the State of Illinois plans to implement an employer-paid dental insurance plan which will be available to all University employees, as well as any of their dependents who are covered under the University's dependent health insurance plans. However, until the State defines the specific terms of the dental insurance program, it cannot effectively be

compared to dental programs provided at peer institutions. Implementation of the dental plan will be a definite enhancement to the University's fringe benefits program, and dependent upon the cost of the program, should increase the University's employer contribution to fringe benefits. However, the fringe benefits program will still rate poorly compared to benefit plans provided by peer institutions due to deficiencies in the areas of life insurance, health insurance, disability insurance, and retirement.

PRICE INCREASES
(\$7,376,100)

As in other sectors of the economy, higher education continues to experience inflationary pressures which reduce the strength of its existing financial resource base and decrease its ability to maintain high quality programs and services. Fortunately, these pressures have diminished from the double digit inflation rates of the early 1980's to rates which are comparatively low. Growth in inflation as measured by the Consumer Price Index was 4.3% in FY 1984, 3.7% in FY 1985, and 3.9% in FY 1986; and recent projections indicate that FY 1987 inflation growth will total approximately 4.0%. Moderation in annual inflation growth is important, since it contributes to the current stability of the state and national economy. It is important to recognize, however, that rates have only moderated, and that inflation must still be addressed budgetarily by the University and the State.

Funding is requested annually by the University to finance expected price increases of goods and services required for the basic operation of on-going academic and support programs. Price increase requests are based upon inflation projections; and due to special circumstances producing unusual inflation rates, differential price increases are sought for certain categories of expense items.

For FY 1988, the University is once again requesting differential price increases for two important budget areas: utilities and library acquisitions. In addition, a "general" price increase is being requested for all other goods and services. The past experience of disproportionately high price increases in fossil fuels is universal, and the State has recognized and supported a differential utilities increase since FY 1975. The need for such increases is no longer debatable; the primary concern has become one of projecting future increases with sufficient accuracy to avoid shortfalls.

State support of the concept of differential price increases for library acquisitions has been intermittent, with special increases in FY 1979 and FY 1980, and FY 1985 and FY 1986, but no special funding in the intervening years. The University of Illinois libraries are sufficiently different from other libraries in Illinois to warrant special recognition

of the severe price increases pressure on acquisitions. Such recognition is absolutely critical if the University is to maintain the current quality of its libraries, and their service not only to the University, but to other libraries throughout the State.

In addition to the special or differential price increase categories, the University's preliminary FY 1988 request contains a 4.5% increase for general price increase funding, a provision which will roughly match the expected increase in inflation. The differential price increases will consist of a 9.4% increase for utilities and a 12% increase for library acquisitions. Discussions of the general and the differential price increase requests are included in the following narrative sections.

General Price Increases - (\$3,257,700)

The general price increase portion of the budget provides for annual price increases for the wide variety of goods and services which the University purchases for instructional, research, administrative, and maintenance purposes. The nature of these goods and services varies from paper products to integrated circuit components and from office machine repair to supercomputer maintenance. Overall, however, there has been an increasing demand, due to laboratory and office automation, for sophisticated supplies and equipment to support highly specialized initiatives in virtually all academic disciplines.

In estimating its general price increase needs, the University analyzes a variety of economic indicators that are commonly used in business, industry and government to measure the impact of inflation on certain sectors of the economy. Annual changes in price index values may be interpreted as the change in resources required to buy a similar quality and quantity of goods and services from one year to the next.

Depending upon the specific pattern of consumption which each index attempts to estimate, indices vary in the specific items included and the weights assigned to these items. Indices have been developed to measure cost increases experienced by the individual consumer as well as changes in wholesale prices of goods, and in the nation's overall production and sale of goods. The varied nature of college and university expenditures suggests the need for using a combination of several price indices to estimate changes in the cost of University operations. The price increase measures used for this purposes are "market basket" indices which combine several differentially weighted cost components into a single index.

The Consumer Price Index (CPI) measures the relative prices which individual consumers pay for the goods and services they purchase. For purposes of this comparison, the CPI less energy is used, since energy price increases are addressed separately in the budget development process. The Gross National Product Price Deflator (GNP) measures that portion of the GNP which is attributed to factors other than the real growth of goods and services. The Higher Education Price Index (HEPI) measures changes in the levels of general expenditures which colleges and universities make from current funds for items supporting instructional programs and departmental research including data processing, communications, transportation,

supplies and materials, and books and periodicals. Although all three indices share a common model, there are differences in the compositions of their market baskets, in their sensitivity to economic indicators, and in their final results. Historically, however, a strong relationship has existed among the economic trends estimated by each index.

The University develops its request for general price increase funding by evaluating its current financial base relative to historical inflation rates. Additionally, the University uses projections of inflation to estimate the potential erosion of purchasing power which may be expected to occur during the budget year, and the additional revenue needed to purchase a constant level of goods and services. These analyses yield a general price increase request which will allow the University to maintain its purchasing power during the budget year, and perhaps, to regain a portion of past inflationary losses.

For the past four fiscal years, inflation has remained at approximately four percent. However, for the preceding four fiscal years inflation ran at or near the double digit level. For the CPI index, both Chase and DRI economic forecasters see inflation to be in the 3.5% to 4.5% range for 1987 and 1988. For the GNP index, Chase forecasts an increase of approximately 4% from FY 1987 to FY 1988. Thus, while still very significant, inflation is lower and more stable than it was only a few years ago.

A graphic display of the historical trends for the CPI, GNP, and HEPI and the actual University appropriations is shown on Figure 4. The graph illustrates the strong relationship between the inflation indices and the pronounced difference between past inflationary trends and University appropriations. Even with moderated inflation rates in recent years, appropriations have lagged inflation considerably. The University's allocation of FY 1987 incremental funds provides for a general price increase of roughly 2.5% overall, lagging the expected rate of inflation by approximately 2%.

A review of the compounded inflation rates as displayed in Figure 5 confirms that a wide disparity exists between actual University appropriations and the inflation experienced for the period FY 1978 through FY 1986. Based on the indicators during this period, University appropriations lagged inflation by amounts ranging from \$11.5 million to \$14.7 million.

FIGURE 4

COMPARISON OF UI GENERAL PRICE INCREASE APPROPRIATIONS WITH ANNUAL INFLATION RATES

PERCENT

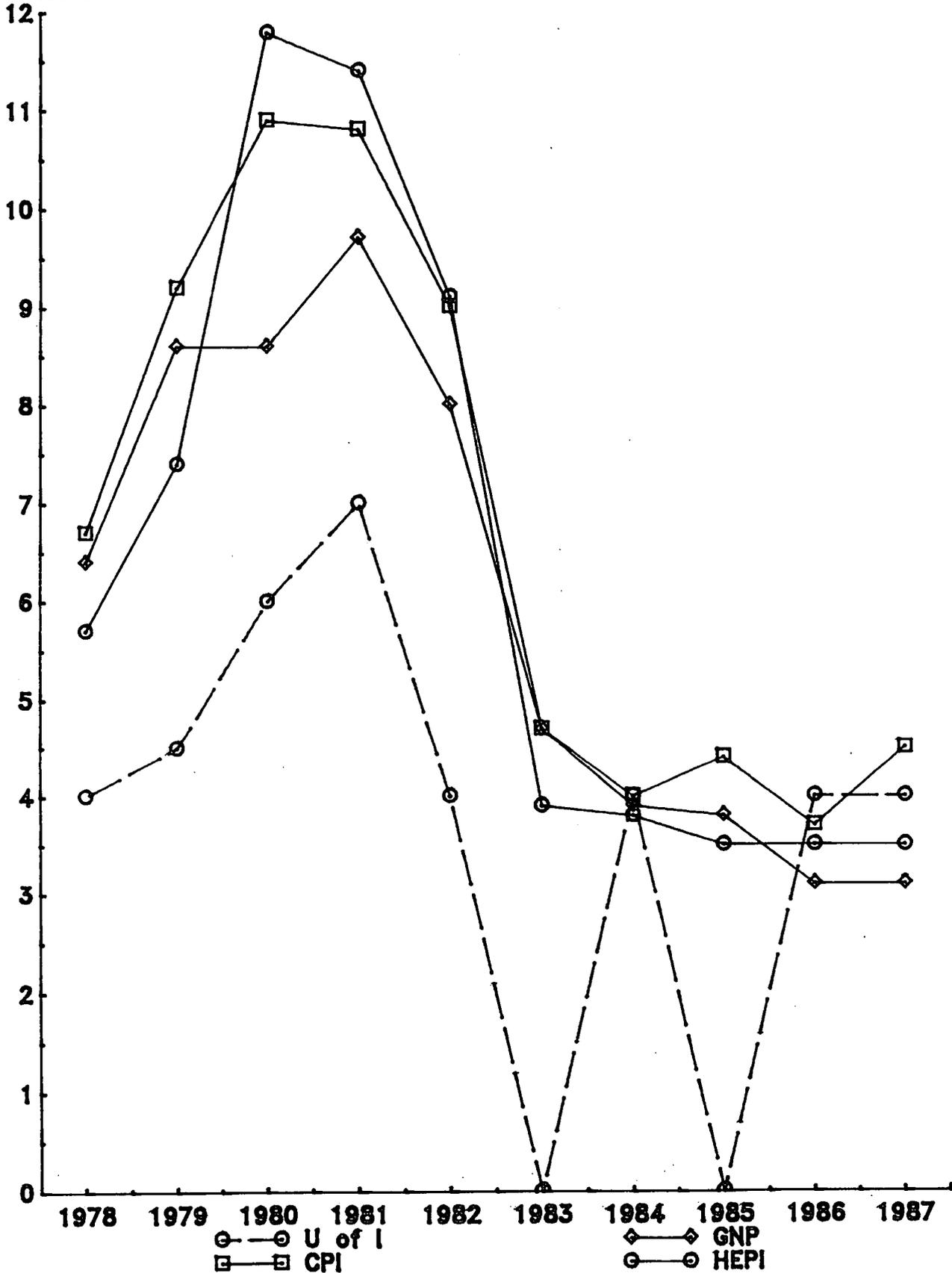
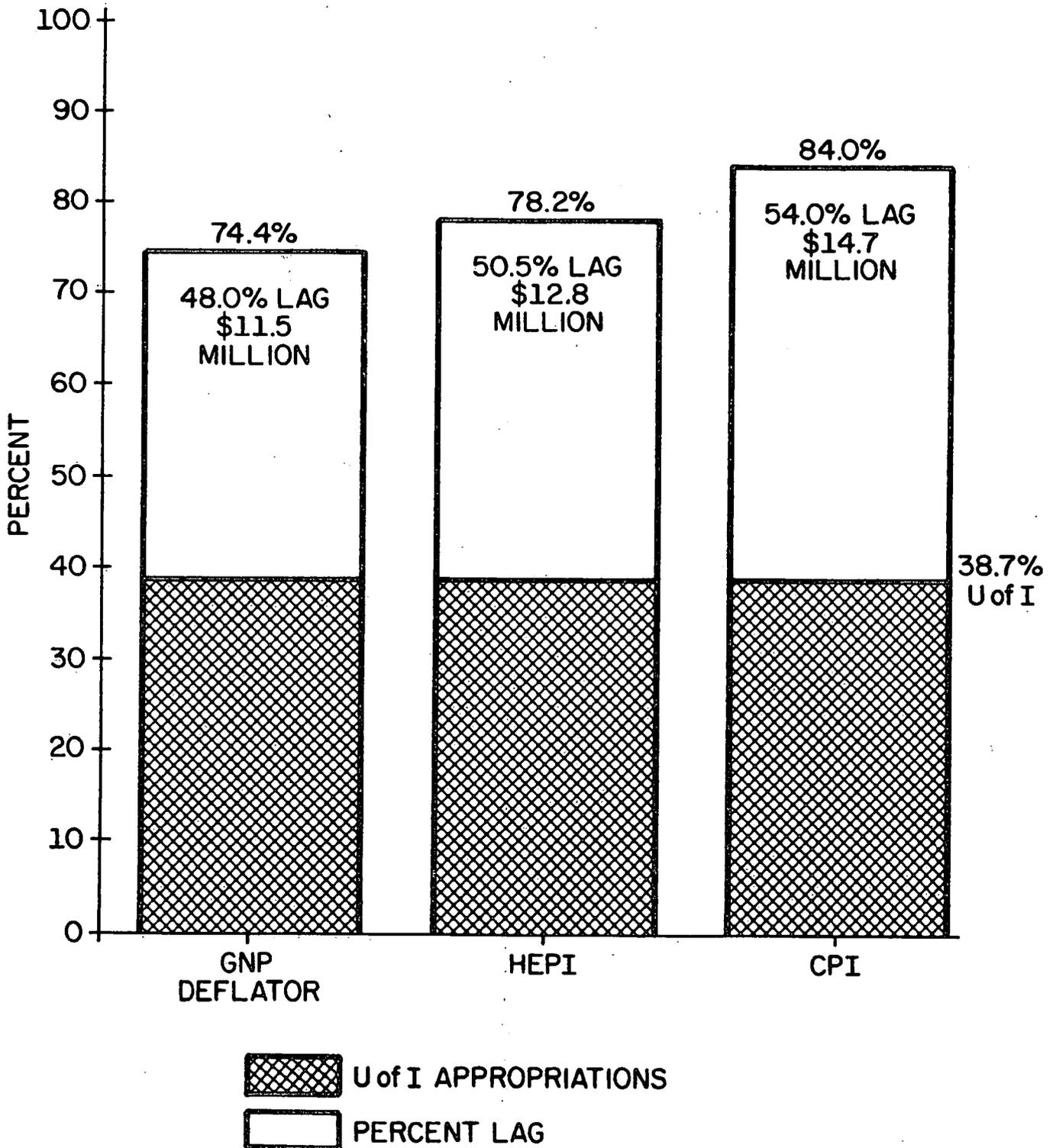


FIGURE 5
CUMULATIVE IMPACT OF INFLATION
FY 1978-1986
U of I GENERAL PRICE INCREASE
APPROPRIATIONS vs. INFLATION



For FY 1988, the University is requesting an increment for general price increases of 4.5%. This request roughly matches inflation projections for FY 1988 and is intended to maintain the same purchasing power during FY 1988 that will exist during FY 1987.

Utilities Price Increases - (\$3,264,800)

Assessment of the University's incremental funding requirements for heat, light, and power and related utilities expenses is based upon projections of future campus energy consumption levels and predictions of fuel and purchased power unit costs. Since this is an intuitively logical and apparently simple approach to developing the budget, the difficulties which underlie the process and the resultant errors of estimation tend to be masked. To better understand the utilities forecasting process and its limitations, it is useful to examine the components of the process individually and in slightly greater detail.

Energy consumption estimates are developed using an actual average consumption level from the previous two years, which is adjusted for the anticipated operation of new buildings and equipment, completion of energy conservation projects, and major changes in weather patterns. While some building and energy conservation projects become operational immediately at the beginning of the fiscal year, this is an exception rather than a rule according to historical records. Therefore, the difficulty in projecting these variables and their impact on total energy consumption requirements in any particular year is partially a function of timing. A two to three month delay in opening a major building such as the Veterinary Medicine Basic Sciences Building may result in a "first year" overestimation of energy needs of several million BTU's. Conversely, a delay in completing a major energy conservation project, such as the steam absorption machine retrofit work at the Urbana-Champaign campus, may result in an initial underestimation of energy needs. Due to the nature of construction schedules and the complexity of both types of projects, completion and occupancy dates do vary from initial estimates.

A second factor which contributes to the variability in new building/energy conservation project consumption estimates is simply the accuracy of initial project consumption projections. Estimates of new or remodeled building energy requirements are developed based upon design information relative to the new or newly remodeled facilities and past performance of similar buildings on campus. Although this approach represents the "state of the art" method for projecting energy usage, design specifications and actual operations typically differ to some extent, and comparisons of new

and existing buildings assume identical usage patterns and operations which often do not materialize.

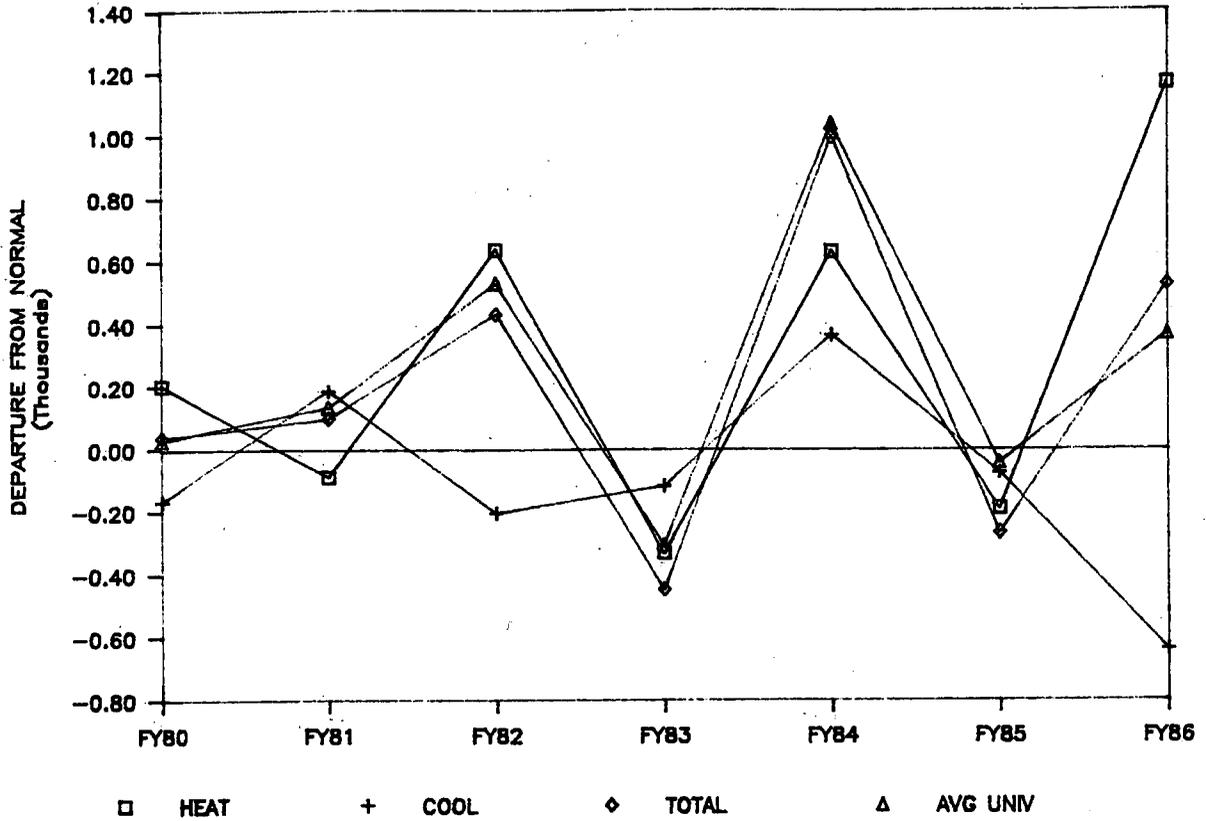
Finally, the role of weather in projecting energy consumption is dramatic and often misunderstood in terms of its affect on the campus' overall consumption needs. Predicting the weather on even a short-term basis is imprecise, as evidenced almost daily by forecasts appearing in the news media compared to actual weather conditions. Compounding this problem is the fact that the interaction of several weather variables such as temperature, humidity, windspeed, and cloud cover determines actual building heating and cooling needs. Therefore, predicting the weather is a process of predicting multiple variables and their interactions rather than a process of forecasting one simple variable called "weather". Summing these variations, which are often not completely random, across an entire year can produce an enormous difference between the year's predicted weather and actual occurrences.

Figure 6 illustrates historical trends of one important weather variable, "degree days" (heating and cooling), during the period of FY 1980 to FY 1986. At both Chicago and Urbana-Champaign, extreme variation occurred during FY 1982 to FY 1985 in ambient temperatures. Cumulative degree days fluctuated from approximately 400 below normal in FY 1983 to approximately 1,200 above normal in FY 1984. Fiscal Year 1982 also recorded an unusually high number of degree days compared to the standard 100 year average. It is important to note that these weather trends were not readily predictable from past weather conditions. It is also important to note that the impact of these fluctuations in overall energy consumption was profound.

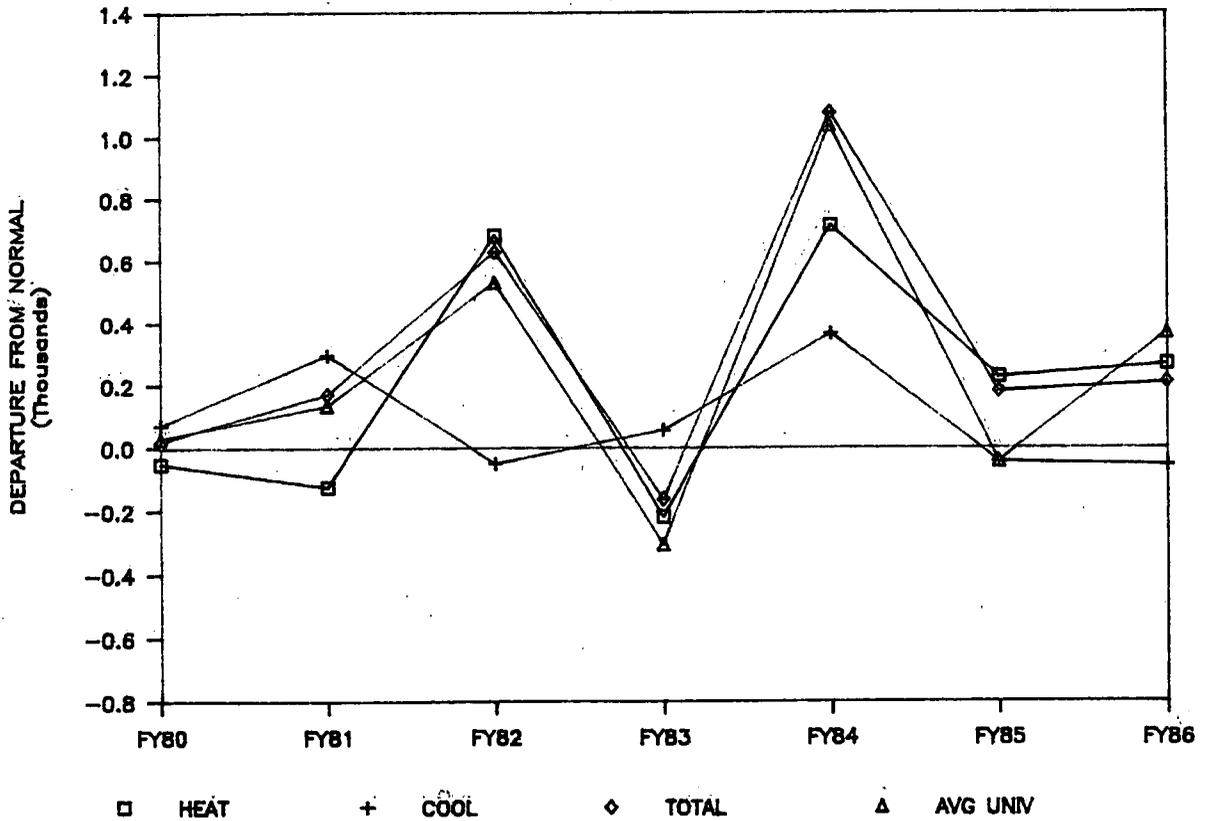
Figure 7 illustrates boiler fuel consumption during the same period of FY 1980 through FY 1986 for the Chicago and Urbana-Champaign campuses and the University overall. Consistent with the degree day trends which occurred in FY 1983 and FY 1984, fuel consumption dropped to almost a five-year low in FY 1983 and climbed to previous unreached levels in both FY 1984 and FY 1985, on a University-wide basis. However, there is not an overwhelmingly positive linear relationship between temperature and energy consumption as evidenced by the concurrent increase in degree days and decrease in energy consumption in FY 1982 compared to FY 1981. It is

FIGURE 6 DEGREE DAYS

UNIVERSITY OF ILLINOIS—URBANA CHAMPAIGN



UNIVERSITY OF ILLINOIS—CHICAGO



useful to note that electricity consumption exhibited similar, but not identical, behavior during this time period, as illustrated in Figure 8.

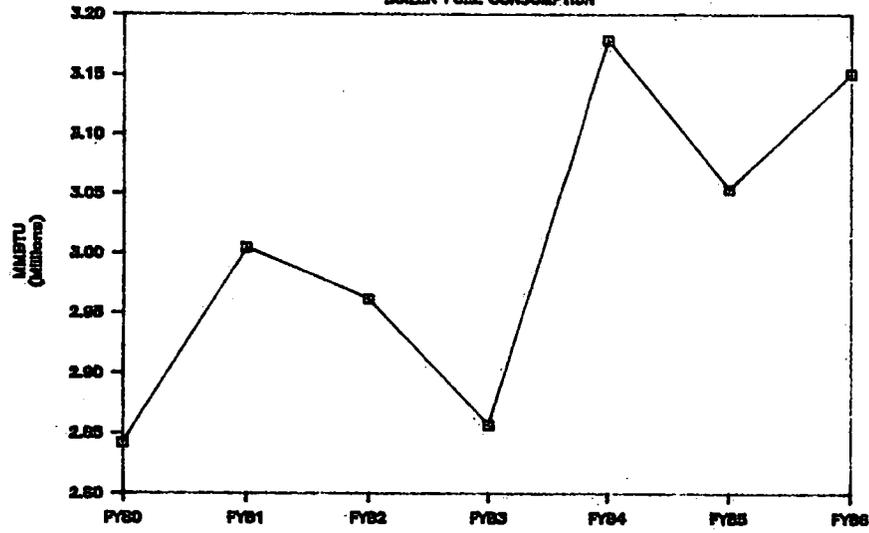
Forecasting energy/fuel unit prices is the second element of the utilities budget needs projection model. Generally, unit prices for fuel oil, natural gas, and electricity have exhibited steady increases during the period of FY 1975 through FY 1984. However, beginning in FY 1985 average natural gas and fuel oil prices moderated, and increases in FY 1987 and FY 1988 are expected to be relatively low. Electricity prices have grown annually since the mid-1970s, and they continue to grow at rates higher than fuel oil and natural gas due to imbedded costs of labor and capital improvements.

Until FY 1985, it was safe to assume that energy prices would increase annually, and the challenge was mainly one of predicting how steeply prices would grow. Figures 9 and 10 illustrate unit price increases of "boiler fuel" (fuel oil and natural gas) and electricity over the FY 1980-FY 1986 period. While at least moderate price growth has been typical in regard to these budget items, annual rates of growth have varied and predicting these variations has been somewhat difficult. Political and economic factors such as deregulation of natural gas prices, variations in world-wide supplies of crude oil, conflict in the Middle East, utilization of alternate fuel sources, tax incentives for oil exploration, and many others combine to influence the direction and magnitude of fossil fuel prices. Regional differences, such as price competition between #6 fuel oil and natural gas in Chicago, also strongly affect commodity pricing. The direct purchase of natural gas from the producer, which has been an option enjoyed by the Urbana-Champaign campus recently, is another factor accounting for differential fuel price increases at each campus.

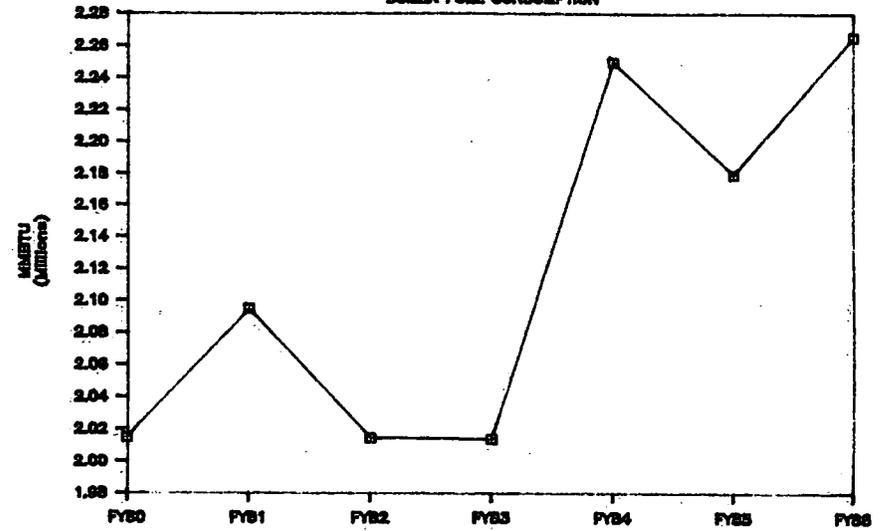
The sensitivity of the overall utilities budget to potential errors in estimating consumption and unit price changes becomes an important factor in evaluating the utilities budget price increase request. For example, the University-wide consumption of boiler fuel is currently 3.17 trillion BTU's per year at a current unit cost of \$4.48 per million BTU's. At current costs each 1% error in accurately predicting consumption of boiler fuel amounts to \$142,000. Therefore, a 95% accuracy rate of the prediction model would still represent a \$709,000 surplus or deficit condition in

FIGURE 7

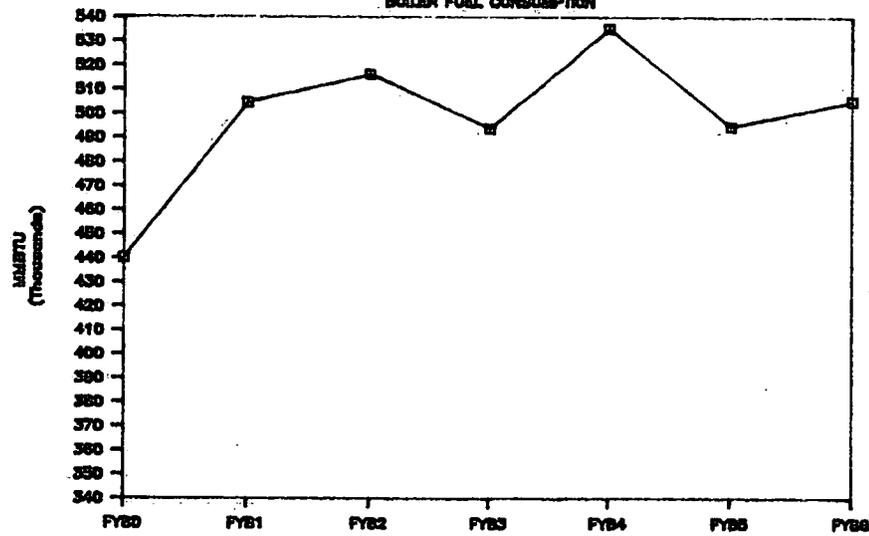
ALL UNIVERSITY
BOILER FUEL CONSUMPTION



URBANA--CHAMPAIGN
BOILER FUEL CONSUMPTION



HEALTH SCIENCES CENTER
BOILER FUEL CONSUMPTION



UNIVERSITY CENTER
BOILER FUEL CONSUMPTION

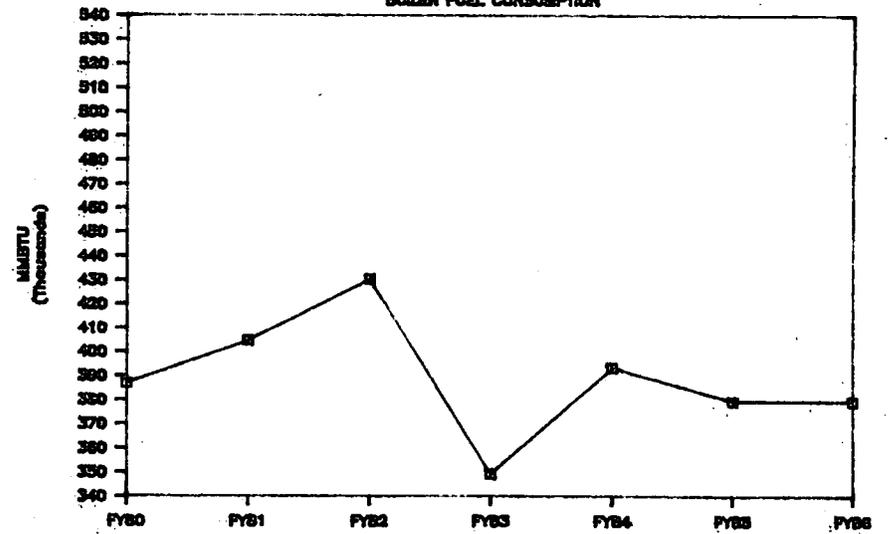


FIGURE 8

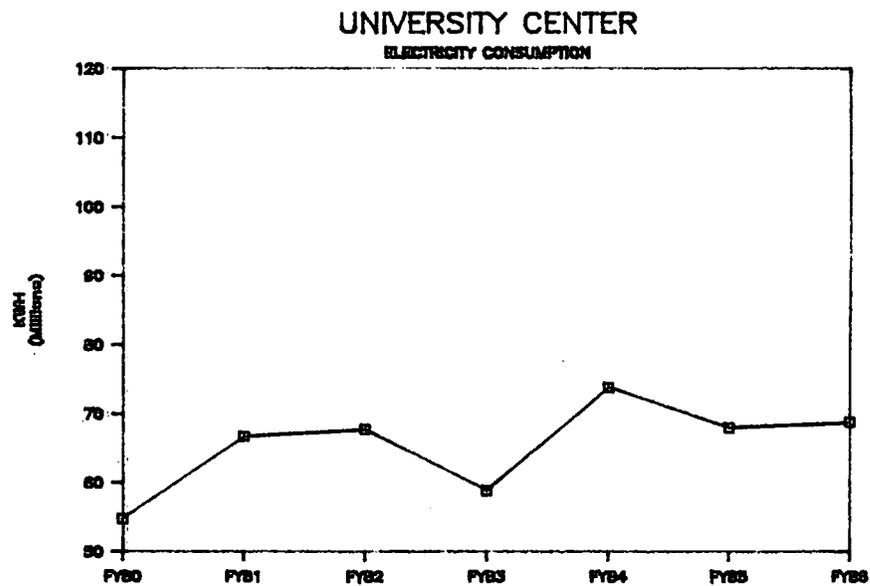
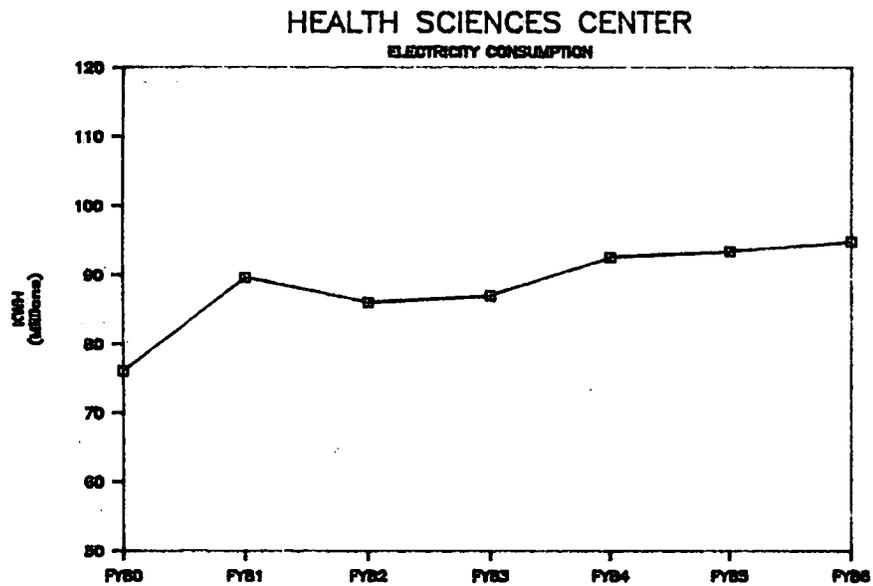
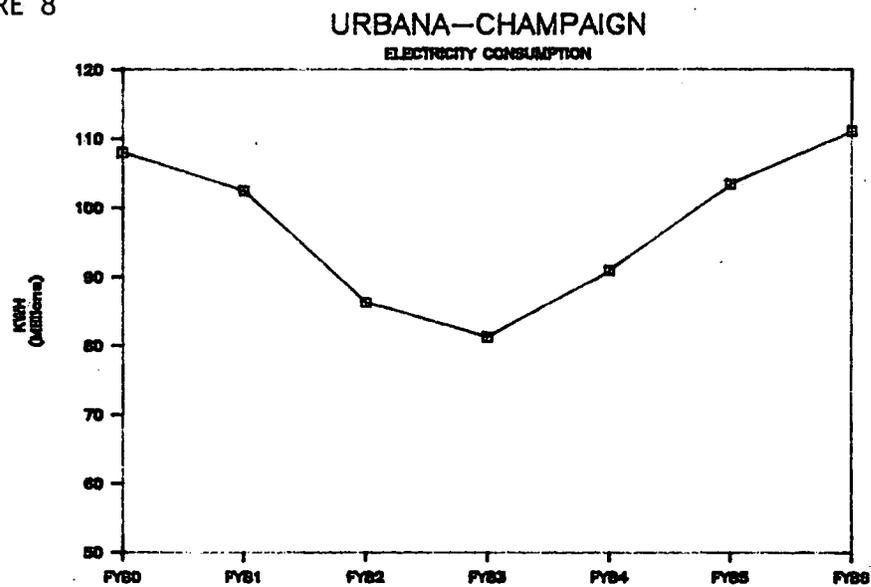
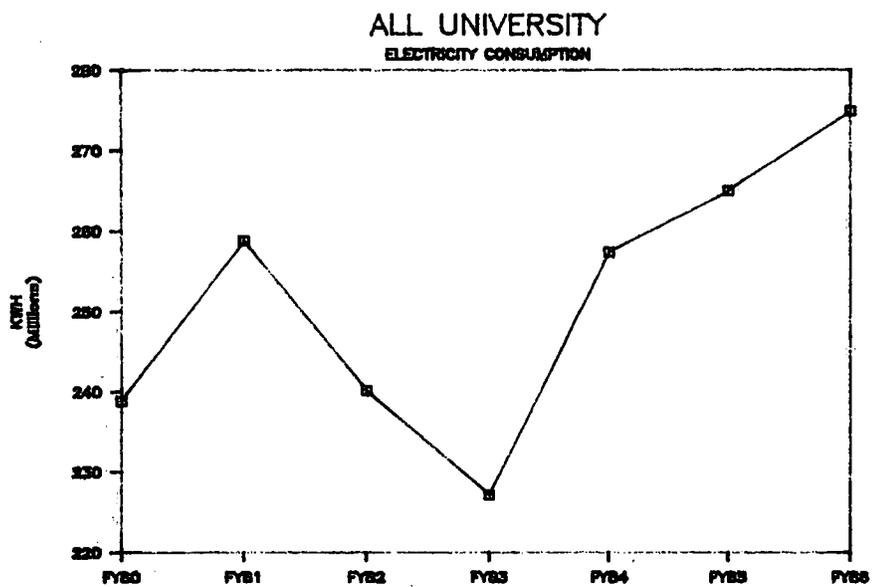
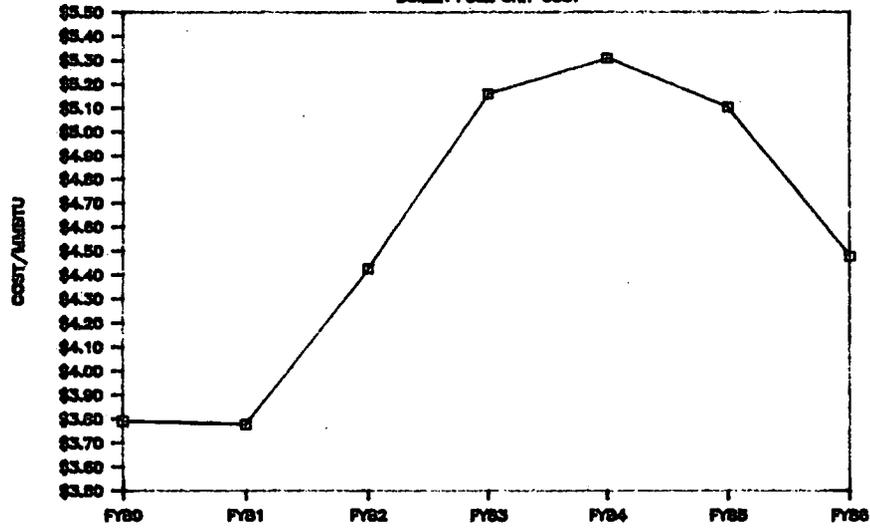
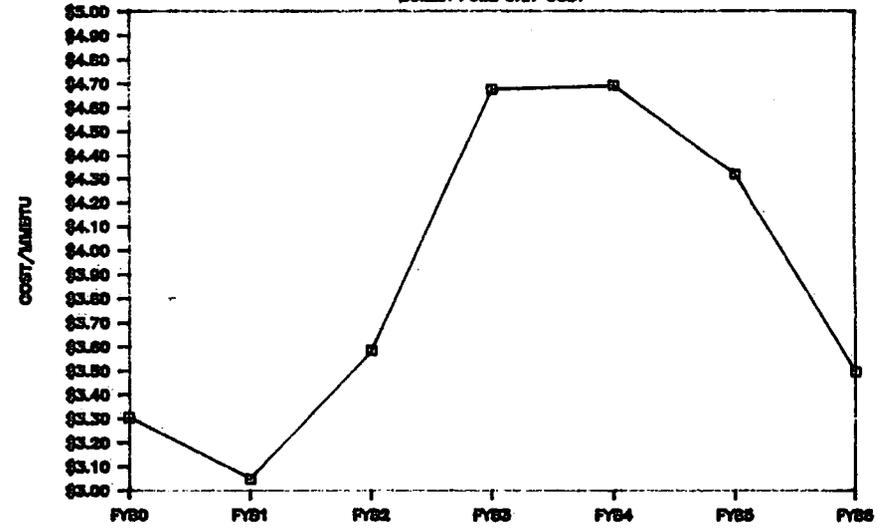


FIGURE 9

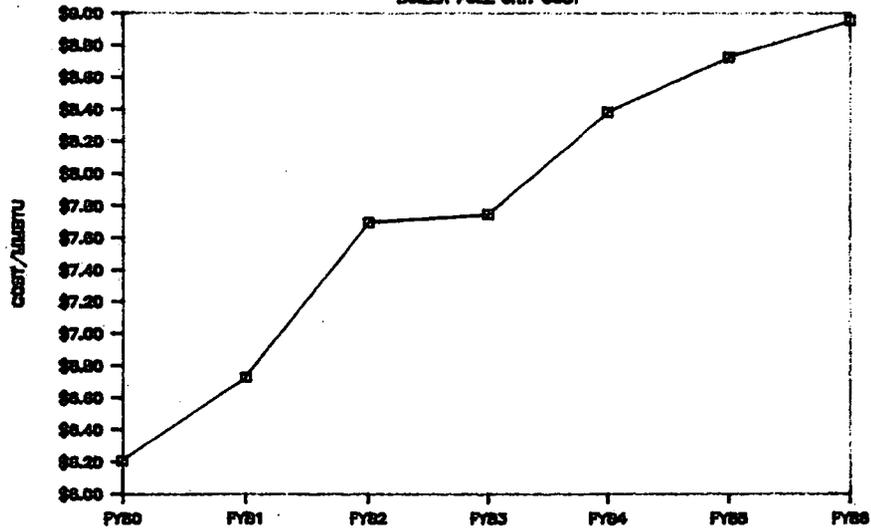
ALL UNIVERSITY
BOILER FUEL UNIT COST



URBANA-CHAMPAIGN
BOILER FUEL UNIT COST



HEALTH SCIENCES CENTER
BOILER FUEL UNIT COST



UNIVERSITY CENTER
BOILER FUEL UNIT COST

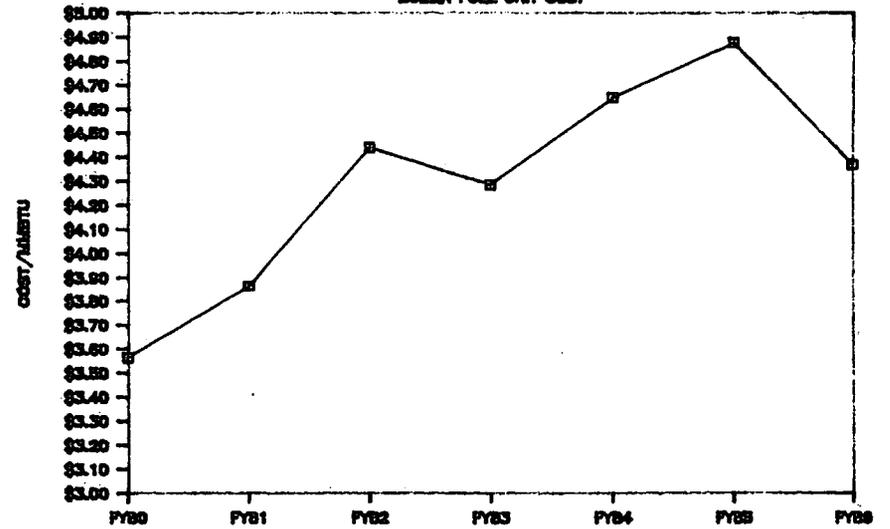
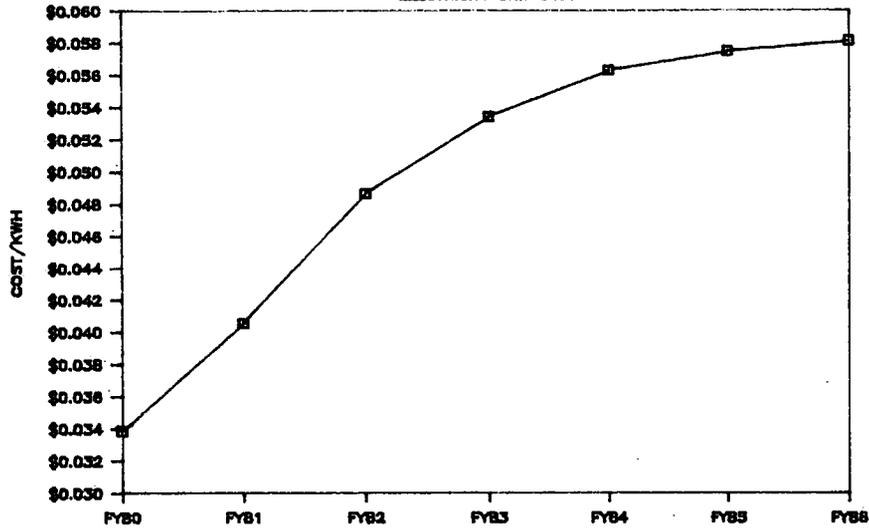
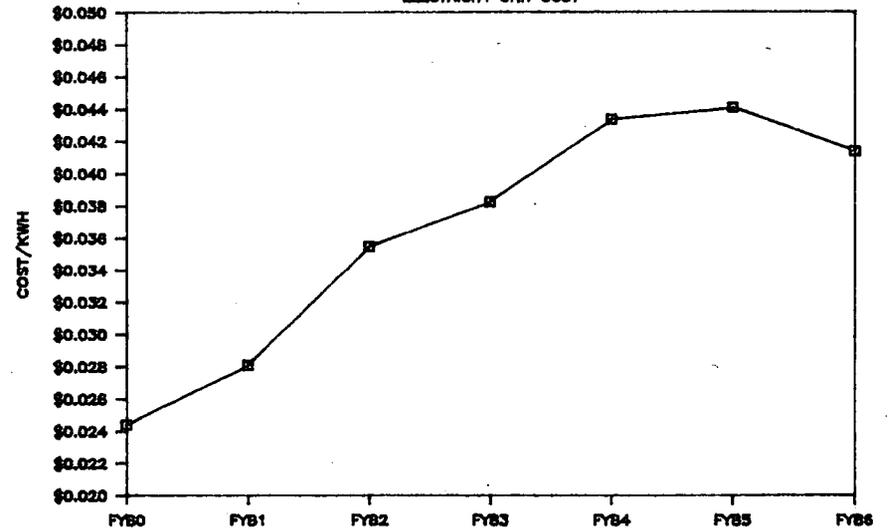


FIGURE 10

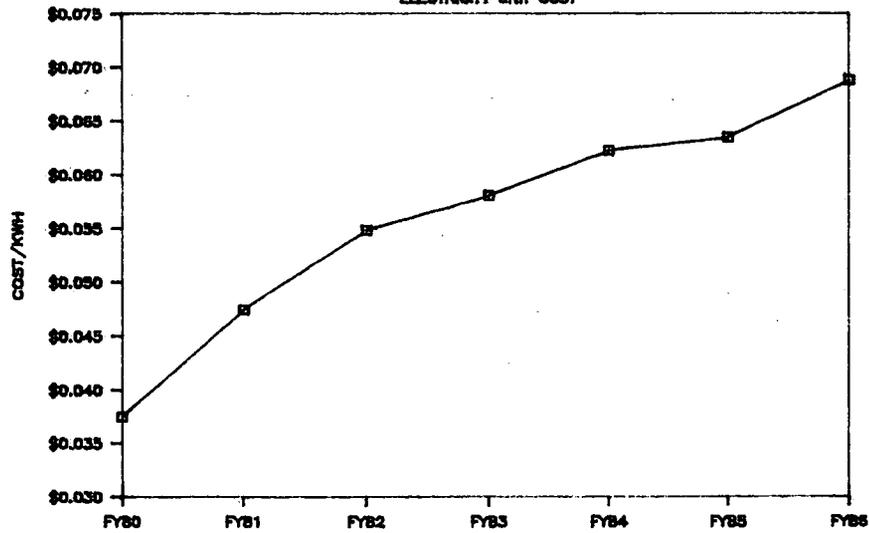
ALL UNIVERSITY
ELECTRICITY UNIT COST



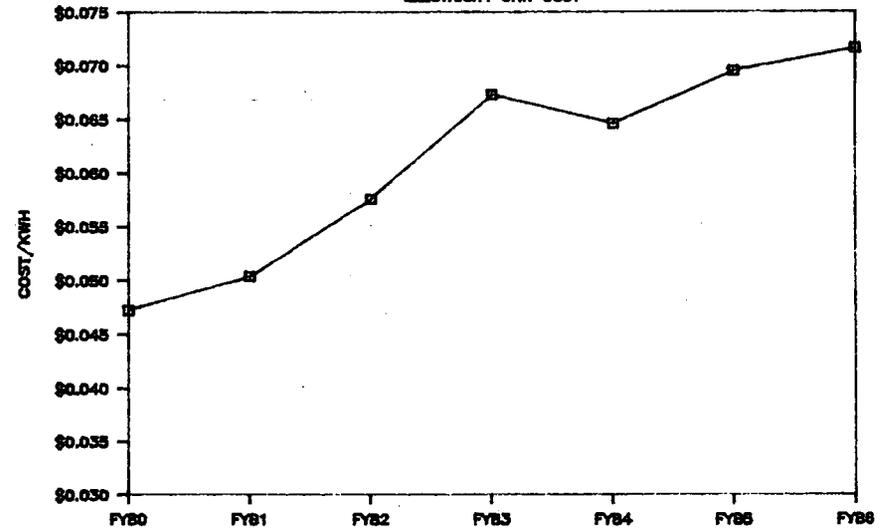
URBANA-CHAMPAIGN
ELECTRICITY UNIT COST



HEALTH SCIENCES CENTER
ELECTRICITY UNIT COST



UNIVERSITY CENTER
ELECTRICITY UNIT COST



terms of the budget. Likewise, an error of 5% in projecting electrical consumption would result in a \$818,000 surplus or deficit, independent of offsetting errors in other budget components.

Despite the inherent difficulties in accurately predicting energy consumption levels and unit prices, past efforts in projecting overall utilities budget needs have been reasonably accurate over the past several years. The projection methodology involves the analysis of historical energy cost and consumption trends and the tempering of the resultant forecasts with information relative to changes in the State and national economy, changes in fuel deregulation guidelines, new Federal energy policies, and other political and social factors.

A key factor in the assessment of future energy consumption is the impact of energy conservation measures at the various campus locations. During the past several years these projects have helped moderate the need for large consumption-based utility price increases. Although energy consumption has increased due to expanded research programs and the acquisition of additional electrically powered equipment, energy conservation projects have helped offset those increases. In fact, energy consumption per gross square foot of building space increased only .4% from FY 1983 to FY 1985, as the result of the counter balancing effects of program expansion and energy conservation.

For FY 1986, the increase of energy usage above FY 1985 levels adjusted for new areas, is over 3.4%, and this represents a departure from recent energy usage trends. This increase in demand is due primarily to the new programmatic initiatives that have taken place at the campuses. Continuation of the remodeling and upgrading of existing facilities combined with the continued programmatic growth in the highly technological areas of Engineering, Computer Science, Biotechnology, and Plant Sciences, will necessarily result in higher energy demand for FY 1988. Super-computers and Electromagnetic Resonance Imagers are truly on the cutting edge of science research, but their use will result in unavoidable increases in energy usage and utilities expenses.

Forecasting unit cost growth for FY 1988 remains as challenging as in the past. The sources used to develop the price projections for the University's preliminary FY 1988 budget request include: national power

plant operations trade publications; recently negotiated regional contracts with utilities companies; consumer agency publications; and consultations with local utility company representatives and the University's Directors of Operations and Maintenance.

It appears that for FY 1988 local fuel and power prices for both Chicago and Urbana-Champaign are governed principally by local developments rather than changes at the national level. In Urbana-Champaign, the Illinois Power Company has requested a 15% rate increase in addition to the 18% increase which is to take effect in FY 1987. In Chicago, the courts are currently deciding how electrical price increases should be implemented, but an increase of 8% is anticipated for FY 1988. The electrical price increases and much of the related litigation concerning them is tied to policies which permit local power companies to pass construction costs of the newly constructed nuclear power plants to consumers.

Fossil fuel prices in both Urbana-Champaign and Chicago are projected to be 10% higher in FY 1988 based on market inflation. In Urbana an additional 5% is expected due to implementation of a fuel use tax. The additional 5% use tax pertains only to the Urbana-Champaign campus, and it results from a recent ruling of the Illinois Department of Revenue which states that natural gas purchased out of State is subject to additional taxation. Since the Urbana-Champaign campus has retained its ability to "direct purchase" gas from an out-of-state gas producer, and will continue to do so for the foreseeable future, it will save money on the basic price of fuel, but it will incur a minor increase in tax liability. If at any time the Urbana-Champaign campus loses this ability, the added cost of purchasing gas from the local utility company will increase the average unit cost by approximately 15% above normal inflation-driven rate increases.

The combined effects of the energy consumption increases and projected utility rate increases yield an estimated composite 9.4% increase in the University's utility expenses for FY 1988.

Library Price Increases - (\$853,600)

The Libraries of the University of Illinois represent the cornerstone of essential support to academic programs and research activities throughout the University. In addition to serving the immediate needs of the local constituency, the Libraries act as a statewide resource for both on-site visitors and remote users who rely on the vast interlibrary loan system in which the Libraries participate. For the Libraries to meet their continuing obligations, it is essential that adequate funding be provided to maintain an appropriate level and quality of acquisitions. This funding must be maintained to meet annual price increases as well as to meet demands on both library budgets from increased statewide usage of the collection, the explosion of information being published, and new and expanded University programs requiring additional library resources.

As the third largest academic research library in the country, the UIUC Library serves a university which grants the third largest number of doctoral degrees in the nation and has an outstanding record of public service. It is a statewide resource which reaches out through eighteen state and regional public library networks to serve every citizen in Illinois. In 1985 by lending 119,420 volumes through interlibrary loans, primarily to the statewide networks, the UIUC Library was second in lending among all members of the Association of Research Libraries (ARL), representing a 52.5% increase over the FY 1980 rate. In that same year the UIUC Library also ranked eighth among ARL libraries in binding and material expenditures--the primary measure of the degree to which existing collection quality and size are maintained on an annual basis. It is significant that the third largest collection, lending the second highest number of titles in 1985, ranked only eighth in binding and material expenditures.

One of the problems in securing adequate annual price increases has been that with few exceptions the increases for library materials have been based on inflationary factors calculated on the Consumer Price Index and other price indexes which do not adequately reflect the actual cost of acquiring research materials within the United States and throughout the world.

The costs of published materials have escalated dramatically in recent years, particularly in the areas of science and technology. During the period 1978-1984, the price of U.S. science and technology books increased

by 54% and the price of technology and science serial titles increased by an average of 11.7% per year from 1977-1984. Since many of the new and expanded programs recently added to the University's budget are in highly technical fields which are dependent upon the serials literature, e.g., supercomputing, biotechnology, artificial intelligence, etc., the cost of providing and maintaining current materials has grown far more rapidly than have funds available for acquisitions in these areas.

Further exacerbating the problem is the traumatic effect on the Libraries' current allocation caused by the dual impact of a drastic fall of the U.S. dollar against foreign currencies and the differential pricing employed by foreign dealers for books and journals supplied to North American libraries. Based on an extensive sample of actual UIUC library unit costs for the period of July 1 - March 1, 1986, as compared to the unit costs for FY 1985, foreign monographs have increased by 29% and foreign journal subscriptions have increased by 19%.

According to Faxon, the nation's leading serial subscription agency, the rise in the cost of periodical serials for 1986 was 19% for American serials and 22% for foreign serials, and this can be expected to rise in FY 1987. The University of Illinois Libraries expend about half of their library material budget on serials, of which approximately 34% at UIC and, 45% at UIUC are for foreign journals. If one applies the percentages mentioned above to the FY 1987 library materials budget base, the results are shown on Table 11.

It is common knowledge that these materials have been increasing consistently in cost at a rate higher than the Consumer Price Index. Based upon the most recent data available, a 12% increase in the Library materials base is necessary for FY 1988. This increase will total \$853,600 (40% for UIC and 60% for UIUC) to cover inflation only. It will not provide the resources required to correct existing accumulated deficiencies or to respond to library needs related to those new and rapidly expanding areas of academic interest: biotechnology, robotics, artificial intelligence/ cognitive science, microelectronics, materials science, magnetic resonance imaging, etc. These needs will be discussed in greater detail in the programmatic section of the budget request.

TABLE 11
 UNIVERSITY OF ILLINOIS LIBRARIES
 CALCULATED FY 1988 PRICE INCREASES

	<u>Chicago</u>		<u>Urbana-Champaign</u>		<u>Total</u>	
Total FY 1987 State Acquisitions Base	\$2,970,090		\$4,143,010		\$7,113,100	
	<u>Base Components</u>	<u>Projected Increase</u>	<u>Base Components</u>	<u>Projected Increase</u>	<u>Base Components</u>	<u>Projected Increase</u>
Serials	\$1,336,540		\$2,071,505		\$3,408,045	
Foreign Serials	454,424		932,177		1,386,601	
Price Increase (22%)*		\$ 99,973		\$205,079		\$305,052
Domestic Serials	882,116		1,139,328		2,021,444	
Price Increase (19%)*		167,602		216,472		384,074
Monographs	\$1,633,550		2,071,505		3,705,055	
General Price Increase (4.5%)		<u>73,510</u>		<u>93,218</u>		<u>166,728</u>
Total Library Price Increase		\$341,085		\$514,769		\$855,854

*Cost increases for 1986 according to Faxon, a leading serial subscription agency.

OPERATION & MAINTENANCE OF NEW AREAS
(\$1,566,408)

As State funded capital improvement projects approach completion, funds are requested to finance the operation and maintenance costs of these new/remodeled facilities. Requests for operating funds correspond to the year in which beneficial occupancy of the newly remodeled or constructed space will be achieved. In instances where the space will be completed and occupied midyear, the incremental request is adjusted to reflect the funding needs for that year and a subsequent request is made the following year for the remaining annualized costs. The anticipated funding need to support these operating expenses totals \$1,566,408 for FY 1988. The needs are estimated by the University Operation and Maintenance Division personnel in consultation with the outside architects and engineers responsible for the projects' design and implementation, and the departments who will ultimately use the space. The cost estimates are based on the specific nature and use of the space in question, and they will vary depending upon the activities conducted in the facilities and the intensity of use.

The individual project components of this request are described below and are summarized in Table 12.

SATS Building Addition/Hangar #4

Two Institute of Aviation facilities at the University of Illinois Willard Airport require a total of \$31,790 in operation and maintenance funds for FY 1988: the Staff Air Transportation Service (SATS) Building addition, and the University Hangar #4.

The poor condition of the facilities used by the Staff Air Transportation Service led to the construction of an addition (1,500 sq. ft.) to Hangar #2 at the Willard Airport. This space is comprised of a flight operations and administration area and a waiting area for passengers. An amount of \$7,128 will be required annually for maintenance and utility support for this addition.

Hangar #4, a gift from IGA (a local grocer), has been adapted for aviation laboratories and instruction classes for aircraft maintenance. The facility is 5,064 GSF in size and is used principally for education. This facility will require \$24,662 annually for operation and maintenance, including utilities, beginning in FY 1988.

Veterinary Medicine Animal Rooms

The construction of animal room facilities in an unfinished area (17,000 GSF) on the first floor of the Veterinary Medicine Basic Sciences Building provides a sophisticated animal disease research laboratory which meets the federally mandated requirements for research animals. To maintain the federal standards required, this space will contain special animal isolation cubicles, and it will require heavy-duty fixed cage washing equipment. Furthermore, because this area will be used for animal research employing relatively hazardous materials, special janitorial and security services are required. The animal room area will require \$143,990 for operation and maintenance activities in FY 1988.

Glass Sculpture Building

This project involved the remodeling of open warehouse space into 4,000 GSF of studio space to accommodate the needs of the Urbana-Champaign campus' School of Art and Design. The open space was divided into five specific areas: glassblowing, cold glass working, all-purpose rooms for critique, a lecture and/or slide room, graduate student space, and a research studio. The operations and maintenance costs include not only the normal janitorial services, but also additional ventilation costs that result from the special removal of the vapor and heat by-products of the glassblowing furnaces and electrical kilns. This facility will require an annual sum of \$12,760 to operate and maintain.

Plant Sciences Greenhouse Complex

The Urbana-Champaign campus' Plant Sciences Greenhouse Complex, which was funded in FY 1984, is designed to provide environmentally-controlled greenhouses, specialized laboratories, and essential support areas for a broad range of research programs in the plant sciences. The project includes a multipurpose headhouse of approximately 19,000 ASF and a modern, aluminum-framed greenhouse consisting of 41,000 ASF. Basic and applied research to be conducted at the complex will have significant economic impact on the production and use of field, forest, and horticultural crops in Illinois and the U.S. This facility will require \$441,354 to operate for six months in FY 1988 and an additional 441,354 in FY 1989.

Krannert Art Museum Addition

This project consists of a new 21,500 gross square feet addition to the Krannert Art Museum. This addition consists of two stories and a full basement. The addition will consist principally of exhibit and preparation space. The existing mechanical systems will be upgraded and expanded and the antiquated museum security system will be replaced to provide for a more efficient use of funds allocated to the operation of the entire facility. This new addition will require \$108,199 for operations and maintenance for eleven months in FY 1988 and an additional \$9,836 in FY 1989.

Chinese Swine Research Center

The Swine Research Center at the Urbana-Champaign campus was initiated in 1964. Since that time, many changes in swine management systems and animal housing accommodations have occurred. Most recently, funds were appropriated for the construction of swine facilities to accommodate the Swine Germ Plasm research program. Presently, a major addition to the Center to accommodate Chinese swine is under construction and nearing completion. This particular project will provide 12,400 GSF of space for a Swine finishing area and a variety of farrowing and breeding facilities. This new facility will require \$64,811 to operate and maintain for a seven month period in FY 1988 and an additional \$46,293 in FY 1989.

Oil Chemists Building

Nearly 8,000 gross square feet of space has been acquired by the Urbana-Champaign campus in the form of a building known as the Oil Chemists Building. This facility will be remodeled to house additional faculty and staff involved in supercomputer research and related computer work for the Department of Computer Science. The space will provide nearly 2,500 NASF for supercomputer research and 2,500 NASF for the Department of Computer Science. The remodeled facility will require \$41,083 in operation and maintenance funds for full operation in FY 1988.

Swanlund Building Phase 2

The two story addition to the Swanlund Administration Building will provide 13,400 gross square feet of space to be used primarily for

administrative offices. In addition to relieving some existing space deficiencies in the current building configuration, the new addition will provide space for the Office of the Vice Chancellor for Research and his staff. The annual costs for operation and maintenance of this new addition in FY 1988 will be \$73,700.

Orr Center Animal Unit

The Orr Center in Pike County, Illinois, is an animal research and demonstration unit of 18,800 gross square feet that consists of a central office and residence facility, a large animal housing and work area, facilities for feed mixing and storage, and areas for farm machinery storage. These facilities are now programmed and scheduled for operation starting in October, 1987, and will require \$21,714 for costs related to the 9 months of operation of the Center for FY 1988 and an additional \$7,238 in FY 1989.

Converted Staff Apartment Building

Conversion of the Staff Apartment Building (96,250 gross square feet) from a residential building to an administrative office facility will provide the space necessary to centralize University Business Office functions and permit academic space in University Hall and the College of Pharmacy building to be reassigned to support academic programs. Converting the building from an auxiliary enterprise to an academic-administrative facility requires state support for operating costs and maintenance. The annual operating costs will be \$975,013 or \$487,507 for six months of service as required in FY 1988.

Free Street Theater

The Free Street Theater, a not-for-profit Illinois Corporation, has agreed to provide the funding for a 25,000 gross square foot performing arts facility on property provided by the University. The new center will be comprised of 12,000 gross square feet of rehearsal/office space. In addition, the center will provide space for the relocation of the campus TV studio and the studios of the Department of Communication and Theater. The annualized cost of operation and maintenance totals \$139,500 in FY 1988.

TABLE 12
 FY 1988 REQUEST FOR OPERATION AND MAINTENANCE
 SUPPORT FOR NEW AREAS

<u>Project</u>	<u>GSF</u>	<u>Total Unit Cost \$/GSF</u>	<u>Annual Cost Total (O & M)</u>	<u>Date of Occupancy</u>	<u>No. Months Funding</u>	<u>FY 1988 Amount</u>
<u>Urbana</u>						
SATS Addition/Hanger #4	6,564	\$ 4.84	\$ 31,790	June 1986	12	\$ 31,790
Vet. Medicine Animal Rooms.	17,000	8.47	143,900	December 1986	12	143,990
Glass Sculpture Laboratory	4,000	3.19	12,760	October 1986	12	12,760
Plant Sci. Greenhouse Complex	77,025	11.46	882,708	January 1988	6	441,354
Krannert Art Museum	21,500	5.49	118,035	August 1987	11	108,199
Chinese Swine Research Center	12,400	8.96	111,104	December 1987	7	64,811
Oil Chemists Building	7,622	5.39	41,083	June 1987	12	41,083
Swanlund Building Phase 2	13,400	5.50	73,700	July 1987	12	73,700
Orr Farm	18,800	1.54	28,952	October 1987	9	21,714
						(939,401)
<u>Chicago</u>						
Converted Staff Apartment Building	96,250	10.13	975,013	January 1988	6	487,507
Free St. Theater Building	25,000	5.58	139,500	June 1987	12	139,500
						(627,007)
TOTAL UNIVERSITY						<u>\$1,566,408</u>

OPERATION AND MAINTENANCE DEFICIENCY
IN PREVENTIVE MAINTENANCE
(\$1,000,000)

The University's Operation and Maintenance (O & M) function serves the essential purpose of developing and maintaining adequate facilities for the support of educational and research programs. Since FY 1971, the funding of this function has been insufficient to provide these services at an adequate level.

Inadequate repair and maintenance services result in a gradual deterioration of the University's physical plant assets, as minor projects are deferred until they reach the status of major problems which require immediate and often costly action. This overall problem, compounded by escalating costs due to the inflation of the late 1970's and early 1980's; physical plant staff reductions, resulting from budget reductions; and the addition of facilities, many of which required specialized maintenance, has prompted the University to critically examine resources needed to adequately support the O & M function.

Fortunately, the Build Illinois program has addressed a portion of this overall problem by providing funds to renew and reconfigure facilities that no longer provide adequate support for academic programs. The Repair and Renovation Program which Build Illinois makes available will permit the University to address a portion of the most critical deferred maintenance needs which have accumulated over the past decade-and-a-half. It also permits the University to upgrade or reconfigure teaching and research laboratories to meet current technology requirements of academic programs. In many respects, however, the Repair and Renovation Program within Build Illinois is retrospective in nature - it provides solutions to a portion of the cumulative deficiency in operations and maintenance support only after those deficiencies have taken on crisis proportions. While such a program permits some attention to past problems, it does not provide resources which, on a recurring basis, can be used to upgrade existing maintenance and service levels so that a prospective program of preventive maintenance can be implemented to offset future deficiency accumulations.

The methodology used to evaluate the adequacy of the University's O & M funding level for preventive maintenance entails a comparison of current expenditures with those levels that were deemed adequate in the

past, specifically, FY 1971, for the portion of total O & M activity most directly related to preventive maintenance efforts. This computation, therefore, includes janitorial, building maintenance, and grounds maintenance services. During FY 1985, actual expenditures for these activities were approximately \$25.3 million. A comparison of recent funding levels with a theoretically adequate level obtained by applying prevailing inflation rates and productivity adjustments to the FY 1971 base yields a preventive maintenance deficiency for FY 1985 of \$5.3 million. When this deficiency is inflated to FY 1988 dollars, the resulting gap is \$6.0 million. Table 13 illustrates the calculation of this deficiency.

While annual budget requests often include funds to support newly constructed or remodeled space, these needs are independent of the general deficiency described here. However, the level of O & M support obtained for new facilities during the past decade has been insufficient to maintain even the new facilities in an acceptable manner. In FY 1988 and future years, as major buildings come on-line, this problem will grow exponentially. Buildings such as the Goldberg Eye Research Center in Chicago and the Beckman Institute and Microelectronics Lab at Urbana-Champaign contain very specialized space which will require additional and continued support from O & M to insure they are properly maintained. The result of the O & M deficiency in the past has been the curtailment of janitorial services, deferral of building maintenance (such as roof and mechanical systems repairs) and reduced grounds maintenance services (such as repair of exterior concrete stairways and sidewalks). Continuing with this lack of support for basic O & M activities will result in costly future requests to restore critical physical facilities resources.

Responsible management of the \$2.2 billion investment the State and the University have in instructional, research, and public service facilities requires that proper attention be given to the O & M function. Therefore, the University is requesting \$1,000,000 to begin reestablishing an adequate preventive maintenance program. The allocation of this amount to the campuses will be made in accordance with the relative deficiencies shown in Table 13 as follows: Chicago - \$570,000; Urbana-Champaign - \$430,000.

TABLE 13
 FY 1987 PROJECTED OPERATIONS & MAINTENANCE DEFICIENCY
 FOR PREVENTIVE MAINTENANCE ONLY^a

	<u>Chicago</u>	<u>Urbana-Champaign</u>	<u>Total</u>
1. FY 1985 Deficiency	\$3,016,300 ^b	\$2,279,300	\$5,295,600
2. Add: Impact of Inflation on Deficiency (FY 1986) 3.6%	108,600	82,000	190,600
3. Less: FY 1986 Incremental Dollars	<u>0</u>	<u>0</u>	<u>0</u>
4. FY 1986 Projected Base Deficiency	\$3,124,900	\$2,361,300	\$5,486,200
5. Add: Impact of Inflation on Deficiency (FY 1987) 4.6%	<u>143,700</u>	<u>108,600</u>	<u>252,300</u>
6. FY 1987 Projected Base Deficiency	\$3,268,600	\$2,469,900	\$5,738,500
7. Add: Impact of Inflation on Deficiency (FY 1988) 4.2%	<u>137,300</u>	<u>103,700</u>	<u>241,000</u>
8. FY 1988 Projected Base Deficiency	<u>\$3,405,900</u>	<u>\$2,573,600</u>	<u>\$5,979,500</u>
% Distribution by Campus	56.96%	43.04%	100.00%

^aPreventive maintenance includes janitorial services, building maintenance services and grounds maintenance services activities.

^bThe UIC deficiency does not include an amount for janitorial services at the hospital (1,228,546 GSF @ \$.0327) because the hospital finances its own janitorial services.

SUPPORT SERVICE UNITS
(\$1,000,000)

Over the past several years, the environment in which the University operates has grown to a stage that has forced support service units (those units that exist to provide a required and specialized service to the University community) to dramatically increase their services. The physical growth each campus has achieved has in itself created increasing requirements for expansion of basic support services. Areas such as Environmental Health and Safety, faced with a rapid increase in research involving hazardous materials and the increasing regulations regarding their handling; and the campus Security Divisions, faced with a growing theft rate related to the expanded acquisition of computers used in both instruction and research, are two examples of the support units facing immediate needs for expanded programs. Other support units including Business Affairs, Central Stores, Personnel Services, Fire Protection, and Mailing Services are also feeling the pressures of new demands.

In an effort to reduce these pressures and provide the services required to insure that the University is operating in the proper environment, programs have been developed at both campuses to begin providing proper funding to selected support units. In total, \$1,000,000 is being requested: \$463,000 for Chicago and \$537,000 for Urbana-Champaign. The following table details this request into individual programs at each campus. In part, these programs have been created for implementation over multi-year periods.

Summary of Support Service Unit Request
(Dollars in Thousands)

	<u>UIC</u>	<u>UIUC</u>	<u>Total</u>
Environmental Health and Safety	\$151.4	\$310.0	\$ 461.4
Security Division	311.6	160.0	471.6
Office of Laboratory Animal Resources	—	<u>67.0</u>	<u>67.0</u>
TOTAL	\$463.0	\$537.0	\$1,000.0

Division of Environmental Health and Safety
(\$461,400)

The Divisions of Environmental Health and Safety (DEHS) are the units on each campus that are responsible for ensuring that all State and Federal health and safety regulations are met. This critical responsibility has been increasing dramatically each year as the sophistication of research efforts increases and as more hazardous materials are used in research activities.

As new State and Federal regulations are mandated, the workload of the DEHS often increases significantly, and virtually overnight. For instance, the recent imposition of the Office for Safety and Health Administration (OSHA) related inspections by the State Department of Labor has created a requirement for major increases in services provided by the Divisions which are already understaffed.

Failure to meet established regulations could result in having the University's license to receive and to work with certain materials revoked. Such action would be extremely costly and disruptive. Even more importantly, failure to comply with requirements could result in serious health and safety problems for segments of the academic community.

Chicago - (\$151,400)

On the Chicago campus, the Division has analyzed the additional service requirements that have been created over the past years, and it has projected the likely growth in these efforts during the next several years. As a result, they have determined that for FY 1988 there is a need for an incremental amount of \$151,400 to add the appropriate services.

The details of the budget for providing the additional required support for the Division of Environmental Health and Safety at Chicago are indicated below:

<u>Nonacademic Staff</u>	
2.00 FTE Technical Positions	\$ 44,000
2.00 FTE Student Positions	20,800
<u>Expense</u>	
Travel	1,000
Commodities	23,700
Contractual Services	44,600
Operation of Automotive Equipment	9,300
<u>Equipment</u>	<u>8,000</u>
TOTAL	\$ 151,400

Urbana-Champaign - (\$310,000)

On the Urbana-Champaign campus, a faculty committee recently completed an extensive study of the problems related to compliance with State and Federal safety regulations regarding hazardous waste management. In addition, the Division staff has performed an extensive study of the broader area of risk curtailment. Together, it has been determined that \$310,000 is needed to ensure that compliance is met and maintained in these areas.

The details of the budget for providing the additional required support for the Division of Environmental Health and Safety at Urbana-Champaign are indicated below:

<u>Academic Staff</u>	
6.00 FTE Academic Professionals	\$ 198,000
<u>Nonacademic Staff</u>	
2.00 FTE Secretarial Positions	30,000
<u>Expense</u>	
Commodities	28,000
Contractual Services	16,000
<u>Equipment</u>	<u>38,000</u>
TOTAL	\$ 310,000

Campus Security
(\$471,600)

Chicago - (\$311,600)

The Police Department's responsibility of protecting the University and its students and staff has important implications for the delivery of instruction, and the performance of research and public service functions. The department must maintain an environment in which University students, faculty, and staff may interact with a sense of personal safety in their work. Without maintaining a sense of safety, the University's staff and students will be reluctant to teach and learn beyond the hours of the normal business day. The 24-hour/7-day-a-week campus operation demands adequate security in an absolute sense, and it must recognize that perceived security is also extremely important to facilitation of normal University activities.

In addition to insuring security for the University staff and students, the Department also responds to calls from the general public in the campus area. Police response cannot be strictly dictated by jurisdictional questions (i.e., who should respond, University or Chicago Police?). Through its willingness to cooperate with the community, the University has established a strong sense of goodwill among the people of the area surrounding the Chicago campus.

It is also vital that the Department provide educational opportunities for the campus population in crime prevention and crime awareness. Although the primary goal of such efforts is to enable the campus community to work in cooperation with the Department in enhancing campus security, these skills will also be transferred to settings outside of the campus.

Adequate staffing is a top priority of the department. Without an adequate number of officers and Student Patrol members to patrol the campus and its surroundings, Department performance and morale deteriorate. This program will produce certain measurable outcomes related both to criminal activity on campus and the overall perception of campus security. Criminal activity itself should diminish due to greater visibility of police officers and Student Patrol members. Apprehension rates of offenders will increase as the effects of the educational and training programs become evident. Finally, there should be a significant increase in the perceptions of campus safety on the part of the campus population and, eventually, the general public.

To effectively accomplish these goals, the campus has identified the following incremental budget requirements for FY 1988:

Nonacademic Staff

7.00 FTE Police Officers	\$	162,400
15.00 FTE Student Patrols		110,000

Expense

Contractual Services		<u>39,200</u>
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TOTAL	\$	311,600
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Urbana-Champaign - (\$160,000)

The security needs of the Urbana-Champaign campus are growing as a result of the addition of facilities and programs utilizing valuable equipment. The massive introduction of computer hardware across campus substantially increases the University's exposure to loss through thefts, burglary, fire, and other hazards. To combat this increased exposure, the Security Division has proposed a low cost approach to expanding the security force without adding police officers. The Division proposes to initiate a late-night patrol program consisting of thirteen full-time unarmed security guards who will work each night from 11:00 p.m. to 7:00 a.m. In addition, the Division proposes introducing extra daytime patrols during University break periods to give more intensive coverage to campus laboratories and buildings during these times of reduced building occupancy.

The major goals of the proposed program are as follows:

1. to reduce risk to campus properties from arson-related or accidental fires,
2. to provide improved conditions of safety and security for those University personnel who work or study in campus buildings after 11:00 p.m.,
3. to reduce property damage by quick and early detection of maintenance problems, such as flooding in buildings from broken pipes, etc,
4. to provide quick detection of safety hazards which create liability for the University, and
5. to reduce risk of damage to campus properties from vandalism and loss of property from thefts and burglaries.

The need for this program has become essential and will be even more critical in FY 1988 and beyond as the supercomputer effort grows and buildings such as Microelectronics, Beckman Institute, Biotechnology and others come on-line.

The budget relating to the proposed expansion in the Security Division for FY 1988 is shown below:

<u>Wages</u>		
13.00 FTE Security Guards		\$ 156,000
<u>Expense</u>		
Commodities		<u>4,000</u>
	TOTAL	\$ 160,000

Office of Laboratory Animal Resources
(\$67,000)

During the next several years, the UIUC Office of Laboratory Animal Resources (OLAR) must expand and assume new responsibilities and functions as the campus addresses the requirements of the revised Public Health Service (PHS) policy that was enacted as of January 1, 1986. These requirements must be met if UIUC is to qualify for accreditation by the American Association for Accreditation of Laboratory Animal Care, and if it is to continue to do research involving animals. At the present time, UIUC has millions of dollars of research grants and contracts that will be in jeopardy unless the PHS regulations are met.

The policy requires that OLAR must administer a complete review of all laboratory animal use protocols on the campus. In addition, it must strengthen its animal health maintenance and surveillance programs. Disease prevention and quality control programs need to be expanded to meet professional standards. These programs involve the quarantine and examination of animals and expanded follow-up diagnostic services.

New services will include random health screening of incoming animals from laboratory animal suppliers. Examinations will include serology, microbiology, histology, parasitology, and other tests which vary by specific animal species. The programs will add rodent viral serology testing to the battery of diagnostic tests now available.

These preventive medicine and quality control programs will assure better health for the laboratory animal populations and will improve the validity of research results. The change in both the scope and volume of services will increase the present level of diagnostic surveillance which now focuses on clinical illness rather than preventive medicine.

A recent self-assessment of UIUC laboratory animal programs pointed out the need for a campus-wide computerized laboratory animal program management system. The system will serve as an oversight mechanism to operate in cooperation with individual animal care units to provide the campus with statistics and information required by outside agencies in addition to providing the animal care unit with a rate-setting and cost-recovery system.

The College of Veterinary Medicine (one of four animal care units) has both the hardware and the software for this program. To expand to a campus network, UIUC must provide computer hardware for OLAR and the three other animal care units (College of Agriculture, School of Life Sciences, and Department of Psychology). A small expansion of the software programs will also be required.

To institute the required new services described here and to develop and to operate the proposed campus-wide computerized laboratory animal program management system will require additional new personnel and operating expense funds. The proposed budget for this program expansion is shown below:

<u>Nonacademic Staff</u>		
2.00 FTE Technical Positions	\$	36,000
<u>Expense</u>		
Commodities		22,000
Contractual Services		3,000
<u>Equipment</u>		<u>6,000</u>
	TOTAL	\$ 67,000

PROGRAMMATIC REQUESTS

PROGRAMMATIC REQUESTS

The impetus behind the University's FY 1988 programmatic requests is directly derived from its three-fold mission as the State's land grant institution: instruction, research, and public service. The programs proposed on the following pages each impact on the University's ability to fulfill at least one of these mandates. In an ever changing world, full of rapid technological advancements and continuously developing cross-cultural and economic interdependencies, the University must continue to identify and develop new initiatives which will provide both its direct, and its indirect benefactors with an educational environment that not only explores the frontiers of knowledge, but successfully maps and disseminates those frontiers in a clear, cogent, and concise manner to those who follow.

The expanded/improved programs proposed for FY 1988 fall into one of seven major categories:

- I. Scientific and Technological Advances
- II. Economic and Professional Development
- III. Promoting Instructional Excellence
- IV. Engineering Revitalization
- V. Minority Recruitment and Retention
- VI. Equipment Replacement
- VII. Library Improvements

A number of the FY 1988 proposals seek funds to broaden or intensify efforts in a particular area, which can be accomplished with one year's incremental advance. Many others are for programs at various stages within multi-year requests that require a more substantial monetary commitment. Each, however, will permit the University to more fully accomplish its instruction, research, and/or public service mission.

Proposals under the rubric of Scientific and Technological Advances are both continuations of previously funded programs and explorations of new initiatives designed to assist the University in meeting the State's continuing need for industrial development and diversification. Research efforts in Biotechnology, Artificial Intelligence/Cognitive Science, and Surface Chemistry and Catalysis have already provided tangible dividends to

the State's initial investment in the form of new scientific breakthroughs, crucial practical applications, and the attraction of major grants and gifts-in-kind from both public and private sources. Proposals for Population Genetics, Biological and Medical Magnetic Resonance, Rehabilitation Engineering, Human Factors in Complex System Design, and Environmental Toxicology display much of the same potential for generating further significant academic, economic, and social impact.

The UIC's Responding to the Impact of an Aging Society proposal is an interdisciplinary attempt to investigate and alleviate problems associated with an increasingly aging population through the training of the next generation of medical professionals who will face these predicaments head on. Current faculty in four colleges and two departments, along with new faculty and staff requested to fill existing program gaps, will continue the work in this very important area of need. Additionally, UIC has submitted two proposals which will benefit the College of Medicine at Urbana-Champaign. The first will permit the recruiting of permanent department heads for newly established clinical departments at the College of Medicine at Urbana-Champaign. These individuals will provide the leadership necessary to further establish and enhance both those new clinical programs and the nationally recognized Medical Scholar's program. The second will serve to provide the operational infrastructure necessary to support the Department of Anatomical Sciences, which has been subsisting on nonrecurring funds.

The proposals contained within the Economic and Professional Development theme, are programs designed to assist in training the State's and the Nation's next generation of workers, as well as those already engaged in the workforce, to meet the demands of new technologies and institutional structures and to address the changing roles of professionals throughout the State. Proposals to further support Research in International Business and Trade (contained in the Commerce and Business Administration proposal) and the Pacific/Asian Research Center at UIC will assist in discovering ways for businesses to compete more effectively in foreign markets and to facilitate economic forecasting and financial planning by developing techniques to be employed by both business and government.

The Health Administration program responds to the need to train personnel to cope with problems in the health care system, such as unequal

access, escalating costs, and inefficiencies. Also addressed are responses to continuing enrollment pressures in the Colleges of Commerce and Communications at UIUC. The program in Imported Swine Genetic Research will focus on delineating the optimal strategy for introducing beneficial traits of Chinese pigs, which have been found to be genetically superior to our indigenous U.S. herds in important ways. The College of Veterinary Medicine proposal aims to focus attention in areas of peak demand in veterinary training and education.

The proposals in West European Studies (WESP) and Arms Control, Disarmament, and International Security (ACDIS) will permit the functional consolidation of these already existing, but administratively struggling programs, in order for them to better serve as forums into the study of the interaction of issues, peoples, and governments important to the United States' foreign and domestic affairs.

The University Outreach program provides an outreach service to the State whereby the University shares its expertise by providing continuing professional education as well as consulting services to local business and industry. A portion of the funds requested are targeted to expand the already existing Office for Advanced Engineering Studies. Similarly, the General Advanced Educational Programs portion of the proposal is designed to implement a complementary program of service and graduate programs to other professionals. The proposal for the Institute of Government and Public Affairs is a plan to coordinate interdisciplinary investigations of scientific, technological, social, and political problems of vital interest to the State.

Programs within the Promoting Instructional Excellence theme are designed to assist the University in its continuing efforts to provide students a balance between a broad based liberal education and a more narrow, in depth study of a particular discipline. The educational programs of the University of Illinois attempt to prepare students to be not only technically proficient, but to be firmly grounded in the interrelationships within and among disciplines complementary to their areas of specialization. This University's first, and primary, responsibility is to strive to teach its students to think critically, and to provide them with a proving ground in which they can demonstrate and improve their proficiency in learning.

The proposals in Undergraduate Education at both campuses respond to problems of student enrollment demand, non-optimal class size, current ineffectual methodologies in the teaching of writing, and issues of faculty workload and support. The Academic Computing proposal from UIC addresses a most critical need to provide more and easier access for students to the institution's computing facilities. The Workstation Support and Development System proposal, UIUC's portion of the Academic Computing proposal, is designed to assist the users of the campus's broad spectrum of micro-computers (both students and faculty) in the evaluation and implementation of both hardware and software in order to successfully integrate these tools into the curriculum. The UIUC's Campus Honors Program is an attempt to provide a more rigorous and in depth educational experience for its very best applicants, many of whom now leave the State.

The Business, Technology, and Society proposal will make it possible for increasing numbers of non-business majors at UIUC to get a better grounding in principles of the market place. Both UIC and UIUC have included proposals aimed at providing important outreach services to Elementary and Secondary Schools in the State. UIC's Center for Urban Educational Research and Development and the Chicago Area School Effectiveness Council will not only engage in fundamental research into teaching, learning, and schooling, but will foster links between the schools and the researchers which will enrich the research, and will also expedite the efficient dissemination of the results of these research efforts into the schools where they can begin to remedy existing problems and further strengthen areas of excellence. UIUC proposes a similar effort through its Office of School Research and Improvement.

FY 1988 marks the fifth year Engineering Revitalization funds have been sought for each of the campuses. Past infusions have permitted the stabilization of faculty salaries at a position competitive with those found in engineering programs at peer institutions, have made it possible to increase undergraduate enrollments, and have allowed for progress in decreasing student/faculty ratios to more optimal levels at both Colleges. The requests for this year focus particularly on the addition of new faculty to further reduce the student/faculty ratio.

Roughly 28% of all students enrolled in Illinois public schools are from minorities. Historically, many of these minority students have either

not completed high school, or if they did, have been unprepared for the demands of a college education. Included in the proposals under the Minority Recruitment and Retention theme are requests to expand and add new features to existing programs at both campuses which have proven to be quite successful in increasing the statewide pool of academically prepared, minority, college-bound students and in retaining those students once they have matriculated.

Recurring instructional, support, and transportation equipment needs at both campuses remain acute. Aging, functionally obsolescent, and irreparable equipment abound in the laboratories, offices, and other areas of both campuses. The Equipment Replacement proposals outline current deficiencies and suggest a strategy for beginning to overcome this problem.

The Library Improvements proposals are put forward in response to increased student demand on current collections and the need to expand collections in certain areas. To meet the increasing student demand, an expansion of programs designed to train students in the use of the library is requested. This will involve not only the addition of new staff, but also the procurement of electronic devices which will permit a portion of this orientation to be conducted via video and/or cassette tape. In addition, recent programmatic expansion and increasing interdisciplinary efforts in areas such as biotechnology, computers, engineering, etc. have made the need for expansion of these collections imperative for faculty and students alike to have ready and ample access to necessary published materials.

The specific proposals to implement programs in each of the areas which have been described are outlined in the following section. Specific funding levels are identified, along with staff additions where appropriate.

TABLE 14
 FY 1988 PROGRAM BUDGET REQUEST
 (Dollars in Thousands)

	<u>UIC</u>	<u>UIUC</u>	<u>CA</u>	<u>Total</u>
I. Scientific and Technological Advances				
1. Biotechnology	\$1,085.0	\$ 500.0		\$ 1,585.0
2. Artificial Intelligence/Cognitive Science		500.0		500.0
3. Surface Chemistry and Catalysis		160.0		160.0
4. Population Genetics		200.0		200.0
5. Biological and Medical Magnetic Resonance		250.0		250.0
6. Rehabilitation Engineering		100.0		100.0
7. Human Factors in Complex System Design		100.0		100.0
8. Environmental Toxicology		100.0		100.0
9. Responding to the Impact of an Aging Society	320.0			320.0
10. College of Medicine Clinical Program at Urbana-Champaign	125.0			125.0
11. Anatomical Sciences at the College of Medicine at Urbana-Champaign	90.0			90.0
Subtotal	\$1,620.0	\$1,910.0		\$ 3,530.0
II. Economic and Professional Development				
1. Commerce and Business Administration	\$ 600.0	\$ 315.0		\$ 915.0
2. Health Administration	150.0			150.0
3. Pacific/Asian Research Center	175.0			175.0
4. Imported Swine Genetic Research		250.0		250.0
5. College of Veterinary Medicine		750.0		750.0
6. College of Communications		100.0		100.0
7. Arms Control, Disarmament, and International Security		100.0		100.0
8. West European Studies		100.0		100.0
9. University Outreach			500.0	500.0
10. Institute for Government and Public Affairs			350.0	350.0
Subtotal	\$ 925.0	\$1,615.0	\$ 850.0	\$ 3,390.0
III. Promoting Instructional Excellence				
1. Undergraduate Education	\$1,050.0	\$1,000.0		\$ 2,050.0
2. Academic Computing	750.0	300.0		1,050.0
3. Campus Honors Program		140.0		140.0
4. Business, Technology and Society		200.0		200.0
5. Services to Elementary and Secondary Schools	190.0	100.0		290.0
Subtotal	\$1,990.0	\$1,740.0		\$ 3,730.0
IV. Engineering Revitalization	\$1,500.0	\$1,700.0		\$ 3,200.0
V. Minority Recruitment and Retention	\$ 305.0	\$ 535.0		\$ 840.0
VI. Equipment Replacement	\$1,000.0	\$1,000.0		\$ 2,000.0
VII. Library Improvements	\$ 300.0	\$ 300.0		\$ 600.0
TOTAL	\$7,640.0	\$8,800.0	\$ 850.0	\$17,290.0

EXPANDED/IMPROVED PROGRAMS
I. SCIENTIFIC AND TECHNOLOGICAL ADVANCES

INTERDISCIPLINARY RESEARCH IN BIOTECHNOLOGY
(\$1,585,000)

Biotechnology Initiatives at Chicago
(\$1,085,000)

The University of Illinois at Chicago has several exciting and productive programs in biotechnology, most attracting significant outside funding and thereby multiplying the State's investment in this area several times. The FY 1988 request extends development in several biotechnology areas and includes new program development as well. Each program is described below.

Bio-Medical Computing (DaVinci Project) - (\$275,000)

The rapid development of microcomputer graphic capabilities is expected to promote sweeping beneficial changes in medical illustration and related health communication practices over the next few years. The DaVinci Project is the development and refinement of an electronic database of a standard, or common male and female, bodily conformation and appearance, with a specific objective of offering authoritative anthropometric standards using computer generated anatomical imaging. The project will be based in the Department of Biocommunication Arts, College of Associated Health Professions, and will serve as the initiating project for a cross-campus, multidisciplinary Resource Center on Anatomical Imaging, combining the talents and resources of diagnostic imaging specialists, anatomists, statisticians, clinical specialists of many sorts, computer graphics specialists, and medical illustrators. The project will stimulate research and development in all of these areas and will result in a unique center offering the ultimate in computer graphic anatomical imagery for both scientific and lay clientele.

An outcome of this project will be the development of a biostructure "image bank" useable for instruction, public information, product development, commercial advertising, and many other purposes. Prior to this time visual imagery produced by traditional means has been extremely labor-intensive. However, with well-researched coordinated image elements in hand, preferably encoded in digital data form, only minor adjustments to

accommodate a special slant on the subject would require individualized attention, and customized imagery of much improved validity could be produced at nominal cost.

Development of an integrated set of anatomical standards and graphic manipulation procedures will have a far-reaching impact in such diverse fields as: surgical instrument design; product design; medicolegal presentations; television animation; fine arts teaching; computer graphics technology; clothing design; sports equipment design; prosthetic, orthotic, or implant design; military technology; pharmaceutical research and development; bioengineering; public information broadcasting; anatomical simulators for crash testing vehicles; and health care training.

Within the medical illustration field itself, the implications will be revolutionary, making the anatomical imaging center a national and international resource to be used by both professionals and students. A faculty member of the Department of Biocommunication Arts, Scott Barrows, was featured in a recent issue of People Finders, a national magazine devoted to finding missing persons. Dr. Barrows is a medical illustrator who has turned his attention to a new technology he has helped to develop to locate missing children. Dr. Barrows has taken photographs of children missing for three years or more and drawn sketches to "age" the outdated photos. Using the scientific study of facial growth in children, Dr. Barrows has contributed to 23 cases with 6 of the children being found.

The DaVinci Project also will develop a plastination facility which should be regarded as a shared resource serving multi-departmental needs. Silicone plastic impregnated into biological specimens renders them permanently preserved, odorless, dry, flexible, and easily stored. Plastinated tissues are preserved down to the cellular level and can be cut without critical loss of material. A plastination facility can yield a number of services to campus units as well as to museums and teaching institutions in surrounding communities, perhaps developing into an income source, providing "in the original" preservation of unique specimens for scholars or autopsy specimens for courtroom cases, and making animal model research more effective and humane. A plastination facility is akin to an input device, actively serving the Anatomical Standards Database collection process, and ultimately leading to supercomputer graphics of anatomical subjects. With a combination of plastination and supercomputer graphics

support--literally, pictorial "graphs," giving visible, communicable means to otherwise incomprehensible numbers--the University can succeed in building important academic bridges among the research interests in gerontology, high-tech imaging, Biocommunication Arts, and the Basic Sciences.

In FY 1989, activities will focus increasing attention on arriving at an "averaged" configuration of the human body. The potential applicability of existing data resource materials to the graphic manipulations envisioned for the DaVinci database will be analyzed. Planning of new morphological research initiatives also will be required at this stage.

In FY 1990 and FY 1991, the DaVinci Project will attempt to describe and visually codify the state of present knowledge of normal morphology across the life cycle including conception to one year, child development toward adult configuration, and the normal aging process. Supercomputer imaging processing experimentation will be needed at this time.

In FY 1992, the DaVinci Project will increase the involvement of clinical specialists in setting standards of normal-to-pathological appearance expectations, characterization of organ motility, and projecting representational applications hoped for from the database. A "Bioform Image Bank" will be assembled demonstrating the developing capabilities of the system, and relying increasingly on the supercomputer facility. Increasing attention will be given to marketing outputs of the system and to seeking application research contracts and other external funding.

Funds requested for the DaVinci Project in FY 1988 total \$275,000.

Academic Staff

1.00 FTE Faculty	\$	70,000
1.50 FTE Faculty Project Specialists		70,000
1.66 FTE Graduate Assistants		25,000

Expenses

36,000

Equipment

74,000

TOTAL \$ 275,000

Joint Pharmaceutical Engineering Center - (\$110,000)

The ability to capitalize on current and emerging technologies has been the pharmaceutical and related biomedical industry's forte for many years, and accounts for the many successes of American-based companies on a

worldwide basis. However, as foreign organizations also develop their expertise, and as new drug delivery systems appear, it has become evident that the danger of obsolescence is as real in the U.S. pharmaceutical industry today as it is in the automobile and electronics industries. In 1983 alone the number of new drug entities originating in the U.S. was a poor third behind European and Japanese industrial groups. A recent National Academy of Engineering report cautions against "clear deteriorations" in the pharmaceutical industry's research efforts.

The State of Illinois and the greater Chicago area contain the second highest concentration of pharmaceutical and medically oriented industries in the United States. Both the College of Engineering and the College of Pharmacy have achieved widespread recognition for their educational and research contributions to these industries. These circumstances represent a unique opportunity for University/industry collaboration in high-technology pharmaceutical research. The campus recognizes this advantage and proposes the establishment of a Joint Pharmaceutical Engineering Center which will include Engineering faculty recruited through the Engineering Revitalization program and faculty of the College of Pharmacy.

The proposed Center will mobilize a broad spectrum of engineering and scientific expertise throughout the University and pharmaceutical companies in the Midwest. The Center also will seek to stimulate pharmaceutical research and strengthen the interaction between the University and local pharmaceutical and health care industries. The expected outcomes will be achieved through: (1) applying engineering concepts to the development of novel and useful drug delivery systems; (2) automating drug formulation processes, production processes, and associated quality control procedures; and (3) making the manufacturing and post-marketing surveillance processes subject to rational procedures.

The Center also will provide an opportunity for the pharmaceutical and health-related industries based in the area to share personnel and facilities not normally available on an individual basis. The latter is of special importance for smaller companies with entrepreneurial ventures.

There is a vital need for expanding the close collaboration between the University of Illinois at Chicago and the pharmaceutical and related industries in the region. Expanded collaboration not only is essential for the flow of creative ideas and innovation; it also is important for the

training of individuals preparing for careers in this industry. Some specific advantages to expanding the campus's close collaboration with pharmaceutical and related industries include:

1. opportunities for collaboration in the research of novel drug delivery systems, knowledge-based design and formulation of chemical, electrical and mechanical systems for drug development, and the processing of pharmaceuticals for large scale manufacturing;
2. access to pioneering investigations that complement industrial research through research reports, individual discussion and formal meetings;
3. ability to monitor the progress of new technologies and developments that may significantly affect current or long-range business; and
4. opportunity for clinical research through the extensive facilities at the Health Sciences Center of the University of Illinois at Chicago.

As a precursor to a joint center, the faculty of the Colleges of Engineering and Pharmacy have been working together for over a year. This collaboration reveals a clear need for a more organized and more formal approach to best use the combined talents of pharmaceutical and engineering scientists. Presently, only four such collaborative groupings exist in the United States, at the University of Utah, Rutgers University, Massachusetts Institute of Technology, and the University of Florida. The University of Illinois at Chicago has some distinctive advantages in developing joint University/Industry cooperation in areas relating to pharmaceutical engineering. For example, possibilities exist for technology transfer from UIC laboratories to the substantial chemical, pharmaceutical and food processing industries in the State of Illinois. The proposed Joint Pharmaceutical Engineering Center could closely articulate such a transfer.

The design of drug delivery systems such as transdermal patches, for example, requires a combined focus of basic characteristics of plastic/polymer matrixes, kinetics of large molecules, absorption characteristics of varied skin layers, and physical models of solubility. The bulk of a process for the preparation of certain antibiotics and biorecombinant DNA products begins after the work of the biologist has been completed. The process demands application of principles of fermentation, fluidization, and, where certain stability characteristics are of primary importance,

lyophilization may be called upon. Clearly, pharmaceutical dosage form development and subsequent manufacture are biological and technological in nature; the combined expertise of pharmaceutical scientists and engineering scientists is most important to these endeavors.

Present drug dosage forms tend to be inefficient given the degradation phenomena known in the digestive system, biliary/hepatic system, and the renal system. Specific work needs to be focused on alternative mechanisms by which chemical entities may reach and affect critical cell/tissue organ structures and by-pass the destructive effects of biotransformation systems. Once such novel systems are developed and proven to be effective, scale-up manufacturing must be considered in the context of the known principles of chemical and mechanical engineering.

The proposed center will require a total of \$110,000 in new funds for the College of Pharmacy for FY 1988. In addition, the College of Engineering will use \$146,000 of Engineering Revitalization funds to recruit faculty with experience in pharmaceutical engineering, and hire a computer programmer and a secretary for the Joint Center.

The Center will require approximately \$100,000 a year in new State funds through FY 1992 to achieve full core funding. External sources are expected to match new State funds by FY 1992.

For FY 1988, a substantial commitment will be made to recruit professional and technical personnel through the collaborative efforts of the Colleges of Engineering and Pharmacy. The newly-recruited personnel along with currently active faculty involved in pharmaceutical engineering research will form the core group necessary to initiate and sustain the Center's activities. The director of the Center will be drawn from the faculty presently collaborating on these efforts. Clerical support will be funded through the Engineering Revitalization program.

A core research group is already in position and working on drug delivery systems within the two Colleges. To complete the necessary core group, 2.00 FTE postdoctoral positions in Pharmaceutics and 1.50 FTE in Engineering are being requested through the Engineering Revitalization program. The academic positions in Pharmacy will be filled by personnel with expertise in phosphatide/protein interactions and bioerodible microparticulate delivery systems. In Engineering, one position would be a faculty member involved in engineering concepts of drug delivery,

especially methods of transdermal delivery. The resulting disciplinary cross-fertilization will lead to increased growth of the research effort.

<u>Academic Staff</u>	
2.00 FTE Academic Professionals	\$ 48,000
1.66 FTE Graduate Assistants	22,000
<u>Expenses</u>	10,000
<u>Equipment</u>	<u>30,000</u>
TOTAL	\$ 110,000

The Research Resources Center - (\$265,000)

The Research Resources Center (RRC) provides a number of facilities and laboratories for the support of faculty and graduate student research and teaching. These include the Bioinstrumentation Facility, the Biostatistics Facility, the Electron Microscope Facility, the Environmental Stress Facility, the Instrument Shop Facility, the Scientific Computer Workstation, and the Spectroscopy Facility. During FY 1985, the RRC's facilities/laboratories were utilized for 3,689 jobs. While accommodating these users, the equipment in various units within the RRC has been over-subscribed. This pattern of activity has not only continued in FY 1986, but is progressively increasing as a result of campus consolidation.

The RRC Facilities are a campus resource with a current staff of approximately thirty who manage the operations of four superconducting NMR spectrometers, two GC/mass spectrometers, seven electron microscopes, and several mini and micro computers. The RRC also provides sophisticated bioinstrumentation, biostatistics and environmental stress facilities, as well as a state-of-the-art instrument shop.

The FY 1988 request for \$265,000 for the Research Resources Center will support additional technical staff who will be responsible for maintaining and operating the Center's high-technology equipment, including the magnetic resonance spectrometers, scanning and transmission electron microscopes, mass spectrometers, an atomic absorption spectrometer, and mini-computers related to the operation of the equipment. Modest funding is also requested for faculty and graduate student instruction in the use of this equipment. Additionally, though major equipment needs are expected to be met through the Equipment Replacement proposal, a small amount of

equipment funds are sought for the recurring needs of the equipment already on hand.

A significant portion of UIC's research activity involves the use of electron microscopes. The campus will recruit a Senior Microscopist to instruct faculty and students in the use and maintenance of the high-technology equipment. The Microscopist will also be responsible for operating the equipment used in designing new experiments and for supervising three newly-recruited Electron Microscope Technologists. The Senior Microscopist will assist investigators in the design and interpretation of electron microscope studies.

The other new positions will include a Research Specialist in Nuclear Magnetic Resonance, responsible for the operation and maintenance of mass and magnetic resonance spectrometers; a Biomedical Engineer who will provide the required maintenance, repair, and redesign of mass spectrometers and electron microscopes; and a Biomedical Engineering Technologist who will be responsible for preventive maintenance and repair of general electron microscopes. These staff members will eliminate the need for costly service contracts with the equipment manufacturers as well as provide repair on a timely basis.

Also, FY 1988 funding for the Research Resources Center will support a new facility, the Cell and Molecular Biology Resource Facility (CMBRF). The Facility is designed to provide University investigators with the equipment and technological assistance necessary for conducting pioneering biological research at the University of Illinois at Chicago. The CMBRF initially will include existing electron microscopes, the fluorescence activated cell sorter, a DNA synthesizer and a laboratory for the analysis of protein composition and sequence. It will act as a resource for academic research and will support continuing education activities associated with the biotechnology community of the Chicago metropolitan area.

The CMBRF will increase the research capability of the Campus and maintain its position as a leader in biomedical education. Much of the advanced biotechnology that is crucial to modern biomedical research (e.g., protein sequencing) currently is unavailable at UIC. Consequently, researchers are forced to rely on inadequate research resources as substitutes for their vital research needs, placing ongoing research programs at a distinct disadvantage. For example, existing resource deficiencies limit

the scope of prospective research activities which might secure external funding. Also, the failure to alleviate this resource deficiency will in the long run threaten to jeopardize the quality of research and biomedical educational programs at the University.

New techniques in cell and molecular biology research are developing rapidly. The CMBRF will be used by faculty who are collaborating in interdisciplinary research programs and also will function as a training center for graduate students in the basic medical sciences. CMBRF personnel will be available to train the skilled personnel needed by academic institutions and industry in the Chicago area and will help to establish a leadership position for UIC in the fields of biotechnology education and research.

The CMBRF will require 1.00 FTE Graduate Assistant, while the equipment necessary to establish the Facility will be funded by a combination of campus and external funds.

Academic Staff

3.00 FTE Academic Professionals	\$	90,000
1.00 FTE Graduate Assistants		15,000

Nonacademic Staff

3.00 FTE Technical/Clerical		57,000
2.00 FTE Technologists		45,000

Equipment

58,000

TOTAL	\$	265,000
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Center for Genetics - (\$220,000)

Research in mammalian and human genetics has contributed immensely to the biotechnology revolution. There is now confidence in the scientific community that many of the diseases which man has known can be eliminated with the help of scientific breakthroughs in the field of genetics. Research and training programs in the Center for Genetics have helped establish UIC as a leader in genetic research. The recombinant DNA technology and major breakthroughs in combining these techniques with those developed by mammalian cell geneticists have made it possible to clone specific human genes for use in basic research.

Scientists in the Center for Genetics are studying the molecular basis of hemophilia, a congenital immunodeficiency disease that conceivably could be treated by gene therapy. The genes associated with both types of diseases have been isolated by Center faculty, and studies with cloned genes should indicate how the genes are regulated and how alterations in the genes lead to the diseases. Center researchers are seeking to identify molecular mechanisms of mammalian and human cells resistant to toxic drugs, providing valuable insight into the problems of cancer chemotherapy. The molecular basis of leukemias is also a major focus of study by faculty of the Center. Scientists are studying a new molecular technique to identify chromosomal rearrangements. Increasing understanding of these relationships could lead to breakthroughs in the treatment of leukemia.

The growth of the Center for Genetics began in 1981 with the appointment of a new Director, the construction of new laboratories, and the recruitment of new faculty members. Prior to FY 1986 the Center for Genetics did not have a Ph.D. program, though the Center did attract a number of graduate students, who were admitted through other departments. The approval of the Center's Ph.D. program in the area of mammalian genetics by the IBHE in early 1986 should help to attract top graduate students to the University. A total of \$308,700 has been provided to the Center from FY 1985 through FY 1986 Biotechnology incremental resources for the development of research and teaching programs.

Over the next five years, the Center's personnel should expand to include 15 full time faculty members, approximately 40 graduate students and 40 post-doctoral fellows, plus technicians, administrative, and support personnel. This number of faculty members would allow the Center to bring in new major areas of expertise and to cover the most important areas of research in mammalian molecular and cellular genetics. At present, the Center's budget funds seven tenure-track faculty members. Over the next five years, the Center anticipates that it will need approximately \$3.87 million from all sources to cover equipment and personnel.

Research in mammalian and human genetics being conducted in the Center will lead to a better understanding of the structure of genes and how they are expressed, how genes change and recombine, and of the genetic changes in cancer. Such research also can lead to breakthroughs in the diagnosis and treatment of genetic diseases and cancer, involving new modes of

therapy, new reagents for treatment, and new techniques for detection and diagnosis. The core faculty in the Center have been very successful in obtaining external research funding. In less than five years, the external research support of the Center has increased to more than \$925,000 per year, approximately \$185,000 per year for each of the five new faculty members. The overall level of support should increase proportionately as additional faculty members are recruited. Funds requested for the Center for Genetics in FY 1988 total \$220,000.

<u>Academic Staff</u>	
4.00 FTE Faculty	\$ 110,000
4.33 FTE Graduate Assistants	65,000
<u>Nonacademic Staff</u>	
1.00 FTE Clerical	20,000
<u>Expenses</u>	<u>25,000</u>
TOTAL	\$ 220,000

Periodontal Center - (\$140,000)

The College of Dentistry seeks funds in FY 1988 for the Center for Research in Periodontal Diseases and Oral Molecular Biology. The central focus of the Center's work lies in the delineation of the pathobiologic mechanisms underlying such diseases as periodontal disease, arthritis, and cancer. By utilizing a multidisciplinary approach, researchers associated with the Center are contributing significantly to etiological understanding, diagnosis, treatment, and prevention of these and related diseases.

In the past five years, Center scientists have made a number of important advances including the discovery of a new cell type found in epithelial tissue, the Thy-1 cell, and the development of an enzymatic assay for active periodontal disease. These advances have generated excitement and enthusiasm in the scientific community as well as external sources of funding. Outside grants to the Center have grown steadily from \$219,200 in FY 1980, to \$1,085,800 in FY 1985. Funding agencies include the American Cancer Society, the Arthritis Foundation, the Chicago Heart Association, the Chicago Lung Association, Eli Lilly Corporation, and the Muscular Dystrophy Association, among many others.

The Center does not grant degrees, though it does plan to engage in educational programs in concert with other academic units. As a campus facility with a multidisciplinary focus, the Center serves the faculty, students, and through research, the citizens of the State. Students in all phases of their education are expected to participate in Center-sponsored research. The Center also participates in the Health Sciences Operation Outreach Chicago Community Program by exposing high school, college and preprofessional students to educational and research activities and plans to sponsor at least one student each year in a preceptorship program. Students work closely with principal investigators and meet frequently with Center faculty to analyze data, discuss experimental design, plan future experiments, and review current literature and advances in their specific areas. A major educational activity has been the bi-monthly Center Forum in which Center members and invited guest lecturers meet with faculty and students to discuss their research. In conjunction with interested departments and units, the Center plans to offer interdisciplinary courses reflective of the Center's program areas. New funds available in FY 1987 will support further development of existing projects.

New funds requested in FY 1988 will support a researcher specializing in anaerobic microbiology, greatly expanding the Center's ability to study diseases such as periodontal disease in which anaerobic microorganisms play a major etiologic role. Additional support staff will also be added. Space remodeling will be required to accommodate Center expansion and a request for remodeling is included in the FY 1988 capital budget request.

Academic Staff

1.00 FTE Faculty	\$	60,000
1.00 FTE Graduate Assistant		15,000

Nonacademic Staff

1.00 FTE Clerical		15,000
1.00 FTE Professional/Technician		35,000

Equipment

15,000

TOTAL	\$	140,000
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Magnetic Resonance Imaging - (\$75,000)

The Magnetic Resonance Imaging (MRI) Center is a major University resource for research and patient care. MRI has been used for many years to investigate the pattern and composition of nuclei in vitro. Advances in magnet and computer technology have recently made it possible to use this same technique in humans. The images, especially of the brain and spinal cord, surpass any that can be obtained using standard radiological techniques, such as the CAT scan. MR Images are produced by mapping the distribution of protons (hydrogen atoms), without the problems associated with ionizing radiation.

MRI holds promise for a major breakthrough in the non-invasive diagnosis of disease and for the explanation of as yet ill-understood disease processes. The tracking of vital atoms such as oxygen, phosphorous, and sodium, plus the subtle chemical changes in their distribution that occur in disease is now possible. For example, disturbances in oxygen distribution lead to oxygen starvation and cell death in the affected tissues--a major cause of irreversible brain injury. MR Images of the brain in patients with multiple sclerosis are beginning to define the stages of that disease process. MRI and spectroscopy may lead to an explanation of the cause of Alzheimer's disease, one of the most distressing conditions facing an aging population.

Over the next decade, the development of MRI as a new diagnostic modality will greatly impact health care delivery costs. As spectroscopic diagnostic techniques are developed, a variety of invasive and often expensive diagnostic procedures may be eliminated. Similarly, the technique offers the prospect of less hazardous--no radiation is involved--and more accurate monitoring of treatments for conditions such as cancer.

The University of Illinois at Chicago has a long history of distinguished biomedical research using MRI. A core group of faculty from a wide range of clinical and basic science disciplines is developing in this technology. New faculty with specific expertise in clinical spectroscopy must be recruited. In time, it is likely, substantial new funds will come to the campus through sponsored research agreements and patient care revenues.

In the meantime, funding is needed to support the salary of the Center Director who is responsible for its operational management and charged to lead and coordinate its research activities.

Academic Staff

1.00 FTE Director	\$	<u>75,000</u>
TOTAL		75,000

Biotechnology Initiatives at Urbana-Champaign
(\$500,000)

FY 1988 marks the fourth year in which this proposal has been included in the UIUC budget request. The total budget for the proposal was initially established at approximately \$2.6 million. Through FY 1987 the State will have provided \$773,000 in recurring funds to support the program.

The goals of the program are as follows:

1. to begin new research and teaching initiatives in biotechnology;
2. to provide the faculty, support personnel, and expense and equipment funds needed to expand research activities;
3. to develop a campus-wide program of research seminars, shared resources, and curriculum enhancement;
4. to provide a State-funded base for acquisition of substantial external support for research; and
5. to provide State support for the Biotechnology Center to form the nucleus of a proposed industrial affiliates program in biotechnology.

The funds already provided have made it possible to make considerable progress toward meeting these goals.

As a first step to developing new research and teaching initiatives in biotechnology, a new faculty member has been hired in the Department of Plant Pathology to study the molecular biology of plant-bacteria interactions to develop strategies for improving these interactions in agronomically important ways. Searches are presently underway to identify a molecular immunologist for the Department of Animal Sciences, a mammalian molecular geneticist for the College of Veterinary Medicine, a molecular biologist for the Department of Biochemistry, an insect physiologist for

the Department of Genetics and Development, and an entomologist for the College of Agriculture. These searches were initiated in FY 1986 and the positions are expected to be filled by the fall of 1986.

These new faculty members will add greatly to the University's strength in the area of Biotechnology. However, there are still a number of research areas that will require new expertise in order to complete existing developmental efforts. The following research areas require new faculty:

1. Fermentation design research holds the key to maximizing the production of economically important microbes that have great potential in the production of value-added chemicals from agricultural products.
2. Microbial physiology research is extremely important to the State's pharmaceutical industry, for it involves extracting synthesized products from microbial cells.
3. Cell biology research, including monoclonal antibody, hybridoma, and cell culture techniques, is extremely important to those Illinois firms concerned with human and animal health. It represents a major factor in the development of a stronger research program in biotechnology that will expand the national visibility of the program and increase its outside funding.

New teaching initiatives have been supported through funds provided for courses in plant molecular biology, plant physiology, molecular genetics, and molecular immunology. These courses were taught for the first time in FY 1986, largely because financial resources became available to set up laboratory space and to provide state-of-the-art equipment required to teach modern techniques. In addition one biotechnology course included twenty-four speakers from industrial companies with large commitments to biotechnology-oriented research and gave students a first-hand account of industrial opportunities for employment in the biotechnology area at both the bachelors and graduate levels.

Funds in FY 1988 will be used to develop a course in plant and animal tissue culture. Both techniques are vitally important modern research tools. To date the techniques have largely been taught informally by a few faculty members in their research laboratories to a limited number of students. A shared facility where plant and animal tissue culture techniques could be taught in alternate semesters using common equipment is

being discussed. Corporations actively seek out graduates with this type of experience.

The two central service laboratories, the Genetic Engineering Laboratory and the Cell Science Laboratory, which were established using the FY 1985 appropriation of \$300,000, have made available to faculty state-of-the-art instrumentation for synthesis of DNA probes and peptides, hybridoma production, and fluorescence activated cell sorting. Both laboratories have served to help recruit new biotechnology faculty to the campus. Additional equipment such as a new \$400,000 fermenter--supported largely by NSF funds--and a molecular graphics workstation, have received partial support through the Biotechnology Center and will be available to researchers across the campus.

The FY 1988 budget requests recurring funds to assist in the purchase of badly needed instrumentation. The campus has only one modern electron microscope, and it is used to capacity. To attract quality faculty to the Cell Biology program and to meet the needs of the current faculty, a new electron microscope (Hitachi 600) is urgently needed. Additional funds are required to purchase a MicroVAX 2 computer and to provide continuing technical support for a systems programmer. Although this campus has an excellent reputation in computing, the resources available for biological research computing are severely limited. The VAX system represents a minimum investment to begin a comprehensive approach to meeting biological computing needs. It will support up to sixteen terminals simultaneously which will serve up to thirty-two faculty members. Currently, the only access to vitally important DNA and protein sequence data banks is via long-distance telephone connection to BIONET, a national database, costing \$400/year per individual faculty member, plus expensive telephone charges. With a computer system on campus the charges will be minimal to the individual user, and far greater access to the information will be provided.

In future years the recurring dollars provided for the purchase of these equipment items will be employed for maintenance and upkeep of the equipment, for the purchase of additional equipment, and for the replacement of outdated and worn out equipment. A recent report estimates that \$613,000 is needed to bring biological computing capacity up to a level where basic needs can be met.

The personnel of the Biotechnology Center have worked diligently to develop campus-wide programs that coordinate resource sharing and curriculum enhancement. A quarterly newsletter reporting on campus activities is distributed to the more than eighty Biotechnology Center faculty. The Biotechnology Center has also organized two conferences during FY 1986 to promote awareness among the general faculty, and invited industrial participants, of research being carried out by faculty at UIUC. Several corporations have joined the Biotechnology Center as corporate partners during FY 1986 and several others have made visits resulting in individual contracts with specific faculty members.

The Biotechnology Center has also coordinated the UIUC participation in the Midwest Plant Biotechnology Consortium. This consortium has been organized under the Midwest Technology Development Institute (MTDI) which is supported by the State of Illinois to enhance cooperation in technology development among mid-western universities and industries.

Approval of \$3 million in planning funds for a \$30 million USDA Biotechnology Building at UIUC represents recognition by the Federal government not only of the importance of biotechnology to plant and animal sciences, but also of the emerging leadership role that UIUC is expected to play in this area. The new building will house at least forty research programs and unique support facilities. The research to be conducted in the new facility is essential to assure the constant flow of new technology that increases efficiency and quality of agricultural operations and to expand markets. Its importance to the economy of the State of Illinois is obvious.

The FY 1988 incremental budget request is itemized below.

Academic Staff

4.50 FTE Faculty	\$	225,000
3.00 FTE Graduate Assistants		42,000
1.50 FTE Academic Professionals		45,000

Expense

Commodities		20,000
Contractual Services		8,000

Equipment

160,000

TOTAL	\$	500,000
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RESEARCH IN ARTIFICIAL INTELLIGENCE/COGNITIVE SCIENCE (UIUC)
(\$500,000)

Artificial Intelligence (AI) is the most rapidly-growing aspect of computer science. Many believe that an intensive development of AI will be the hallmark of the next phase of development of computer science. If Illinois is to play a major role in the computer science industry in the next generation, it must develop a reputation for frontier research in this area. In addition, the demand for computer scientists trained in AI is very intense, and the capacity of the University of Illinois to produce well-trained graduates of its computer science programs, at levels ranging from the B.S. through the Ph.D., is an essential aspect of the State's capacity to attract high-tech industry to Illinois.

The long-term goal of studies in AI is to make it possible for computers to perform tasks that require the intelligent use of knowledge. Ultimately, this capacity should allow computers and computer-controlled devices (e.g., scientific or industrial robots) to perform tasks for which humans are inherently unsuited (e.g., tasks that are too dangerous and/or cognitively or physically impossible).

Recently, interactions between AI, cognitive psychology, theoretical linguistics, and other disciplines have given rise to a field called Cognitive Science (CS), a critical aspect of which is the search for an understanding of cognition, be it real or abstract, human or machine. The goal of CS is to develop intelligent devices that can augment human capabilities in important and constructive ways and to understand the principles of intelligent, cognitive behavior in the hope that they will lead to a better understanding of the human mind, of teaching and learning, and of mental abilities. Thus, CS is necessarily an interdisciplinary endeavor to which theories about learning, experiments, and computer models all make unique contributions. New advances will require a high degree of interaction between researchers from such disciplines as computer science, engineering, linguistics, psychology, and even philosophy.

A growing number of universities in this country are making multi-million dollar commitments to programs that focus on AI and CS. Many of these institutions are among the nation's best in computer science and/or the relevant behavioral sciences (e.g., Carnegie Mellon, MIT, Stanford,

Texas). Their highly visible programs are likely to affect the attractiveness of the states or regions surrounding those institutions as locations for new industry that will make use of new development in AI/CS. Given the exceptional strengths of UIUC in these areas, it would seem prudent for Illinois to enhance an already strong effort. (Total external support for research at Illinois that has an AI/CS orientation rose to about \$4 million per year in FY 1985.)

The potential for AI/CS at UIUC is great, since the University is strong in most of the constituent disciplines. The groundwork for a sound program has been laid by appointing an interdisciplinary AI/CS steering committee to plan future efforts and to promote the growth of AI/CS at UIUC.

Several efforts to promote interdisciplinary research and training in AI/CS were initiated during FY 1986. For example, a fellowship program has been established for graduate students who wish to pursue interdisciplinary training in AI/CS, with the requirement that the student work under the supervision of an AI/CS faculty member outside the student's degree department. This program not only promotes interdisciplinary training in research, but also promotes faculty interaction, especially between the student's dissertation advisor and fellowship advisor, who are usually in different fields.

An AI/CS seminar series has been instituted as another means of drawing together the AI/CS research community. Papers on cutting edge research have been presented by a mix of local faculty members and distinguished outside speakers, with an emphasis on those whose research exemplifies the interdisciplinary nature of AI/CS. This seminar series has been responsible for integrating this widely disbursed interdisciplinary community.

The steering committee has also begun a formal study of curriculum needs for the AI/CS program. It is working to exploit current instructional resources and to propose new courses where necessary.

Toward the goal of identifying gaps in the AI/CS capabilities of the campus, proposals have been solicited from relevant departments for new and/or visiting positions to strengthen the AI/CS faculty. The proposals are now being evaluated and some of these gaps will be filled in the coming year. Searches are now underway for persons working in the areas of

computational linguistics and connectionist theory. Since AI is a unifying force in the AI/CS program, the use of computing equipment is a common need that will also be addressed this year. The purchase of various peripherals and networking equipment for existing workstations will proceed on a limited basis.

The increased visibility and strength of the program, and its perceived high quality have led the Defense Advanced Research Projects Agency to consider UIUC for a major grant in artificial intelligence research (\$1 to \$2 million per year). The presence of the AI program was also a significant factor in the proposal leading to the gift of the Beckman Institute. During FY 1987, efforts will be expanded to increase the visibility of the program and to increase the outside funding. To move the program to the forefront of research, efforts will be intensified to identify high-priority needs for AI/CS, including gaps in existing research capabilities.

The rewards for increased teaching and research activity in AI/CS at UIUC continues to grow at an accelerating rate, seriously straining the existing faculty resources and causing severe overloading of current scholars and researchers. The situation has reached the point where promising graduate students who wish to pursue AI/CS are sometimes unable to find advisors. The long-term solution, of course, is to recruit more AI faculty; in the short-term the AI overload can be reduced by adding teaching assistants for large undergraduate courses and by providing more instructional equipment.

In FY 1988, UIUC plans to begin to move the AI/CS program to the forefront of the field. World-class researchers will be recruited, both as permanent faculty members and as distinguished visitors, in areas where present expertise is thin (e.g., research in molecular biology of nerve cells) and in newly-opened research areas that bridge current disciplines (e.g., research in connectionist theory that bridges the gap between AI research and work in neuro-science). The kind of faculty that will be attracted will be natural candidates for participation in the Beckman Institute, which may well be the future home for the AI/CS program. Small additions to the nonacademic staff will also be required to support the new faculty.

Given the central nature of computing equipment in AI/CS, a recurring commitment for the acquisition of advanced workstations and related

equipment is required to ensure that state-of-the-art hardware is available at all times. Funds for high-speed networking and maintenance will be needed to allow the equipment to be used to its fullest potential.

Details of the proposed budget for FY 1988 are shown below:

<u>Academic Staff</u>		
6.00 FTE Associate Professors	\$	300,000
<u>Nonacademic Staff</u>		
2.00 FTE Technical Staff		40,000
<u>Expenses</u>		
Contractual Services		20,000
Commodities		50,000
Travel		5,000
<u>Equipment</u>		<u>85,000</u>
TOTAL	\$	500,000

Additional increments of \$480,000 will be requested for FY 1989, FY 1990, and FY 1991.

PROGRAM IN SURFACE CHEMISTRY AND CATALYSIS (UIUC)
(\$160,000)

Some of the most dramatic and far-reaching developments in science and engineering during the past several years have occurred in surface science. The study of surfaces is of great importance in fields such as corrosion, preparation of microelectronic devices, performance of new engineering materials, in chemical catalysis and in many other areas. A recent National Research Council report cites surface chemistry and catalysis as one of the intellectual frontiers in chemistry, a field that will produce many exciting discoveries of major basic and technological relevance in the future.

The first step in the expansion of the surface chemistry and catalysis program at UIUC will be initiated in FY 1987 with a \$120,000 appropriation to fund a position for a senior professor, an electronics technician, and an appropriate expense budget. The program will be devoted to graduate instruction and research and will involve the preparation and characterization of catalysts and of catalytically active surfaces and the study of the reactions which they generate. Research in this area is central to developments in energy utilization, both directly, in terms of making existing technology cleaner and more efficient, and indirectly, in terms of leading to new devices and processes.

The importance of catalysis in modern day chemistry has recently received considerable attention, even in non-technical publications. A recent Wall Street Journal article noted that "Catalysts will be the key, for example, to whether gasoline can be made economically from coal, and to whether benzene and other major chemicals can be made more cheaply than at present. New catalysts are emerging as the major weapon in the chemical industry's battle against inflation . . . helping to reduce energy consumption . . . and reducing the amount of undesirable by-products, including pollutants."

The economic ramifications of such developments are immense. For example, most of the U.S. petroleum cracking capacity has been changed from silica-alumina to catalysts based on zeolites. By converting a larger fraction of crude petroleum to gasoline rather than to coke and light hydrocarbon gases, this change is saving the U.S. economy more than \$2

billion per year, including a decrease in the amount of crude oil that has to be imported to maintain the economy. On a longer term basis, catalytic chemistry based on carbon monoxide and hydrogen has been described as a potential way of obtaining fuel when current petroleum supplies become exhausted. This technology will produce a new set of raw materials from coal that the chemical industry will then have available as building blocks for its products.

Apart from fundamental or basic research, many aspects of the effort in surface chemistry and catalysis at the University of Illinois involve finding solutions to important problems that affect the entire State. All agricultural crops, including corn, wheat, and soybeans, are critically dependent on the availability of nitrogen-containing compounds in the soil. These compounds, such as ammonia or nitrates, must ultimately be obtained from nitrogen in the air, either by the catalytic action of bacteria in the soil, or through large-scale catalytic production by the chemical industry. UIUC research chemists in the field of surface chemistry and catalysis at UIUC are studying the mechanism by which bacteria utilize nitrogen in the air. They are attempting to discover how the industrial catalytic processes work and are investigating new and better catalysts in an effort to make essential nitrogen-containing compounds more available and less expensive for agricultural uses.

The coal industry represents another important segment of the Illinois economy, and several problems relating to the efficient use of coal are also being studied. The treatment of high-sulfur coal to yield low-sulfur coal by catalytic desulfurization and the catalytic conversion of coal to other fuels, such as natural gas, gasoline, and kerosene, are just two projects that are being pursued in order to reduce the nation's dependence on foreign petroleum supplies. Related work in catalysis may lead to the development of better fuel cells, new micro-structures for the electronics and computer industries, and new plastics, pharmaceuticals, and other chemicals that could have a large beneficial impact throughout the State. The program will also help development of high-speed electronic circuits that depend critically on understanding the electronic structure of solid-solid interfaces (heterojunctions).

Basic research in catalysis and surface science has undergone a renaissance in recent years because of the development of powerful new

instrumental tools for study of the systems. A major graduate program in chemistry and chemical engineering must reflect a greatly increased level of activity in catalysis and surface science. It is important to generate new basic knowledge, which can lead to further advances in the area, and to train chemists and chemical engineers who can apply that knowledge to the improvement of current technology. Catalytic reactions at surfaces are very complex, and their study requires the integration of a wide range of technical expertise and experimental capabilities. The Departments of Chemistry and Chemical Engineering already have taken significant steps in this direction, involving four faculty on a part-time basis in Chemistry and one faculty member on a full-time basis in Chemical Engineering. These departments propose to build upon their existing strengths in this area and to expand and to broaden them by bringing additional faculty committed entirely to this area to UIUC and by encouraging greater involvement of current faculty.

The demand for Ph.D. chemists and chemical engineers in general is high. Moreover, the employment opportunities for graduates of this program are expected to be even better for the foreseeable future, because of the importance of the field in terms of the State and national economies. Because of the existing strengths and strong reputation of the School of Chemical Sciences at UIUC, this will be a highly successful and visible program.

A final incremental allocation of \$160,000 will permit UIUC to implement its full program in surface chemistry and catalysis. In view of the complex nature of problems dealt with in these areas, it is essential to add faculty who are experts in different areas of surface science. Two new faculty members, one to be hired in FY 1987 and one to be hired in FY 1988, will complement and further strengthen the current surface science expertise already available in the School of Chemical Sciences. Since research in this specific field necessitates the building and maintaining of very sophisticated equipment, additional support personnel in the various research facilities will also be required. Once the budget has been fully funded, it will be possible to offer new graduate courses and seminars in this area and to enrich lecture and laboratory offerings at the advanced undergraduate level. It should be noted that the nature of this program is such that significant levels of outside funding will be available to

support some of the start-up costs and a major fraction of the continuing operating costs associated with the program.

The details of the budget required for FY 1988 are included below.

Academic Staff

1.00 FTE Professor	\$	70,000
1.00 FTE Academic Professional (spectroscopist)		30,000

Nonacademic Staff

1.00 FTE Instrument Maker		30,000
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Expenses

Commodities		20,000
Contractual Services		<u>10,000</u>

TOTAL	\$	160,000
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POPULATION GENETICS (UIUC)
(\$200,000)

Genetics is fundamental to the understanding of biology because processes at all levels of organization--from molecular/cellular biology to whole organism/population biology--are linked to the inherited characteristics of organisms. Inherited traits change in populations from generation to generation in response to selective pressures of the environment. Population genetics is the study of the distribution of and changes in these traits. In the past fifty years population genetics, more than any other area of biology, has developed a rigorous quantitative theory amenable to experimental testing. Yet, one of the major gaps in the biological sciences at the University of Illinois at Urbana-Champaign is the lack of strength in population genetics. This is particularly felt now when dramatic advances in molecular techniques promise to give life scientists the ability to synthesize diverse fields of biology as never before. It is not only the application of these techniques to biotechnology that has fired the imagination of biologists, but also their application to problems of basic science.

To meet these gaps, a program is proposed to provide leadership for teaching and research in population genetics and to knit together diverse interests that already exist at UIUC. These interests, the facilities of the University being planned or already in place, and the new spirit of cooperation across departmental lines would assure that a first-rate program in population genetics will flourish.

Some examples of how this program would interact with and strengthen current programs of the University follow:

1. A strong group of quantitative geneticists has been assembled in the Department of Animal Science. This group works on selection of quantitative traits (those controlled by multiple genes) because it is these traits that are largely responsible for improved production of domestic organisms. Nevertheless, the group has strong theoretical interests and has expressed a need for support from more general population geneticists who also deal with one- or two-gene models.
2. The Department of Statistics is particularly interested in adding staff in the area of applied probability theory. Many population geneticists deal with such theory, and the Head of Statistics has suggested that a joint appointment (even a shared line) in theoretical population genetics should be pursued by the

Department of Statistics and the Department of Ecology, Ethology, and Evolution.

3. Many School of Life Sciences faculty members have interests in molecular evolution. Such molecular analysis aids in solving problems of systematics (the study of relationships among organisms) and in understanding many peculiarities of molecules that can only be understood in the context of their evolution. Recent national and international meetings of molecular biologists have indicated that increasing importance will be given to understanding the design (evolution) of molecules. Population genetics will make major contributions to this understanding.
4. The solution to many problems in modern population biology require both genetic and ecological analyses. These include such things as understanding life history patterns, mating systems, population dynamics, and plant-herbivore interactions. The core groups of ecologists in the School of Life Sciences, whose expertise includes these areas, is strongly supportive of the need for ecological population genetics.
5. Another area of current concern, both to agricultural and wildlife biologists, is genetic conservation. The long-term effects of reduced genetic variability owing to inbreeding, either because of human manipulation or because of small population size, are not clear. Population geneticists are beginning to apply their skills to these problems and to identify optimal breeding programs for maintenance of genetic diversity. Again, this is an area that draws together diverse groups from across campus.
6. The development of a national supercomputing center (needed for the analysis of complex models) and of a USDA Biotechnology Building (needed to provide space for new laboratories) will provide important resources necessary to support a strong program in population genetics.

The interactive and cooperative efforts described in the preceding list will require recruitment of five new faculty members. These will include a theoretical population geneticist who analyzes traditional genetic systems (one- or two-gene models) and their implications for evolution, a theoretical population geneticist who specializes in probability models, a population geneticist interested in molecular evolution, an ecological geneticist who synthesizes genetics with ecological phenomena found in natural populations, and a population geneticist concerned with inbreeding and the effects of small population size on problems of genetic conservation. Additional secretarial help and logistical support will be needed to support the research and teaching of these faculty. The budget details are indicated below.

Academic Staff

2.00 FTE Associate Professors	\$	80,000
3.00 FTE Assistant Professors		90,000

Nonacademic Staff

1.00 FTE Secretarial Position		15,000
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Expense

Commodities		10,000
Contractual Services		4,700
Telecommunications		300
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TOTAL	\$	200,000
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CENTER FOR BIOLOGICAL AND MEDICAL MAGNETIC RESONANCE (UIUC)
(\$250,000)

Magnetic Resonance Imaging (MRI) provides a powerful, non-invasive method of seeing organs and tissues inside a living organism. Nuclear Magnetic Resonance (NMR) devices use large magnets, which generate a constant magnetic field. The magnetic field causes the nuclei of atoms to "line up" so the magnetic polarity of the atom is aligned with the field. The atoms then are subjected to pulses of radio waves, which raise them to a higher energy level. When the radio waves are turned off, the atoms realign and return to their normal energy states, thus emitting radio waves of their own.

Since each type of atom produces radio waves at a characteristic wavelength, molecules can be identified by the radio spectra that their component atoms emit. Bone, blood, muscle, and other tissues of the body are composed of different amounts of water, minerals, proteins and other substances and often can be recognized by the radio "fingerprints" that they emit.

An NMR image is obtained by placing the patient or subject within the superpowerful magnetic field. Signals are detected, interpreted by a computer, and assembled into a picture somewhat similar to an X-ray.

But NMR images can reveal important details invisible to X-rays. NMR is more versatile even than the newer CAT-scan technique, which makes computer-assembled images of the body using only X-rays. Depending on how it is used, NMR can look at four or five fundamentally different aspects of the body, and thus in many cases is more useful than other methods. Unlike X-rays, CAT scans, and some other diagnostic methods, MRI employs no potentially dangerous ionizing radiation, radioactive material, or contrast dyes.

The University has begun to develop an MRI Program, with a goal of establishing a Center for Biological and Medical Magnetic Resonance. The objectives of the program are to: (1) create an interdisciplinary research effort incorporating all aspects of biological and medical applications of magnetic resonance, including the development of new techniques; (2) to provide sophisticated equipment and support systems for faculty using

magnetic resonance in their research; and (3) to provide education and training for scientists and physicians.

Dr. Paul C. Lauterbur was hired recently to direct the Biological and Medical Magnetic Resonance Program at UIUC. Dr. Lauterbur is known throughout the scientific and medical communities for his pioneering research in MRI. Dr. Lauterbur was the first to propose the use of NMR to produce images, the first to produce those images, and the first to contribute substantially in a number of areas to the development of the application of MRI in the study and diagnosis of human disease. His early studies led to the development of the Magnetic Resonance Imaging scanner, one of the most powerful diagnostic tools in modern medicine. MRI pictures, which are based on the responses of atomic nuclei in the body to a harmless magnetic field, frequently provide diagnostic information that cannot be obtained by computed tomography or other imaging techniques. MRI is used to diagnose brain and spinal cord disorders, document damage from heart disease and stroke, examine the kidney and pelvic organs, and identify degenerative neurological disorders such as multiple sclerosis.

Magnetic resonance and its applications have come to play a central role in a number of areas within the life sciences and medicine. The interdisciplinary nature of this field, the complex and expensive equipment required, and the several kinds of special expertise needed to develop new equipment and techniques and to guide research projects have stimulated the development of new integrated programs in many institutions. The research program being developed at the University of Illinois will cover a broad spectrum of activities from the basic theory of image formation, through the development of mathematical algorithms and instrumentation, to novel applications in the fields of plant, animal and human physiology, pharmacology and biophysics, and to the development of new areas of usefulness in medicine.

The funding requested, which will serve as the base of support, provides the Center with necessary scientific equipment, faculty members, and administrative staff, technicians, and graduate assistants. It is estimated that there will be approximately 40.00 FTE faculty, graduate students, and staff involved on an interdisciplinary basis from the Colleges of Medicine, Agriculture, Applied Life Studies, Engineering, Liberal Arts and Sciences, and Veterinary Medicine.

A high resolution multinuclear NMR spectrometer for tissue and organ studies is already in use and is being modified to permit microscopic NMR imaging studies as well. A whole-body superconducting magnet and a computer system for fundamental imaging research have been donated by industry and will be installed in FY 1987 in a new building now being designed for this program. Funding for the building is being provided by the Servants United Foundation. A relaxometer, an NMR instrument for fundamental studies of relaxation processes in solutions and tissues, is being donated by another company and will be installed in the fall of 1986. Another instrument, a small animal NMR imaging and spectroscopy system, is on order and due for delivery in late spring of 1986. A donation of a workstation for image processing and display is being arranged through the National Center for Supercomputing Applications, and it will be linked to the NCSA by a high-speed data line to be funded by a variety of campus sources. In addition, several items of special purpose NMR imaging equipment, purchased with NIH funds, will be transferred from the State University of New York at Stony Brook when space is available for them.

In the planning stages are a special NMR system for microscopic and solid studies, with funding to be requested from the NSF and other sources; a high field imaging and spectroscopy system for use in neurobiological investigations on large animals, to be installed in the Beckman Institute; and an experimental high-field human imaging and spectroscopy system, to be developed and installed in collaboration with a manufacturer. The total value of major equipment to be installed by FY 1992 is expected to be between \$4 and \$5 million.

The headquarters of the Center, and most of its equipment, will be in existing and planned buildings adjacent to the northern boundary of the UIUC campus, although some instruments will be placed closer to supporting laboratories elsewhere on campus. Close collaborative interactions are being arranged with the National Biomedical ESR Center, the Biotechnology Center, and the National Center for Supercomputing Applications. Others may be worked out with local medical institutions as they develop clinical NMR programs.

There is also a plan being formulated, under the leadership of one of the faculty, to establish a unique national facility for ultra-high field medical NMR. Three national planning meetings have been held, and funds

for the next stage of technical evaluation and facility planning are now being sought. With the proposed Center for Biological and Medical Magnetic Resonance in productive operation, the University of Illinois will have become a leader in this field and could be a very strong contender for such a national facility.

The center will require a total continuing operating budget of \$847,000 and approximately \$2 million in nonrecurring equipment funds. Of the total operating budget necessary, \$250,000 is requested in FY 1988. The nonrecurring equipment funds will be provided through a combination of University allocations, grants and private gifts.

Academic Staff

2.00 FTE Associate Professors	\$	100,000
1.00 FTE Academic Professional		30,000

Nonacademic Staff

1.00 FTE Technical Position		25,000
1.00 FTE Secretarial Position		15,000

Expenses

Commodities		60,000
Contractual Services		<u>20,000</u>

TOTAL	\$	250,000
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An additional funding increment of \$597,000 will be requested for FY 1989 and beyond to implement the full program.

REHABILITATION ENGINEERING RESEARCH PROGRAM (UIUC)
(\$100,000)

More than 35 million Americans suffer from some form of physical or mental handicap. For many, such simple tasks as eating a meal, dialing a telephone or saying "Hello" may be impossible without assistance. Disabilities take a toll on the individuals, who want more independence, and on their families, who often must cope with the emotional strain and demands of caring for them. Rehabilitation engineers and health researchers are working to lessen that burden and to increase potential for independence, adapting some of today's most sophisticated technologies to create aids for the disabled.

Meanwhile the growing ranks of the elderly in the U.S. population will place greater demands on finding improved strategies for meeting housing, communication, and health and safety needs of older people. Given the fact that the elderly share problems faced by younger disabled individuals, such as impairment of mobility, vision and hearing, new knowledge generated through rehabilitation engineering research can be expected to serve a growing segment of the population in the future.

Perhaps the greatest potential for enhancing the functional capabilities of individuals with disabilities lies in exploiting recent advances in micro-computer technology, cognitive science, artificial intelligence, robotics, and related fields. However, effective programming and interfacing of computers for individuals with disabilities can only be accomplished with the careful study of their real needs by educators, scientists, and engineers who are on the cutting edge of their disciplines. The University of Illinois at Urbana-Champaign, with its unusual strengths in rehabilitation education, computer engineering, cognitive sciences, and other relevant areas of knowledge, already has the essential academic ingredients to develop a strong interdisciplinary research program in this challenging area of rehabilitation engineering.

The basic objectives of the program are:

1. to conduct basic and applied research in adapting microcomputer systems for use by individuals with disabilities;
2. to evaluate new computer hardware that facilitates the use of computers by individuals with various disabilities;

3. to evaluate existing software to determine its propriety and, as necessary, to recommend modifications to better serve individuals with various disabilities;
4. to work closely with students with diverse disabilities who are willing to participate in the research, development, and evaluation of new computer-related technology appropriate for business, professional preparation, and higher education applications;
5. to facilitate research in the adaptation of input technology (switches, modified keyboards, braille, etc.) for individuals with physical or sensory (vision and/or hearing) impairments;
6. to facilitate research on speech input technology and its implications for computer use by disabled individuals;
7. to establish a research base for the evaluation of output technology (print, braille, speech synthesis, etc.) to meet the needs of disabled individuals;
8. to create an opportunity for faculty and disabled students to develop cooperative research efforts that will focus on new applications for individuals with disabilities; and
9. to explore applications of microcomputer technology pertinent to other areas of concern for the disabled, e.g., environmental control, independent living, household management, and leisure activities.

The program in Rehabilitation Engineering at UIUC will start in the fall of 1986 with limited external funding, and it has already attracted widespread interest and promises of cooperation at the local, state, and national levels. Salient developments that are of importance are listed below:

1. A committee chaired by the Director of Rehabilitation Education, under the aegis of the University of Illinois College of Medicine, has been working closely with the V.A. Hospital at Danville to promote research activities in rehabilitation engineering and other areas of rehabilitation research.
2. A joint proposal with the UIUC College of Medicine to develop executive workstations for individuals with physical and sensory impairments has received initial funding of \$138,000 from AT&T.
3. A project EXCEL pre-proposal: "Microcomputer Based Graphic Services for the Visually and the Motor Impaired Students" (\$61,598) has been approved.

4. Bioengineering continues to attract strong student and faculty interest at UIUC. The further development of Rehabilitation Engineering will provide a cornerstone for future bioengineering curriculum and research offerings.
5. A recent poll of current UIUC bioengineering students revealed a strong interest in research related to prosthetic design and other rehabilitation problems.
6. A proposal has been submitted to the National Institute for Handicapped Research to establish a special research and education program for the sensory impaired.
7. Further proposals for corporate, State and national support are under development.

The funds requested here will enable the units involved to build the core faculty and staff and in-house resources to a level where it will be possible to compete effectively with rehabilitation engineering research programs at other top-flight institutions (Harvard, MIT, Johns Hopkins, Stanford, Case, Northwestern, and Duke, among others).

The proposed budget request for FY 1988 is included below.

<u>Academic Staff</u>	
1.00 FTE Faculty Administrator	\$ 28,000
1.00 FTE Associate Professor	48,000
<u>Nonacademic Staff</u>	
1.00 Secretarial Position	15,000
<u>Expenses</u>	
Commodities	7,000
Telecommunications	<u>2,000</u>
TOTAL	\$ 100,000

An additional increment of \$150,000 will be required in FY 1989.

HUMAN FACTORS IN COMPLEX SYSTEM DESIGN (UIUC)
(\$100,000)

The Human Factors field examines the limits and strengths of human performance capacities and considers their impact on the design of complex systems such as automobiles, aircraft, air traffic control, nuclear power plants, robots, manufacturing equipment, and computers. While the need for human factors consideration in the past has been neglected, there is evidence of a growing realization within the Department of Defense and in U.S. industry that system design is currently driven largely by technological capabilities. This trend has resulted in complex systems that are less effective than they could have been if human factors had been considered in systems design. There are current efforts to establish a requirement within the system development decision process that will require a 30% weighting factor be given to the evaluation of the human factors aspects of system design. This significant increase in the weight of importance of human factors early in system development will create a tremendous need for human factors scientists and engineers. Other current evidence of an awakening in human factors concerns is the accelerating growth in membership of the Human Factors Society over the last few years, an average increase of 10% per year, and by the increasing demand for human factors personnel in industry. The computer revolution has significantly contributed to this increase.

The driving force behind the present program request is the requirement for humans to interact with complex, highly automated systems of which the computer is an integral part. Such systems are found in a variety of environments, five of which are strongly represented by ongoing research at UIUC. These are the environments of the complex computer-assisted aircraft, air traffic control, the automated and flexible manufacturing system, the nuclear power monitoring console, and the high-speed computer.

These systems, while differing in their purpose and time-constants, share in common certain important features:

1. They are complex, with many interacting elements and parallel ongoing processes.

2. They are highly automated, with extensive dependence on computer support. Increasingly, artificial intelligence and expert systems are integrated to provide high-level decision support to the human operator.
3. In spite of such automation, the human operator remains an integral part of the process--both to supervise and to coordinate elements of the system when the system operates normally, and to intervene with correct and timely action when it fails.
4. The economic and human costs to society when the system fails (as a result of either human or computer error) may be extremely large, as witnessed by events such as Three Mile Island, Chernobyl, or some recent airline accidents.

The common principles underlying these systems, and their collective identification of the human supervisor/operator as a focal point, define the need for a major research effort to address issues of human performance and human factors in complex systems. Relative to the extensive body of psychological knowledge pertaining to human interaction with non-computerized systems, very little is known about this interaction with complex and highly automated systems, beyond the realization that operators are usually overwhelmed by the complexity in times of system failure, as was graphically evidenced recently at the Chernobyl nuclear accident in the Soviet Union.

At present, some aspects of these issues are being addressed in various departments at the University of Illinois at Urbana-Champaign. In fact, the Engineering-Psychology program at UIUC is viewed as one of the top programs of its kind in the country. The strength and uniqueness of the program lie not only in the expertise of its faculty, but also in its interdisciplinary nature. This latter quality is evident in the series of joint faculty appointments (8.00 FTE) among the Departments of Psychology, Mechanical and Industrial Engineering, and the Institute of Aviation.

The existing Human Factors Group is developing working relationships with a number of major firms and governmental laboratories and agencies both within and outside of Illinois. The Illinois list includes the Clinton Nuclear Power Plant; Commonwealth Edison, Chicago; AT&T-Bell, Naperville; International Harvester, Oak Brook; John Deere, Moline; Caterpillar, Peoria; the National Center for Supercomputing Applications, Urbana-Champaign; and General Motors, LaGrange. Those outside the State are McDonnell-Douglas, Hughes Aircraft, Boeing, Boeing-Vertol, Northrup,

Honeywell, Oak Ridge National Laboratory, the Nuclear Regulatory Commission, and the human factors teams for the various branches of the U.S. military.

The specific goals of the proposed budget initiative will be to expand and to strengthen this program in the following fashion:

1. Through new faculty hiring, the program will incorporate subject matter experts in the fields of energy and nuclear process control, manufacturing systems, and computer-based expert systems, who have specific training in the human factors area. This will both broaden the scope of research in this area and will expand the graduate and undergraduate course offerings to meet the current demands.
2. The program will provide centralized coordination of these research efforts in the form of a senior level program director with academic training in one of the relevant disciplines.
3. The program will provide resources to operate an advanced computer-based generic simulator facility (i.e., a capability of simulating the information processing demands of a variety of complex systems). This facility will be made available to users with an hourly charge to research contracts, with the income generated employed to recover operating costs. Two nonacademic personnel will be responsible for developing and operating the hardware/software configuration and for the modification of this facility to meet research demands. Other units that would be interested in collaboration in the simulator facility include the Computer Science Department, the Artificial Intelligence Program, the School of Medical Sciences, the Department of Civil Engineering, and the College of Commerce and Business Administration. The latter three will be associated because of the obvious relevance of applications to decision making, diagnosis and complex system management.

The proposed program will permit the University of Illinois to take full advantage of the opportunities to make significant human factors contributions to complex system design. The return on this modest investment can be manifold, through continued growth in the outside funding support the program now produces.

An amount of \$100,000 is being requested for FY 1988, and an additional \$155,000 will be needed in FY 1989. The details of the budget for FY 1988 are listed below.

Academic Staff

1.00 FTE Associate Professor	\$	50,000
1.00 FTE Research Associate		32,500

Nonacademic Staff

.50 FTE Secretarial Position		7,500
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Expenses

Contractual Services		3,000
Commodities		2,000
Travel		3,000
Telecommunications		<u>2,000</u>

TOTAL	\$	100,000
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INTERDISCIPLINARY PROGRAM IN ENVIRONMENTAL TOXICOLOGY (UIUC)
(\$100,000)

Illinois ranks second nationally in the production of toxic wastes. The importance of health-related environmental toxicology has increased dramatically with public concern over acute and long-term human health implications of environmental contaminants. PCB's, PBB's, dioxins, formaldehyde, asbestos, lead, EDB, radon, and pesticides in general are now considered to be ubiquitous environmental hazards. Yet the long-term human health effects of these materials remain unresolved. While new compounds are sought to replace "problem" substances, hazardous wastes already generated have created an exposure problem of enormous proportions. In addition, technological advances continue to create new situations of potential human and general environmental health consequences. Proper control and management of toxic substances in the environment and prevention of their adverse health effects will require increased expenditures for control and increased numbers of scientists to conduct the research required to define more clearly the health effects of environmental toxins and to assess their long-term risks to man. Currently the demand for toxicologists in government, industry, and academic life far exceeds the number of students being trained throughout the country.

To meet current and future demands for trained personnel in toxicology, the University of Illinois at Urbana-Champaign proposes to expand its current strengths in Environmental Toxicology to complete a strong program in the health-related aspects of toxicology. UIUC already has in place much of the necessary research faculty and facilities to carry out an effective interdisciplinary program in environmental toxicology. Recently, several new scientists whose research interests are closely related to the biomedical aspects of environmental toxicology have joined the faculty of various UIUC departments.

To satisfy the concerns of the public and to strengthen the University's expertise in the biological effects of toxins, UIUC has initiated the first phase of an expanded Environmental Toxicology Program which focuses on the health effects of toxic substances in the environment. Environmental toxicology, interdisciplinary by definition, spans the colleges of Agriculture, Engineering, Liberal Arts and Sciences, Medicine, Veterinary

Medicine, and the Institute for Environmental Studies (IES). The program is administered by IES, which, because it is organized outside traditional departmental structures, enjoys a unique ability to foster and to support interdisciplinary programs. Decisions concerning the academic program are made by participating faculty from approximately 20 academic departments under the leadership of the Program Director. The specific objectives of the overall program are as follows:

1. to conduct fundamental research on the effects of toxins on man and animals;
2. to train students to fill the current shortage of professionals in biomedical toxicology; and
3. to coordinate the research efforts of UIUC environmental toxicology faculty members so as to provide an informational resource to Federal, State and local authorities.

Students must be enrolled for an advanced degree in the department of their major advisor. Acceptance of students into the graduate program is the combined responsibility of the faculty of the Environmental Toxicology Program and the department of the student's major advisor. Students meet all degree requirements of their specific department and participate in a common core of interdisciplinary courses and seminars devoted to environmental toxicology; they conduct their research in the laboratory of their major advisor. Depending upon the research problem, however, a student may work in more than one laboratory. Such a course of study can only be realized if it is supported by a coordinated academic program.

A total of five new faculty positions are necessary to fill existing gaps in the health-related aspects of the current environmental toxicology program: (1) immunotoxicologist, (2) biostatistician/epidemiologist, (3) inhalation toxicologist, (4) behavioral toxicologist, and (5) analytical toxicologist. The first two of these positions will be filled in FY 1987.

The next two positions are requested for FY 1988. All faculty will hold joint appointments with appropriate academic units, notably the Colleges of Medicine and Agriculture. A 75 percent IES, 25 percent other-department split is proposed. These faculty will extend, invigorate, and unify the Environmental Toxicology Program. Each new faculty member will develop new courses, will develop a disciplinary research program, and will conduct collaborative research to augment the interdisciplinary nature of

the Environmental Toxicology Program. The program exemplifies the campus interest in interdisciplinary studies dealing with an area of critical concern to the State, the nation and the world, and will educate graduate students to become the toxicologists of the next decade and beyond.

An amount of \$144,000 provided in FY 1986 has served to establish a firm base for the Environmental Toxicology Program. The addition of the requested two new faculty in FY 1988 will expand the core around which the environmental health aspects of the program will function, leaving only one additional faculty position to be filled. An increment of \$100,000 is requested for FY 1988. A further increment of \$320,000 will be requested for FY 1989 to complete the environmental health aspects of the program and to extend the risk assessment aspects of environmental toxicology to the management of those risks in the political, economic, legal and societal contexts. This last phase, environmental management, will be detailed in a subsequent proposal.

The details of the proposed budget for FY 1988 are provided below.

Academic Staff

2.00 FTE Faculty	\$	76,000
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Expenses

Commodities		10,000
Contractual Services		8,000
Computer Time		4,000
Telecommunications		800
Travel		1,200
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TOTAL	\$	100,000
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RESPONDING TO THE IMPACT OF AN AGING SOCIETY (UIC)
(\$320,000)

The U.S. Bureau of the Census has reported that the nation's median age rose from 27.9 years in 1971 to 31.2 years in 1984. This aging trend will continue as the baby-boom generation approaches middle and old age. Unless American society makes significant changes in how the elderly are treated, many persons will find growing old a frightening and painful experience. At the University of Illinois at Chicago, a group of faculty from many disciplines is working to identify ways in which the elderly can be helped to remain healthy, independent, and productive for as long as possible.

To coordinate and direct the development of the gerontological program activities at UIC, the University Center for Gerontology has been reactivated. The Center was established several years ago, before there was widespread interest in the aging of the population. In FY 1986, a noted scholar in geriatric medicine, was appointed Dean of the School of Public Health. Because of his interest in gerontology, the Center for Gerontology has been moved organizationally to the School of Public Health. With new State funds received for the development of the gerontology program at UIC in FY 1986 and FY 1987, core State funding for the Center has been established, and key faculty with expertise in various fields of aging are being recruited to provide support to the faculty in all of the colleges at UIC with an interest in gerontology. The Center will become the focal point for collaborative research in the field of aging and for the development of interdisciplinary approaches to teaching and research in the field of gerontology.

Half of the \$200,000 in new gerontology program funds received by the campus in FY 1986 was allocated to support the expanding role of the Center. The Center will coordinate gerontological instruction and training activities in which faculty from several disciplines work together, coordinate multidisciplinary research activities, and provide a clearinghouse for faculty research activity, research publications, and research and training grant availability. Of the remaining \$100,000 received in FY 1986; \$50,000 each was allocated to the Colleges of Associated Health Professions and Dentistry. The College of Dentistry used the funds to continue the

development of the geriatric dental clinic. The College of Associated Health Professions is recruiting a physical therapist who has been on a year's leave from another University as a fellow with the Institute of Medicine, doing research in the field of gerontology.

In FY 1987, new incremental funds will be available to support the initial development of instructional and research programs identified by the Center for Gerontology.

During FY 1989 and beyond, three additional faculty members will be added in each year until there is a strong emphasis with national recognition in gerontology throughout the program. Research activities will increase, and by FY 1992, over 35% of the funds needed to operate the Gerontology Center should be generated from external sources.

Many people experience multiple health problems as they grow older and a great deal of money is spent on health care for the elderly. It is estimated that a total of \$76.4 billion was spent in 1986 by the Federal government alone for the provision of health care to the elderly. Faculty from seven colleges at UIC have been developing a model of an integrated system of health and medical care for the aged which will serve as a laboratory for education and research and a demonstration center for clinical excellence provided in a cost effective way.

The developing model encompasses a complete range of health care alternatives integrated into a system of care. The alternatives include intensive, acute care in a tertiary hospital when necessary, but only when necessary. More often care will take place in an intermediate facility, an outpatient setting, or, to the maximum extent possible, in the patient's home. Movement from one level of the system to another will be coordinated by a health care team, and interdisciplinary consultation and continuity of care will be provided throughout. This flexible, cooperative model will enable the patient to preserve the greatest amount of personal freedom and dignity and should do much to keep costs of care at the lowest possible level.

The development of these components into an integrative whole will require several years of effort. The process is well along the way on several levels, where the resources are already available to faculty. The University of Illinois Hospital and Clinics now provide, through the Diagnostic Clinic, access to an Interdisciplinary Assessment Unit. Elderly

individuals coming to the clinic have their case evaluated by a team of health care workers. An individualized care program is designed and the health care team follows the patient's progress, with adjustments to the care plan being made as appropriate.

Ambulatory patients are seen four half days each week by physicians with an additional half day devoted to interdisciplinary assessment by a team comprised of a physician, nurse, medical social worker, and pharmacist. There is usually a two- to three-week wait for the assessment due to chronically full schedules. Physical facilities in the Clinic are also limited. Full-time geriatric ambulatory service is necessary to accommodate present and anticipated future demand for these services.

In addition, education programs for health professionals at both the undergraduate and graduate levels need to be instituted. The College of Medicine faculty must expand present levels of clinical gerontological investigative research, particularly in such areas as incontinence and osteoporosis. The College requests \$100,000 in FY 1988 to add faculty with training in geriatric medicine.

At this time, faculty in the College of Health, Physical Education, and Recreation are engaged in research which identifies the effects nutrition and physical exercise have on the aging process. Through this research, it may be possible to identify life styles in which health problems normally associated with the elderly can be reduced. The College offers a graduate level course in the effects of aging on motor and physiological fitness and recreation. In FY 1988, new equipment, supplies, and laboratory support staff, requiring \$55,000, are needed to fully develop an exercise laboratory for this individual to pursue his research.

The College of Associated Health Professions has been actively involved in the development of a teaching nursing home, the Westshire Retirement Center in Cicero, a suburb of Chicago. This nursing home is serving as a working laboratory for student clinical experiences in the care of the elderly. It is now projected that many health care professionals will spend up to 75% of their time treating elderly patients; thus, it is essential that didactic and clinical curricula be revised to include gerontological components.

In addition to working with the elderly in nursing home settings, practitioners will treat large numbers of elderly in their own homes. Such

treatment, utilizing health care professionals in the much-less-expensive substitute for hospital or institutional care, requires modification of existing health care curricula. The College of Associated Health Professions has already developed a new course in the Department of Nutrition and Medical Dietetics, now required of all graduate students in the program.

Faculty in the Department of Physical Therapy have developed an interdisciplinary graduate course focusing on teamwork in the care of elderly patients. The course teaches methods of dealing with pertinent health problems of older people and also simultaneously develops basic ideas and strategies about dealing with the allied health concerns of the elderly. For FY 1988, the College requests \$105,000 to broaden this effort by enlisting the services of nationally-recognized gerontological experts in the areas of physical and occupational therapy, nutrition and medical dietetics, medical social work, and medical records administration. These experts would be brought in as visiting faculty and would, over the years, enrich both the College and its recruitment efforts.

Offering gerontological content to students, practitioners, and faculty in both basic preparatory and continuing education contexts is an effective and efficient mechanism for the dissemination of new information and skills in gerontology. For allied health faculty members, such experiences tend to add a new dimension to their current teaching role since good health care and the alleviation of multi-factor problems for the elderly are largely functions of the adequacy of a multidisciplinary health approach. Teaching from an interdisciplinary perspective reinforces regard for comprehensive care and for advocacy services for the elderly.

Faculty of the Jane Addams College of Social Work have long been interested in the problems associated with the aging process, and they have revised their graduate curriculum to include gerontologically-related topics. Now the College wishes to focus research efforts on the effectiveness of services provided the elderly by its graduate students, faculty, and community agencies. Several members of the College's faculty are skilled in areas important to an aging population such as psychological depression, alcoholism, and sexuality. Their knowledge and abilities will not merely contribute to the gerontology program but will also stimulate outside support of research projects examining how the elderly are served

by society and government. In FY 1988, \$55,000 will be needed to support these research efforts.

In FY 1988, a total increment of \$320,000 is requested to support another phase in UIC's multi-year plan for expanded activities and service in the area of gerontology. UIC is now in a position to take a national leadership role in the many fields of gerontological research and training.

The FY 1988 budget request is itemized below.

Academic Staff

3.50 FTE Faculty	\$	162,800
1.00 FTE Administrative		36,000
2.50 FTE Graduate Assistants		40,200

Nonacademic Staff

1.00 FTE Clerical		15,000
1.00 FTE Nurse Director		41,000

<u>Expenses</u>		18,000
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<u>Equipment</u>		<u>7,000</u>
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TOTAL	\$	320,000
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COLLEGE OF MEDICINE CLINICAL PROGRAM AT URBANA-CHAMPAIGN (UIC)
(\$125,000)

Since clinical education began there in 1978, the Urbana-Champaign program has contributed between 12 and 30 students per year to the graduating class of the College of Medicine. At the same time, the nationally recognized Medical Scholars program has continued to develop, linking medical education to the outstanding academic resources of the Urbana-Champaign campus. Within this program, academically superior medical students simultaneously enroll in fields such as law, economics, accounting, business administration, history, physics, and electrical engineering, completing requirements for both the M.D. and the Ph.D. The strength of the clinical training experiences and the success of the Medical Scholars program are dependent on the addition of new program funds. The increase will allow completion of plans to recruit permanent heads to provide academic leadership for the newly established clinical departments.

Permanent department heads have been appointed in the clinical departments of internal medicine, family practice, and pediatrics. Recruitment activities are underway in surgery and psychiatry but have yet to begin in pathology and obstetrics and gynecology. In addition, one or two part-time salaried faculty have been appointed in each clinical department. These departments must have permanent heads, a small number of salaried faculty, and modest base budgets if they are to develop and provide an expanded clinical research program.

The department heads and salaried faculty will provide academic leadership for the practicing physicians who teach in the program and will organize the curriculum for the major affiliated instructional sites in the community. Internal reallocation has provided the funds to initiate these efforts.

New State funds are needed to complete the development.

<u>Academic Staff</u>		
2.10 FTE Faculty	\$	101,000
<u>Nonacademic Staff</u>		
1.00 FTE Clerical		14,000
<u>Expenses</u>		<u>10,000</u>
TOTAL	\$	125,000

ANATOMICAL SCIENCES AT THE COLLEGE OF MEDICINE AT URBANA-CHAMPAIGN (UIC)
(\$90,000)

The Department of Anatomical Sciences at the College of Medicine at Urbana-Champaign originated as an outgrowth of the Department of Physiology and Biophysics in the School of Life Sciences at UIUC. Faculty were recruited into Physiology and Biophysics in order to serve the anatomical sciences component of the then-School of Basic Medical Sciences at Urbana-Champaign. The primary instructional and research thrust of these faculty was in the area of developmental neural biology.

Although this was the most expedient way to fashion an academic unit to meet this specialized need for a developing medical program, the disparate research orientations of the faculty of Physiology and Biophysics and the group of anatomical scientists eventually required a functional reorganization. In addition, it was necessary that there be in place an independent, basic science Department of Anatomy in keeping with the programmatic structure of the developing medical school.

As a result, a Department of Anatomical Sciences was created within the School of Life Sciences to meet the research agendas of the faculty and to provide a service to the medical program. An Acting Head was brought in, and a department consisting of approximately seven core faculty, mostly funded by the College of Medicine, was formed within the School of Life Sciences over a four-year period.

The formation of the Department of Anatomical Sciences was not accompanied with funding appropriate to sustain such a department. The School of Life Sciences within the College of Liberal Arts and Sciences and the School of Basic Medical Sciences within the College of Medicine at Urbana-Champaign supported the establishment of the Department of Anatomical Sciences with little other than the faculty lines already described. No formal budget lines for graduate assistants, wages, operating expenses, equipment, or other academic and nonacademic staff existed. The Department has received some nonrecurring funds but an adequate infrastructure is not available.

The FY 1988 request is detailed below. It will provide a minimum level of support for the Department to maintain its current level of activity.

<u>Academic Staff</u>		
3.00 FTE Graduate Assistants	\$	54,000
<u>Nonacademic Staff</u>		
1.00 FTE Clerical		15,000
<u>Expenses</u>		<u>21,000</u>
	TOTAL	\$ 90,000

EXPANDED/IMPROVED PROGRAMS
II. ECONOMIC AND PROFESSIONAL DEVELOPMENT

COMMERCE AND BUSINESS ADMINISTRATION
(\$915,000)

Chicago Program
(\$600,000)

Research and Teaching in Commodities, Futures Markets, and International Business and Trade

International business and trade is becoming increasingly important to the economy of the State of Illinois. Development of global markets for Illinois' agricultural products, the growing influence of international financial markets for the Illinois' business community, and the rapidly changing economic environment affecting Illinois' traditional manufacturing community are forces which will have a profound and lasting impact on the social and economic well-being of the State. Recognition of these forces and their potential effects on the citizens of Illinois has stimulated efforts from the Governor, legislative groups, the Mayor of Chicago, and many business and professional leaders to work to improve the State's international trade position and to encourage foreign investment in Illinois.

Presently the Chicago area lacks a strong interdisciplinary academic program in international business. The multidimensional program being proposed by the College of Business Administration (CBA) would place UIC at the forefront of efforts supporting international economic development in the State of Illinois. Advanced undergraduate and graduate courses, combined with a well-designed and sharply focused research program to identify and examine issues and problems confronting Illinois in the international trade arena will significantly improve opportunities for many sectors of the State's economy to participate and compete successfully in international markets.

Investment of additional funding will permit the CBA to attract outstanding senior scholars, to augment the existing faculty strength and to build on a base already provided by UIC's activities in the international academic community. UIC has established liaisons with Europe and with many nations of the Pacific. Faculty and graduate student exchange

programs are in effect with universities in Poland and in China. The College has recently extended a very successful cooperative education program for MBA students into the international arena by placing students in jobs with participating firms in several European countries.

With new FY 1987 funds, the College will be able to hire a senior scholar and initiate research programs geared to examine, on the one hand, the flow of commodities and services, and on the other, the means of payment and movement of capital. This approach provides a large area of intersection between the study of international trade and research in the commodities and futures markets. Problem areas to be examined include the availability of financing, credit, and currencies; expediting and executing trade; location of production and transport; legal, cultural, political, and environmental differences affecting trade; organizational effectiveness and labor relations; and economic assistance to underdeveloped countries. These studies will examine social, political, and cultural factors underlying the success or failure of international business and financial enterprises. Comparative analyses will be undertaken to yield information and models with which Illinois firms can plan more efficiently and compete more effectively in foreign markets.

Results of these research efforts will be introduced into the curricula of the CBA in the form of new courses, as well as improvements in existing courses, providing better trained students with a more complete understanding of the international business environment and the factors affecting a firm's ability to compete successfully in international markets. Since most CBA graduates find employment in Illinois, these benefits will be directly transferred to Illinois firms, and through those firms to an improved Illinois economy. Research will also be disseminated to a broader public through publication of theoretical and empirical studies. It is anticipated that some research projects will be undertaken in cooperation with, and partially funded by, government agencies, professional organizations, industry groups and firms which will apply the findings to their own activities in international business and trade. Most of the traditional methods of distributing information derived from this research will be employed, including lectures, seminars, and workshops designed to explore a set of issues or themes. Funds requested for FY 1988, which are listed below, would continue and complete these research efforts.

<u>Academic Staff</u>	
7.00 FTE Faculty	\$ 340,400
4.00 FTE Graduate Assistants	60,000
<u>Nonacademic Staff</u>	
2.66 FTE Clerical	45,600
<u>Expenses</u>	90,000
<u>Equipment</u>	<u>64,000</u>
TOTAL	\$ 600,000

Urbana-Champaign Program
(\$315,000)

Strengthening Commerce and Business Administration

The College of Commerce and Business Administration at UIUC is in serious financial difficulty. Although the College has received incremental State funds in recent years to hire additional faculty members and graduate assistants to lower its extremely high teaching loads, it still needs additional funds (\$700,000) to reduce those teaching loads to a reasonable level. It has also encountered continuing difficulties in the area of salary competition for new faculty. Of the twenty-two offers that the College has made to faculty candidates in FY 1986, only five have been accepted, and the College has learned that candidates are getting much better offers elsewhere.

This situation is similar to what UIUC has experienced in certain other areas such as engineering, computer science, the physical sciences, and others where UIUC faculty are among the strongest in the nation. UIUC must compete with other universities and with industry to retain current faculty, and must, as well, compete directly with them in trying to attract the best new faculty available. Such competition inevitably brings stiff pressure for salary increases well beyond the average available for the campus as a whole. Salary competitiveness simply must be maintained both for new faculty members attracted to the campus and for current faculty who must be retained.

As has been the case in engineering, the campus and University will continue to monitor the salary competitiveness in Commerce and Business Administration during the coming year. If the present lack of competitiveness continues, it may be necessary to utilize a portion of the FY 1988 program increment to restore Commerce and Business Administration's ability to compete more favorably with other top quality colleges for faculty.

The demand for admission by prospective students wishing to major in Commerce, or for entrance into selective courses by students in other colleges on the campus, has grown extensively over the past fifteen years. Growth in the number of students wishing to enter business schools is not unique to the College, but is being experienced by leading business schools across the country. Instructional units generated in courses taught in the College increased by 75% from 1970 to 1981. The College, in cooperation with the campus administration, has imposed enrollment ceilings on entering freshmen and transfer students since 1974. All growth in student enrollments was stopped in approximately 1980, and forced reductions in the size of the undergraduate student body occurred during FY 1984 and FY 1985 in an attempt to bring the enrollment in line with the available resources.

Funding has not kept pace with this growth in demand. The results are listed below:

1. Section sizes have averaged over forty-five students per section. Not only is this average believed to be the largest for any college on the UIUC campus, but numerous courses in the College are among those listed as having large unmet demand.
2. Over 37% of the instructional units are taught by graduate assistants. Some students never have a class with a faculty member until they reach their junior year.
3. Standards for admission into the College have risen sharply. The 1985 freshman class entered with a minimum required ACT of approximately 26 and high school percentile rank of 90. These entrance standards are believed to be the highest of any undergraduate business school in the country.
4. Students wishing to transfer into the College from other colleges and universities around the country or from other colleges on the campus must have completed 60 credit hours inclusive of a set of required courses and must have achieved at least a 4.4 GPA.

There is no present evidence of any abatement in the demand for enrollment in courses taught in the College.

Underfunding has made it difficult for the College to hire the faculty required to provide a modern curriculum tied to the rapidly changing technology of the business world. The College has met with considerable success in acquiring microcomputers and related software through outside support and plans to increase such efforts, but it must have more faculty to reduce teaching loads so that its current faculty and new faculty will have time to stay abreast of current changes and will continue to produce graduates with the skills sought by those firms and businesses in the marketplace that return each year to recruit at UIUC.

Because the State has recognized the severity of the financial problems of the College of Commerce and Business Administration and has contributed incremental funds in recent years to ease the stress in the College, the campus administration began increasing the number of freshmen admitted to the College in the fall of 1985. This increase in enrollment was made in anticipation that additional increments totalling \$700,000 over the next several years would be available to hire sufficient faculty and graduate assistants to accommodate the students.

Space has also become a serious problem for the College. Its faculty are now spread among three different buildings. Many of them are in small, cramped quarters. Classrooms in the Commerce Building and in David Kinley Hall have been converted to offices for Commerce faculty members, forcing them to teach classes in locations sometimes quite distant from the buildings in which their offices are located. This problem is addressed in the capital budget request. Planning funds are being requested for a New Commerce Building in FY 1988.

The proposed budget for FY 1988 is listed below.

<u>Academic Staff</u>	
3.00 to 6.00 FTE Assistant Professors*	\$ 280,000
2.00 FTE Graduate Assistants	29,000
<u>Expense</u>	
Commodities	<u>6,000</u>
TOTAL	\$ 315,000

*Precise number will depend on amount of salary enhancement necessary.

Because of the uncertainty of the precise level of market-driven faculty salary enhancements necessary in FY 1988 and beyond, it is presently not possible to state exactly what level of additional incremental funds will be requested in FY 1989. However, the present student-demand-driven need of \$700,000 is a fixed goal, and future requests will reflect the proportion of FY 1988 funds allocated to meet this need.

HEALTH ADMINISTRATION (UIC)
(\$150,000)

The Health Administration program of the University of Illinois at Chicago is a multi-year interdisciplinary program having the following specific goals:

1. to prepare, through professional graduate education and a multi-disciplinary approach, individuals who possess the requisite knowledge, skills, and values to function effectively in managerial roles in health service organizations or to participate in the administration, formation, and evaluation of Federal, State and local health policy;
2. to provide opportunities for research directed at improving the organization of health services and promoting management effectiveness and efficiency;
3. to serve as a resource for students throughout the University who wish to increase their understanding of health service organizations and enhance managerial skills; and
4. to facilitate effective interaction among faculty, staff, alumni, and practitioners, encouraging their continuing professional development and providing advisory resources to organizations involved in the financing, delivery, and regulation of health care services.

The Health Administration Program builds on strengths of several cooperating units including the College of Business Administration, the College of Nursing, the College of Pharmacy, the School of Public Health, the School of Urban Planning and Policy, the Center for Educational Development and the University of Illinois Hospital. The program is designed to consolidate, redefine, and expand elements of current programs, and thereby improve the educational experience and enhance the identity and visibility of a health administration specialization within existing degree programs.

The Health Administration Program will operate as an intra-campus consortium, drawing upon the resources of participating colleges and schools to achieve education, research, and service goals. Students desiring a health administration specialization will be admitted to degree programs of participating academic units beginning in Fall 1986. State funds are being requested in FY 1988 to address deficiencies in the campus' instructional offerings; to provide required program administration and

coordination of resources; to support graduate assistantships; and to develop an executive management series.

Two new faculty members will be recruited in FY 1988. One will be based in the College of Business Administration and the other will be hired in the School of Public Health. The latter faculty member, in addition to normal instructional responsibilities, will participate in the activities of the Institute for Government and Public Affairs.

A Coordinator will be hired to coordinate curriculum planning, implement marketing and recruitment strategies, provide information to potential applicants, advise students who specialize in health administration, coordinate practice, develop cooperative educational opportunities, identify additional sources of student financial aid, and provide assistance and coordination for research and service projects sponsored by the program. Two clerical staff members and a part-time graduate assistant also will be hired.

The development of an Executive Management Series will allow the Health Administration Program to expand its visibility in the Chicago area and the State. Development of the Executive Management Series will be undertaken jointly by the Consortium program sponsors and by the Institute for Government and Public Affairs. The FY 1988 funding request will support the preparation of program brochures, program marketing expenses and other required operational expenses of the Executive Management Series.

With a modest level of new funding support from the State, the University of Illinois at Chicago can begin the development of a broad-based health services administration program. Management in perhaps no other field today faces as difficult and far reaching challenges as does management of health services agencies. The University of Illinois at Chicago should be able to train individuals to meet the challenges of maintaining quality of care, in delivering care at all levels of acuity, and in keeping the costs of care low without sacrificing quality. At no time have challenges in this field been as great and the opportunities for expanding the benefits of health care been as promising.

Academic Staff

2.00 FTE Faculty	\$	74,500
1.00 FTE Academic Professional Program Coordinator		28,000
.50 FTE Graduate Assistant		7,500

Nonacademic Staff

2.00 FTE Clerical		30,000
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Expenses

10,000

TOTAL	\$	150,000
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PACIFIC/ASIAN RESEARCH CENTER (UIC)
(\$175,000)

The Pacific/Asian American Mental Health Research Center, associated with the University of Illinois at Chicago since 1976, is one of six minority research and development centers funded since 1974 by the National Institute of Mental Health. At present, the Center is conducting research on a number of topics: psychiatric epidemiology in China, particularly an epidemiological survey of Alzheimer's Disease in China; social change, work, and family stress in South Korea; international migration and family changes in Taiwan; and attitudes toward mental health and mental illness in Thailand. These projects have been undertaken with the collaboration of indigenous and university-based medical and research groups.

The campus plans to expand and build on these existing research and collaborative ties in Asian countries by broadening the focus of the Center and changing the Center's name to accurately reflect present faculty activities in Asia. Renamed the Pacific/Asian Research Center, it will provide access to a broad base of support from both federal and private sources, particularly in view of the dramatic increase in international trade and technological transfers between Asia and the United States. Business and governmental communities have already entered the Asian market through the official exchange of visits and trips to the Far East within the past twelve months by both Governor Thompson and Mayor Washington, to the benefit of the State and the City of Chicago.

The immediate goal of the expanded Center is to develop more active collaborative research relationships with appropriate groups in Asia beyond the limited focus of mental health. This expansion will cover limited interests in science and technology, international business, finance and trade, international migration, environmental health, epidemiological surveys, and family change--in short, economic development on both sides of the Pacific Ocean. Achievement of this goal requires attracting able and interested faculty members for identification of immediate research possibilities and for development of projects useful to Illinois business and political communities.

The increase of Asian immigrant populations in the State and in Chicago is clearly consistent with the growth of Asians in other large

American cities. Between 1970 and 1980, these populations have grown more than 130%. At the same time, trade relationships between the United States and countries in Asia have also increased many times. As the State and City continue to look to Asia for new markets and exchanges, State universities will provide specialists to further the cross-cultural and cross-national communications and exchanges.

The renamed research center, with its expanded mission, will help to consolidate individual faculty research efforts and create a critical mass, thus making the University's academic work in Asia, and on Asia, more visible to potential donors and funding sources. The broadened focus of the Pacific/Asian Research Center will accomplish two major tasks: expansion of research focus and emphasis on research in Asia by faculty and graduate students.

Although research centers are not degree conferring units, the Center does perform educational functions as a part of the University of Illinois at Chicago. The Pacific/Asian American Mental Health Research Center, for the past decade since relocating to the UIC campus from the University of California at San Diego, has become known for many national and international symposia, training workshops, and conferences. The expanded Center will continue to engage in such training and continuing education activities, to offer research fellowships and internship opportunities for both faculty and graduate students, and to house visiting scholars during their stay on campus.

Academic Staff

1.50 FTE Academic Professionals	\$	44,600
2.00 FTE Faculty		90,000

Nonacademic Staff

.33 FTE Clerical		5,400
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Expenses

25,000

Equipment

10,000

TOTAL	\$	175,000
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IMPORTED SWINE GENETIC RESEARCH PROGRAM (UIUC)
(\$250,000)

The College of Agriculture is committed to a program to evaluate and to incorporate desirable traits of imported Chinese swine into U.S. breeding stock. The impetus for this program came from Governor James Thompson's recent visit to the People's Republic of China. During that visit an agreement was made with the Chinese to exchange germplasm and breeding stock that could lead to a research program which could lower swine production costs, give greater reproductive efficiency to producer's herds, and have a major beneficial impact on the Illinois economy.

Research conducted in the People's Republic of China and in France has clearly established that some Chinese breeds are far more prolific than any other in the world. Females of these breeds reach puberty at about 90-100 days of age, three or four months sooner than American breeds. They produce litters that average 13-17 pigs, of which 11-15 are weaned. In comparison, outstanding commercial producers in the U.S. currently wean approximately 7.4 pigs per litter. The high rate of production of weaned pigs by Chinese sows is primarily a result of the larger number of pigs born and to a lower death rate among suckling piglets. Chinese pigs possess natural resistance to some forms of baby pig diarrhea, the major cause of death loss in U.S. swine production. An increase of three to four pigs weaned per litter in Illinois, which is a conservative estimate of the potential, would produce an additional \$300 million per year in the Illinois economy, even if there were some price decline related to the increase in supply.

There is strong support for this project from producers and producer groups in the State, notably from the 10,000-member Illinois Pork Producers Association. The College of Agriculture will work with public and private organizations in Illinois to reach the goal of developing superior swine by incorporating the best characteristics of Chinese swine into Illinois stock while genetically minimizing the effects of any inferior traits.

Twenty-two persons have been invited to serve on an advisory committee to make recommendations on various aspects of the program, including when and how the germplasm eventually will be released to commercial breeders and producers (i.e., public sale, lottery, etc.). The advisory committee

members will represent Illinois agricultural organizations, Illinois pork industry breeder and producer organizations, the Illinois Department of Agriculture, State legislators, and the University of Illinois at Urbana-Champaign.

The Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture is negotiating an agreement with the People's Republic of China regarding the selection of breeding stock and its quarantine. The tentative agreement involves selection of superior breeding stock by Chinese experts and includes a five-month isolation period at the USDA center in Florida. The cost of quarantine is estimated to be approximately \$5,000 per pig.

Illinois must move rapidly to incorporate desirable Chinese swine characteristics into Illinois herds and to benefit from this new technology. Despite their natural productivity and disease resistance, Chinese pigs cannot be usefully introduced directly into Illinois production systems because they lack some desirable carcass characteristics and do not convert feed as efficiently as domestic breeds. An intensive basic research breeding and evaluation effort will be required to incorporate the best characteristics of Chinese swine into Illinois herds. As in all other agricultural research and development efforts, the early adopters of the new technology will benefit most significantly. Those who are slow to adopt the technology will find themselves in a very difficult competitive position. It is absolutely imperative to introduce this technology into Illinois swine production; otherwise, this vital Illinois agricultural enterprise will suffer very serious competitive consequences.

It should be noted that the facilities to accommodate the proposed research program have already been approved. With the support of the Illinois Pork Producers Association, the General Assembly passed, and Governor Thompson signed, an appropriation for FY 1986 to erect a building at Urbana-Champaign to house the imported Chinese swine. The imported animals must be isolated from domestic animals while they are being evaluated. The facilities will be available by FY 1988. At that time the recurring operating funds listed below will be required to initiate the desired research.

Academic Staff

1.00 FTE Academic Professional \$ 30,000

Nonacademic Staff

1.00 FTE Foreman 23,000
2.00 FTE Herdsmen 40,000

Expenses

Commodities 137,000
Contractual Services 20,000

TOTAL \$ 250,000

COLLEGE OF VETERINARY MEDICINE (UIUC)
(\$750,000)

Veterinary medical education has changed dramatically in the past fifteen years. The profession requires greater sophistication than ever before. Veterinarians must have expertise in preventive medicine, the safety of drugs and toxic effects of pollutants, single and complex infectious disease processes, as well as clinical medicine. Veterinarians have an expanding role in public health and medical research, and their skills in treating and preventing diseases of livestock have a direct effect on the success of one of the leading industries in Illinois--animal agriculture.

The need for, and importance of, animal science and veterinary medicine to support and to protect animal agriculture in one of the nation's leading agricultural states is unquestioned. The College of Veterinary Medicine was given high priority in the Food for Century III capital construction program because of its important multiple roles in Illinois. Its facilities are now among the best in the world. As a result of that construction program a number of new faculty with strong commitments to research have been recruited. Major efforts were placed on the recruitment of faculty in areas of current and emerging research importance. The University of Illinois College of Veterinary Medicine is now ranked sixth nationally among veterinary colleges in the generation of extramural research funds. Its record for attracting outside research funds over the past seven years is shown below.

Annual Extramural Research Fund Expenditures
(Dollars in Thousands)

FY 1979	\$ 1,155.7
FY 1980	1,428.8
FY 1981	2,125.2
FY 1982	2,270.4
FY 1983	3,285.9
FY 1984	4,161.8
FY 1985	3,782.9

The College, however, still lacks the faculty and staff depth to sustain its research programs and to deliver top-quality veterinary education. A series of national studies¹ predict continued shortages of specialty-trained veterinarians. Graduate programs in clinical medicine, pathology, microbiology, pharmacology, toxicology, laboratory animal medicine, and epidemiology are identified as producing inadequate numbers of veterinarians with postdoctoral research training.

Even though the College now has some of the best physical facilities in the world and its faculty members have made significant progress in generating additional extramural research funds, it lags far behind leading institutions like the University of California, the University of Pennsylvania, and Cornell University in terms of state-appropriated dollars per student. The data shown below are quite revealing and provide a strong justification for the incremental funds being requested for FY 1988 and beyond.

State-Appropriated Dollars/Student
FY 1986

<u>Institution</u>	<u>Dollars/Veterinary (DVM) Student</u>	<u>Dollars/Total Students (DVM and Graduate)</u>
University of California at Davis	\$ 47,125	\$ 31,698
Cornell University	59,896	43,266
University of Pennsylvania	32,753	27,068
Average	\$ 46,951	\$ 34,010
University of Illinois	\$ 32,073	\$ 23,052

New programs such as those at North Carolina State and the University of Florida have appropriated support levels of over \$15 million and \$10 million, respectively, while the State budget for the UIUC College of Veterinary Medicine is less than \$9 million. These and other institutions continue to compete vigorously for the best faculty. It is imperative that the UIUC College receive incremental support to achieve and to sustain a

¹Specified Veterinary Manpower Needs Through 1990, Committee on Veterinary Life Sciences of the National Research Council, National Academy of Sciences.

level of excellence that will assure its place among the nation's best colleges of veterinary medicine.

The incremental funds requested for FY 1988 will be used in the following areas:

1. Post-graduate training in food animal production systems must continue to be developed. Interaction with food animal production corporations and farmers has continued to verify a significant shortage of veterinarians trained to provide the services demanded by these industries. The College has established computerized systems of disease surveillance and currently is in the process of hiring epidemiologists to establish functional teaching and research programs in this area. Other related instructional areas in the College such as infectious diseases, pharmacology and reproductive physiology are in place. Effective systems, coupling large data bases with artificial intelligence systems to integrate disease prevention and management analysis programs, must be developed. The interaction of agricultural economics instruction in areas such as macroeconomics, microeconomics, finance and commodities marketing must be brought into the program from other disciplines on campus. The selection of field training sites with large animal production organizations must be established and coordinated on a continuing basis. Teaching associate positions are required to establish effective recruitment and flow of post-graduate students through this program.
2. The College's toxicology program has been designated as the National Animal Poison Control Center. It is currently developing the interactions with a new USDA program on the national surveillance of animal diseases. This Center will be responsible for the establishment of an interactive toxicology data base dealing with antimicrobials, drugs, chemicals and natural toxins of all types that can enter into the human food chain through animal feeds or direct contaminations. This broad-based program has and must continue to address problems in animal agriculture as well as in direct environmental contamination that may affect human health.
3. Continued development and expansion of the College's biotechnology and bioengineering programs are planned. Those new faculty members hired to date in these areas are becoming established and have been very successful in gaining grant funds from NIH and other Federal agencies to establish their research programs. The area of animal biotechnology dealing with enhanced protection through the development of improved immunogens (vaccines, bacterins) and diagnostic products is being emphasized by several groups. A fuller understanding of potentiation of the host's own natural protective mechanisms through immunogenetics and immunoregulation is another area of interest. Efforts to couple this latter area with embryo manipulation procedures need to be developed with the addition of expertise in this area.

4. Expansion of programs dealing with neoplastic diseases will also continue. The massive push for national research into all aspects of acquired immunodeficiency is an excellent example of such an effort. Another example involves the research on understanding of the causes of many oncogenic diseases collectively grouped as cancer. An effort to incorporate facets of this research dealing with hyperthermia, virology, and other biotechnology aspects into a multidisciplinary approach are being made. Studies dealing with monoclonal antibodies, tumor cell receptors analysis, tumor cell chromosome analysis, and anticancer agents must be coordinated to assess the effectiveness of both diagnostic and therapeutic processes in preventing or treating oncogenic processes.

The coupling of studies of the complex interrelationships between disease agents, animals, and environment as a component of food animal production management systems is the final goal of many of the above programs. Many of these production systems dealing with swine and cattle are changing dramatically with extreme economic pressures for improvements in production efficiency.

In FY 1985, the College identified a \$3 million deficiency in its budget, and it was decided that an attempt would be made to erase that deficit by requesting increments of \$750,000 a year from the State for the next four years with the understanding that the College would be expected to match every dollar provided by the State with an equivalent amount of research support from outside agencies. To date, incremental funds of \$300,000 in FY 1986 and \$150,000 in FY 1987 have been provided.

The recovery and further development of a healthy agricultural industry in Illinois is essential to the economic well-being of the State. Animal production systems account for approximately 50% of the agricultural income generated both in Illinois and nationally. The economic losses related to animal diseases consistently remain as the most significant problem facing the livestock industries. Diseases are still listed as accounting for 20% or \$17.5 billion annually of economic losses in production potential. The College's budget deficiency in FY 1985 (\$3 million) represents less than 3% of the losses sustained annually from disease by Illinois livestock producers. The College will not be in a position to address many of these problems without an expansion of its programs as requested. Improved programmatic support is also essential to provide maximum utilization of the new facilities that have been provided to the College in recent years.

The details of the FY 1988 operating budget are shown below.

Academic Staff

6.50 FTE Assistant Professor	\$	288,000
2.00 FTE Academic Professional		47,000
9.00 FTE Teaching Associates		140,000
3.00 FTE Teaching Assistants		22,000

Nonacademic Staff

6.00 FTE Technical Positions		85,000
3.00 FTE Clerical Positions		44,000

Expenses

Commodities		70,000
Contractual Services		40,000

Equipment

Instructional Equipment		<u>14,000</u>
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TOTAL	\$	750,000
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ENHANCEMENT OF THE ACADEMIC AND PUBLIC SERVICE PROGRAMS
OF THE COLLEGE OF COMMUNICATIONS (UIUC)
(\$100,000)

In recent years the College of Communications has encountered tremendous enrollment pressures. Although it turns away hundreds of students wishing to be admitted and wishing to take its courses, it is still presently over-enrolled. As a result, teaching loads have increased, advising demands are greater, and time for research and public service activities on the part of the faculty has diminished. This budget proposal has been developed to meet the consistent student demand for admission to the College of Communications and its courses, to improve the College's advising system, to strengthen its research program, and to provide for the creation of a television production unit within WILL television.

The proposed budget increment will allow the College to increase its enrollment by 100 students and to open more of its courses to students outside the college. This would in no way accommodate the existing demand, but it would satisfy the needs of many excellent students who are now being denied access to Communications instruction.

At the present time, virtually none of the College's courses are open to students outside the College. The College has even found it impossible to expand its existing course offerings in international communications and computer communication systems--both increasingly important areas of employment and research.

The programs of the College of Communications, like programs elsewhere, have been very much affected by changes in the technology of education. Existing work in photography and graphic design is now being converted to computer-based technology. The industries to which the College relates are becoming increasingly paperless and computer-integrated, including the print industry itself. While the College's programs in no way attempt to simulate the actual technology of creation and production, they must imitate it to a modest degree. The College expects to purchase the modern equipment that it needs with private gifts and grants and by reallocation of existing resources.

The advising process has become more complicated as the technology has changed. Students must be kept apprised of new types of job opportunities, and they must be informed of the courses offered, both inside and outside

the College, that will prepare them to take advantage of the many new opportunities that are developing.

The television production capacity of WILL has been another casualty of budgetary problems of recent years. The College was forced to eliminate much of that capacity to economize on broadcast operations and now wishes to restore it, though in an altogether different way. In the past, the College had a staff and crew to produce sustaining local programming. That was both expensive and inefficient. It now wants to add two full-time staff members to plan intermittent local productions of a non-sustaining type. The actual production will occur in College facilities but with contract staff and outside funding through the National Endowment of the Arts and Humanities, the Markel Foundation, and other such organizations. The television production capacity will also enhance the College's educational programs by offering greater instruction in and work opportunities for students involved in documentary programming.

The College believes it can begin to accomplish the goals outlined here by a combination of redeployment of existing faculty and by the addition of the staff members listed in the budget below.

Academic Staff

2.00 FTE Assistant Professors	\$	52,000
2.00 FTE Academic Professionals		<u>48,000</u>
TOTAL	\$	100,000

For FY 1989 an additional \$100,000 will be requested to complete the necessary staffing and to provide essential support funds.

PROGRAM IN ARMS CONTROL, DISARMAMENT AND INTERNATIONAL SECURITY (UIUC)
(\$100,000)

Initiated in 1978 and subsequently developed by faculty from the sciences, social sciences, humanities, and law, the Program in Arms Control, Disarmament and International Security (ACDIS) brings together the talents and expertise of faculty from a broad spectrum of disciplines. Non-partisan, non-ideological, and non-advocatory in nature, it is dedicated to the application of disciplinary knowledge to the understanding of arms control and international security problems and to the search for ways to resolve these problems and to enhance security. By relying on proven faculty in established disciplines for its intellectual base, the ACDIS program ensures objectivity, rigorous analysis, and relevance in addressing one of the most important issues of the day. Its activities significantly complement and enhance, but in no way duplicate, the work of existing units.

The success and maturity of the ACDIS program and the need to establish it on a stable basis at UIUC are demonstrated by three key developments:

1. Innovative courses have been introduced into the undergraduate and graduate curricula as a result of ACDIS faculty initiatives. Three undergraduate courses, offered by Physics, Political Science, and Asian Studies are open to students of all disciplines. ACDIS has also created a student-faculty honors seminar for advanced undergraduates. Enrollments in some of these courses, which reach over 200 students each year, have had to be limited for lack of adequate support. Specialized seminars and reading courses are also offered to advanced graduate and professional students.
2. ACDIS has attracted more than \$850,000 in grants from governmental agencies and private sources, including the Ford Foundation and most recently the MacArthur Foundation.
3. An increasing number of ACDIS faculty consult regularly with governmental bodies, sit on national and international professional and policy advisory panels, and teach and publish in ACDIS-related areas.

Recurring funding is now required to sustain the ACDIS program. It has achieved a level of activity, national visibility, and success that cannot be maintained by contributions of faculty as an overload to their

regular duties and by the infusion of modest funds on a short-term basis, as has been the case to date.

There is a need to integrate the program into the existing disciplinary and professional programs on campus and to involve additional faculty from disciplines currently unrepresented or under-represented in ACDIS, such as economics, engineering, life sciences, psychology, and philosophy. Many faculty are willing to contribute if the ACDIS program is funded on a permanent basis.

An institutionalized ACDIS program can better respond to the general educational needs of all students as well as to the training requirements of students planning to specialize in the arms control and security field. Also, a secure base is needed to enhance the ability of ACDIS and participating campus units to compete for funds from governmental, foundation, and private sources, thereby strengthening the campus' leadership role in arms control and security studies.

Given rising student demand, strong and widespread faculty interest, and favorable prospects for additional funding from external sources, investing now in ACDIS at UIUC will yield a stable high-quality program with growing national impact.

The incremental funds requested for FY 1988 are itemized below.

Academic Staff

.50 FTE Faculty Director	\$	30,000
1.00 FTE Professor		38,000
.50 FTE Academic Professional		11,000

Nonacademic Staff

1.00 FTE Secretarial Position		14,000
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Expenses

Commodities		<u>7,000</u>
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TOTAL	\$	100,000
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An additional final increment of \$150,000 will be requested for FY 1989.

WEST EUROPEAN STUDIES PROGRAM (UIUC)
(\$100,000)

The West European Studies Program (WESP) began in 1973 as the Office of West European Studies on the initiative of faculty from a variety of colleges and units including Agriculture, Commerce and Business Administration, Communications, Education, Labor and Industrial Relations, International Programs and Studies, Law, Liberal Arts and Sciences, and Social Work. Its goal is to pool the rich resources the campus enjoys for the study of Western Europe. Over the years, its program has evolved into a valuable linking of foreign languages and professionally oriented areas which is unique in the country.

WESP has developed this program in a number of ways:

1. It has attracted over \$700,000 from government and private sources.
2. It has developed eleven core courses in West European Studies based in the Departments of Economics, French, German, and Political Science, and in the School of Social Work. In FY 1985 these courses had a combined enrollment of 245 students.
3. It has developed an intensive foreign language program for faculty, staff, and dependents to prepare them for travel, study, and research abroad. Seventy people participated in this program during Intersession, 1985.
4. It has conducted interdisciplinary courses, seminars, and colloquia for faculty, students, staff, and the community.
5. It has administered Foreign Language and Area Fellowships granted by the U.S. Department of Education to WESP as a National Resource Center. Eleven fellowships have been given to students in Business Administration, Economics, Engineering, Finance, Journalism, Law, and Theatre.
6. It has provided a number of outreach services to University High School and the Agricultural Leadership Program of the State of Illinois, among others.
7. It has arranged new collaborative international research contacts for faculty, new study abroad and internship programs for students, and international seminars for faculty and administrators.
8. It has brought together scholars of European origin from among the campus faculty with scholars from abroad, thereby creating a more cosmopolitan ambiance, and increasing the attractiveness of the Urbana-Champaign campus as a site for collaborative projects on Western Europe.

Although the West European Studies Center has accomplished these many things, although it has created strong linkages to the professional and scientific areas on the campus, and even though UIUC is known for its strength in area studies generally, the U.S. Department of Education has continued to reject its application for Center funding. A recent evaluation of WESP by peer reviewers and experts at the U.S. Department of Education emphasized that WESP had not yet attained the visibility required for Center status and would not be able to do so without additional permanent support.

The campus administration believes that UIUC already has the necessary well-qualified students and faculty expertise to compete successfully with regularly-funded centers at Columbia University, Cornell University, Indiana University, the University of Minnesota and New York University. It believes that all that is required is a strengthening of the administrative structure of the West European Studies Program, and it will be possible through improved coordination to increase the visibility of WESP and to make it very competitive in its attempts to increase its outside funding.

The proposed budget increment for FY 1988 is shown below.

Academic Staff

.50 FTE Faculty Director	\$	25,000
1.00 FTE Faculty Member (to be released time for existing faculty, teaching assistants, or visiting faculty to teach WESP courses)		32,000
1.00 FTE Academic Professional		20,000

Nonacademic Staff

1.00 FTE Secretarial Position		15,000
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Expenses

Commodities		4,000
Travel		2,500
Contractual Services		1,000
Telecommunications		500
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TOTAL	\$	100,000
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UNIVERSITY OUTREACH (CA)
(\$500,000)

The ability to attract and retain industry has a direct impact on the economy of the State of Illinois. Universities and colleges play a vital role in enhancing the State's effectiveness in these endeavors by providing:

1. a generally, and technically, well qualified supply of graduates from which industry can select and sustain a workforce;
2. educational opportunities for those already engaged in the workforce, in close proximity to their place of employment and residence, to upgrade and broaden their present skills; and
3. an opportunity for industry to obtain technological advice and consultation from university researchers, as well as to encourage and facilitate joint research enterprises between industry and the academic community which will provide tangible benefits for both parties, and which ultimately can lead to an expanded economic impact on the State.

Two proposals designed to meet these service and outreach needs are described below. The first is a proposal to extend an already successful program that focuses directly upon engineering. The second proposes efforts to meet these same needs more generally, in an area of the state that is experiencing rapid demographic, commercial, and industrial growth.

Office for Advanced Engineering Studies - (\$350,000)

Since FY 1984 the University of Illinois has been engaged in a special effort to meet the needs of continuing education, consulting, and jointly sponsored and conducted research of industries dependent on engineering, through the Office of Advanced Engineering Studies (OAES). To aid in the accomplishment of these goals, OAES offers four major programmatic components:

1. continuing professional education in engineering and related fields;
2. access to consultants with the expertise required by local businesses and industry;
3. collaborative efforts with industry to solve industrial problems through research; and

4. technical assistance opportunities which are designed to update and/or upgrade the skills of community college faculty and the technical programs at those institutions.

The OAES has its headquarters in the Colleges of Engineering at Chicago and Urbana, but operates through its satellite facilities in communities with demonstrated needs in engineering education and research. The first such satellite office is now operational in Rockford. This proposal for FY 1988 incremental funding will assist OAES in expanding its efforts into the high growth area of the western Chicago suburbs.

IBHE approval has been given to five off-campus masters degree programs in engineering, and the University has initiated them as a result of increased FY 1986 funding. The number of graduate level engineering courses offered through OAES in Rockford and the western suburbs has more than doubled in the last two years, with enrollment increasing 82% during FY 1986. Continuing increases are projected through at least FY 1988. Incremental funding for FY 1988 is requested to develop and deliver additional courses to meet this growing demand.

Non-credit technology programs designed to promote technical "updating" for employees at various occupational levels in manufacturing firms have been an important part of the OAES's service to industry. For example, five Institute of Electrical and Electronics Engineers video-conferences were held in the last year. Three 2-5 day short courses were offered, as well as the professional engineering review series. In addition, research reviews were held, as were two brief technical seminars for top management. More than 350 engineers participated in non-credit programming in FY 1986. Incremental funds are requested to expand these non-credit offerings.

One of OAES's goals is to provide access to University of Illinois consultants. For example, special arrangements have been made with one company to achieve an overall "technology update." This process began when OAES was requested to conduct a technology audit of the company's systems and machinery. Following the audit, a 3-5 year implementation plan was developed to update and upgrade personnel, systems, and machinery. Phase one of this update, the adoption of the PLATO System, is complete. Additionally, contract courses with other individual industries, seminars and

technological audits have been conducted. FY 1988 will see an expansion of this service to the western suburbs.

As part of OAES's mission to upgrade and/or update the skills of community college faculty and technical education programs, OAES offered a Summer Institute for Community College faculty. Due to the success of this program, the Institute will be offered on an annual basis (perhaps during the winter months), if incremental funds can be secured.

The Rockford OAES satellite has been a success. It is time to expand these services into the western suburbs with the goal of keeping Illinois engineers on the "cutting edge," thereby helping Illinois industry to assume a leadership role in the economic development of the State.

Academic Staff

1.00 FTE Academic Professional \$ 45,000

Nonacademic Staff

1.00 FTE Clerical 20,000

Expenses

Commodities 6,000
Contractual Services 225,000
Telecommunications 2,000
Travel 7,000

Equipment

45,000

TOTAL \$ 350,000

General Advanced Educational Programs - (\$150,000)

The Chicago west-suburban region is an area presently experiencing rapid growth. For example, the I-5 corporate corridor in Du Page County is one of the fastest industrial/technological growth areas in the U.S. The number of businesses in Du Page County increased by 125% in the decade of 1970-80 alone. It has also had the largest population growth of any county in Illinois since 1970. This trend is expected to continue with a 20.5% increase projected through the year 2000. Thus, growth factors alone indicate a need for expanded educational activity in this region of the state. Additional factors affecting the demand for educational programs in this area are the special characteristics of the Du Page County populace. The majority of these individuals are between 35 and 65 years of age, and

they are highly educated. These factors, among many, affect the demand for advanced educational programs.

In a recent Illinois Board of Higher Education report, needs of the Chicago metropolitan area were identified to include expanded and new graduate programs to serve part-time, off-campus students; assessment of needs for graduate and professional education; and continuing education and off-campus degree programs in professions related to scientific and highly technological subject areas. The University of Illinois has established increasingly closer relationships with business and industry by playing a major role in technology transfer through teaching, research, and public service. This service needs to be expanded further and targeted more directly on the needs just identified.

To more fully meet the specialized needs of this rapidly growing area, additional support staff are required, beyond the one University staff member now working in Oak Brook, to provide business and industry with better and more clearly focused access to the University and to the institutional resources appropriate to their needs. As an initial step in this direction, additional staff would begin to make this access more visible and responsive.

To provide access to the University's resources, new staff in the west suburban area would have responsibility to cooperate with business and industry to:

1. identify specific companies which are largely un-served and which could benefit through access to University programs and services;
2. jointly determine which University of Illinois programs and services could meet needs identified by the company;
3. arrange for University of Illinois units and staff to provide needed assistance; and
4. provide participating companies with information about opportunities for expanded collaboration and interaction.

The University's communication with potential clients will require information portfolios which will be used to provide an avenue for discussion between the University representative and business, and contain materials from units such as the Executive Development Center, Executive

MBA, Management Development Program and several other units, all of which have programs which could assist business and industry.

Because this University effort will result in being more responsive to business and industry's educational and research needs, appropriate training and staffing will be required to achieve more effective communication with the corporate sector. This effort, paired with the expansion of the Office for Advanced Engineering Studies, will provide a dual thrust to enhance our State's economic growth through cooperative research, continuing professional development, and access to University expertise.

Academic Staff

2.00 FTE Academic Professionals \$ 75,000

Nonacademic Staff

2.00 FTE Clerical 30,000

Expenses

Commodities 2,000

Contractual Services 35,000

Travel 5,000

Equipment

3,000

TOTAL \$ 150,000

NEW INITIATIVES IN POLICY STUDIES (CA)
(\$350,000)

Established in 1947, the Institute of Government and Public Affairs (IGPA) is committed to research and service on matters of public concern, public policy, and government. Policy studies is a field that responds to specific social, technological, and economic issues by analyzing the nature, causes, and effects of alternative public policies. It is also an area of research concerned with the formulation and implementation of policies that can lead to prescriptions for changing and improving societal conditions.

The Institute of Government and Public Affairs plans to expand its commitment to research and services on policy studies to help in identifying policy problems and potential solutions which will facilitate scientific and technical advances and economic and professional development within the State. This IGPA expansion would involve distinguished academics from a wide range of disciplines, government officials and practitioners, and would be accomplished through the following activities:

1. Serve as a focal point for research in health policy in cooperation with the College of Business Administration (UIC), the College of Commerce and Business Administration (UIUC), the Colleges of Liberal Arts and Sciences, the College of Medicine, the College of Nursing, the College of Pharmacy, the School of Public Health, the Department of Urban and Regional Planning (UIUC), the School of Urban Planning and Policy (UIC), and the University of Illinois Hospital.
2. Create a research base in science technology policy in cooperation with the colleges of engineering and the life sciences departments on both campuses.
3. Coordinate interdisciplinary research and provide service in the area of economic development policies in cooperation with the College of Business Administration (UIC), the College of Commerce and Business Administration (UIUC), the Colleges of Liberal Arts and Sciences, the School of Urban Planning and Policy (UIC), and the Department of Urban and Regional Planning (UIUC). The findings of this research should have direct relevance for state and local government as well as for public/private partnerships that may emerge in the future.

4. Reestablish a closer link between the IGPA and state and local government in the form of: (a) research and policy analysis on issues of direct relevance to these units of government (e.g., economic development, taxation policies, regionalism); (b) internship programs for students interested in government service; and (c) "executive training" programs for senior officials in government and the not-for-profit sector. In particular, the Institute is interested in exploring the possibility of establishing a program similar to the "laurel project" in the State of Pennsylvania. This program is designed to provide policy analysis to the State legislature in cooperation with several public universities. Students in masters and doctoral degree programs provide short-term policy analyses requested by the State legislature. This program is administered jointly by faculty at the participating universities and the legislative research bureau. Students are asked to complete one short-term project as part of their degree requirements.
5. Conduct research in the area of intergovernmental relations with a special emphasis on the "new federal role" and the emerging relationship between federal, state, and local levels of government.

These initiatives will be accomplished by: 1) creating a number of "rotating" faculty positions that would allow individuals from both campuses to work on a part-time basis on policy studies for a one- to three-year period of time; 2) establishing post-doctoral positions on both campuses for individuals interested in policy studies in the areas of health policy, science and technology policy, and other programs of the Institute; 3) establishing an external advisory committee to provide guidance in the development of the research and public service agendas; 4) developing a mechanism for the dissemination of research to policy makers, professionals, and the public; and, 5) producing a special seminar series in the area of policy studies that would invite participants who are distinguished academics, government officials, and practitioners.

The area of health policy illustrates how these diverse initiatives can be integrated into the overall work of the Institute. Cost containment, for example, is an issue of concern to federal, state, and local level policymakers. Economists, political scientists, health services researchers, and others have identified this area as particularly fruitful for purposes of research. The Institute seeks to recruit scholars who demonstrate considerable promise in this area. These individuals would have the opportunity to work closely with faculty from both campuses who are occupying the "rotating positions" offered by the Institute. The new

and rotating faculty would in turn (a) attract post-doctoral fellows seeking to undertake challenging projects, and (b) facilitate new research funding. The health policy research on cost containment completed within the Institute and in the cooperating colleges would then be disseminated to government officials, hospital administrators, and professional associations who have a demonstrated interest in the area. In addition, the faculty associated with the Institute would serve as a resource to students in health care administration as well as participate in executive training programs for health care practitioners.

Similarly, the political, economic, technological, and social impacts of acid rain is an issue which might be analyzed by faculty in the area of science and technology policy as well as the social sciences. Analysts who have focused on what is happening to the lakes, streams, and forests of this country are not certain about the effect of acid rain vs. ozone vs. other air pollutants. In designing a research project on this issue, the external advisory committee would be used to identify officials in government and in the private sector who might help identify key problems and targets of opportunity. The Institute's seminar series could be used to attract speakers who would integrate this issue into the overall context of science and technology policy. The individuals who participate in this seminar series would be selected in consultation with the Colleges of Engineering, Colleges of Liberal Arts and Sciences, and the life sciences departments on both campuses. This level of interest would then be used to recruit new faculty, rotating faculty members, and post-doctoral fellows with a general interest in science and technology policy issues. Technology assessment is one form of policy analysis which might be undertaken in this area. The results of this research would be disseminated to academics, professionals, government officials, and the public.

These types of integrated research initiatives should serve to strengthen the relationship between state government and the University, while at the same time contributing to the national debate on policy issues of growing concern. The Institute seeks to investigate some of the most promising policy problems which are important to the State of Illinois and to the nation as a whole.

In FY 1987 institutional funds will be used to initiate the policy studies expansion. For FY 1988, funds are requested for two FTE

appointments in the area of health policy, two FTE positions in the area of science and technology policy, two FTE positions to be used as "rotating faculty positions," one post-doctoral position, an academic professional who will take responsibility for the Institute's dissemination of research, and expense funds for the speaker series and advisory committee.

The route to increased scientific and technical advances and economic development within the State of Illinois lies in creation of progressive state policies and creative solutions to policy problems. The IGPA's agenda to expand policy research and service represents a unique opportunity to coordinate an interdisciplinary investigation of current scientific, technological, social, and political problems using one of the most rapidly growing areas of social and economic research: policy studies.

Academic Staff

7.00 FTE Faculty Positions	\$	230,000
1.00 FTE Academic Professional		45,000
2.00 FTE Graduate Assistants		24,000

Expenses

Commodities		18,000
Contractual Services		20,000
Telecommunications		2,000
Travel		11,000
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TOTAL \$ 350,000

For FY 1989 and FY 1990, an additional increment of \$250,000 per year will be requested.

EXPANDED IMPROVED PROGRAMS
III. PROMOTING INSTRUCTIONAL EXCELLENCE

UNDERGRADUATE EDUCATION
(\$2,050,000)

Initiatives at Chicago
(\$1,050,000)

Revitalizing Undergraduate Education

In FY 1986 and FY 1987, a total of \$1.09 million in incremental resources has been made available to support the revitalization and strengthening of undergraduate education within the College of Liberal Arts and Sciences at Chicago. These funds were used to restore teaching assistant lines in English and the sciences; to add new faculty in mathematics, chemistry, and English; to provide lecturers in foreign language departments; to purchase instructional equipment and supplies for undergraduate laboratories; and to develop innovative and integrated core sequence courses in the Honors College. The FY 1988 request represents the third phase of this revitalization and strengthening of undergraduate education.

From 1979 through 1983, the financial difficulties encountered at UIC--and throughout most of higher education--had a severe impact on the College of Liberal Arts and Sciences. To recoup some of the losses suffered during that time and to expand existing programs and develop new ones, the College seeks funds to support teaching assistants and upgrade artificially low salaries in some departments, upgrade and update the foreign language laboratories, provide modest new support for the Black Studies program, improve the quality of instruction by developing and offering a training program for assistants, hire post-doctoral teaching associates in biological sciences and mathematics, address expense and equipment deficiencies, and provide a writing competency program for all undergraduates.

The language laboratories face serious instructional equipment deficiencies. Both new computer-based equipment and additional software are needed. The use of personal computers as well as the increasing availability of access to mainframe computers have spurred tremendous development of software for language instruction. Additional funds will enable the

laboratories to replace deteriorating and outmoded equipment, add additional student instructional stations, purchase new software, and further develop the locally-designed software.

Increasingly, interdisciplinary research and instruction, which by definition crosses the standard boundaries of single discipline-based instruction, has brought about exciting new insights on both old and new areas of inquiry. In the most recent past "interdisciplinary" has meant a melding of various sciences together, but the fruits of new partnerships can be just as bountiful within the arts, humanities, and social sciences. One area in which UIC proposes to encourage this type of cross-pollenization is in Black Studies. To enhance and broaden the connections between the Black Studies Program and other departments, the new Director of the program plans to expand program offerings by including broader disciplinary issues within existing courses and developing new courses which intertwine Black studies with various disciplines. New faculty affiliated with content departments as well as with the Black Studies Program will help accomplish this goal.

The constant evolution of new software, and enhanced usages for existing software, have lead to the development of instructional materials and techniques at a pace that outpaces the ability of those faculty and teaching assistants who already employ microcomputers in their courses to stay up to date. Additionally, there are a large number of instructional personnel who, though they may understand that microcomputer resources exist which could be used in their courses, do not have the necessary familiarity and understanding to utilize them successfully. To begin to address this problem and enhance the educational experience of a large number of students, new FY 1988 incremental funds will be used to hire post-doctoral associates well versed in microcomputer teaching techniques and material development, who will serve as resource personnel for instructional staff who need assistance in integrating these rich instructional tools into their classes.

The erosion of expense and equipment budgets throughout the College, caused by several years of inflation and increasingly expensive instructional equipment, have pushed many departments beyond their limits. Further, the advent of personal computers and/or terminals for instruction has created a demand that cannot be met with the present budgetary

resources. Office equipment has deteriorated, as has audio/visual equipment, furniture, and all the other common equipment needed to carry on business. Without tools to support teaching, one of the major missions of UIC is severely hampered.

Equipment needs are extensive and the need for the larger, more expensive items used for instruction and research are addressed in the Equipment Replacement program request. But many times it is the less elaborate and more commonplace equipment, when unavailable or in disrepair, that most seriously impact day-to-day classroom instruction. Again, the erosion of departmental equipment budgets has caused such seemingly minor deficiencies to reach crisis proportions. Insufficient, outmoded, and broken equipment of all types must be repaired, replaced, and upgraded if the instructional mission is to continue to be met.

The inability of many students to write clearly and correctly is all too apparent at all levels of schooling. Students frequently need instruction in basic writing skills and almost always could benefit from instruction in writing for particular subject areas. Since 1982, a Writing Center has been operating within the College of Liberal Arts and Sciences, using English Department resources, and providing peer tutoring to students. During the 1985-86 academic year, more than 1,800 peer tutoring conferences were held under the auspices of the Center.

But peer tutoring is not enough. An effective program in writing instruction needs to provide computer assisted instruction in composition as well as to assist in the development and delivery of materials and techniques which ensure that students possess and can apply basic writing skills to substantive areas. Faculty members throughout the University presume students can write sufficiently well to complete course requirements satisfactorily, and, outside of the communications departments, seldom offer direct instruction or guidance in writing, either in general or within a specific discipline. Even graduate students could benefit from more direct writing instruction.

Such a program at the University of Illinois at Chicago must also have as a long-term goal the generation of knowledge about literacy as well as the application of such knowledge to the improvement of literacy instruction across our own campus and beyond. This writing program, with its emphasis on research and application, requires a base of support of its own

and can no longer rely on a single department to carry the load. An Office of Writing Skills, built initially on the efforts of the English Department and the Writing Center, will quickly include the Departments of Linguistics and Communication and Theater in developing the Writing Across the Curriculum program.

The work of the Office will be fundamental inquiry, instructional research, and application efforts. New State funds will support additional faculty working on application efforts, with outside funding sources providing support for research efforts.

When the program is fully operational, UIC will be able to provide support to students for strong writing achievement, whether they be from disadvantaged pre-collegiate backgrounds needing basic skills or from graduate programs needing assistance in writing their theses. This program will provide the capacity to assist thousands of students each quarter. In addition, because the program will train several teaching assistants and scores of peer tutors each year, an ever-increasing pool of individuals well-qualified to teach English writing will be created. The influence of this program can reach far beyond UIC.

Overall, this revitalization program directly affects the instructional efforts within the entire College, but particularly in the lower division courses. The requested funds will enable the College to hire additional faculty and thereby reduce class size, train assistants in teaching skills, and provide desperately-needed equipment and modest increases in departmental expense budgets. Spread throughout the College but concentrated in lower division basic courses, the funds will support additional teaching assistants and post-doctoral associates as well as new faculty positions. Modest increments will be made to the expense budgets of departments with the greatest deficiencies.

An upgraded and expanded language laboratory will be made available, all students will be able to avail themselves of purposeful instruction in the development of better writing skills, and an invigorated and newly-focused Black Studies program will be put in place. To meet these goals the following FY 1988 funds will be needed.

<u>Academic Staff</u>	
15.00 FTE Faculty	\$ 396,500
3.80 FTE Academic Professionals	75,000
3.33 FTE Graduate Assistants	50,000
<u>Nonacademic Staff</u>	
7.50 FTE Clerical	113,500
5.00 FTE Technical	123,500
<u>Wages</u>	41,500
<u>Expenses</u>	79,000
<u>Equipment</u>	<u>171,000</u>
TOTAL	\$ 1,050,000

Initiatives at Urbana-Champaign
(\$1,000,000)

Strengthening Undergraduate Instruction in LAS

Many complaints have appeared in the press and elsewhere about the literacy of high school and college-level graduates. It is widely asserted that they neither write well, nor communicate with effect orally; that they are competent in only one language (English), and vast improvement is needed even in that language; and that they do not understand social processes in their own culture, let alone the cultures of other nations. Many, especially those with technical orientations, are considered to have been insufficiently exposed to the arts and humanities. Receiving most prominent attention is the belief that these graduates are not well trained in the sciences, mathematics and computing.

These complaints are not without foundation. Over the last twenty years, Scholastic Aptitude Tests scores measuring comprehension in reading and mathematics have declined nationwide, with a fifty-point drop in verbal tests and a thirty-two point drop in mathematics. The scores reached their low point in 1980 and 1981, and for the last several years have stabilized at approximately those levels. According to a 1982 Gallup youth poll, 89% of all recent high school graduates felt that the most serious deficiency in their schooling was the lack of assistance for students struggling with

reading and mathematics. In 1983, the National Commission on Excellence in Education reported that only one-fifth of the nation's students were able to write a persuasive essay. The Illinois State Board of Education released a report in June, 1985, which indicates that Illinois secondary students are not academically competitive with their peers in a number of countries, that their performance in math and advanced problem-solving is a "particular cause for concern," and that they have difficulty when asked to condense and apply information or organize a collection of facts into a coherent whole.¹

A recent report on the condition of higher education in the nation sponsored by the National Institute of Education and prepared by the Study Group on the Conditions of Excellence in American Higher Education discusses these concerns and several others, and suggests a number of recommendations for remedial actions to be taken by the higher education sector. Among these recommendations are the following:

Faculty and other institutional resources should be reallocated toward increased service to first- and second-year undergraduate students. Opportunities should be provided for intense intellectual interaction between students and instructors, with as many of the finest instructors as possible assigned to first-year classes. Graduate teaching assistants should be assigned selectively and measures taken to ensure they are well-prepared for their responsibilities.

Liberal education requirements should be expanded and reinvigorated to ensure that (1) curricular content is directly addressed not only to subject matter but also to the development of capacities of analysis, problem solving, communication, and synthesis, and (2) students and faculty integrate knowledge from various disciplines.

Remedial courses and programs should be offered, but standards should be set that will enable students to perform well subsequently in college-level courses.

The University of Illinois shares the concern of the Study Group and other groups regarding the quality of undergraduate instruction. Although the University has an excellent reputation for undergraduate preparation, it is aware that in the past decade there has been an erosion in the quality of instruction in a number of areas and that room for improvement

¹Student Achievement in Illinois: An Analysis of Student Progress--1984. Illinois State Board of Education, June, 1985.

exists. The Strengthening Basic Instruction program presents several strategies to improve undergraduate education, many of which parallel the recommendations of the Study Group mentioned above.

The single most important factor influencing the erosion of basic education at the University is the fact that for a sustained period in the 1970s and early 1980s budgetary allocations rarely kept pace with inflation, while a number of "productivity improvements" have been absorbed at the same time that severe market pressures in such areas as engineering, computer science, commerce and business administration, and the sciences have placed an insurmountable demand on the overall resources which were available. As a result, levels of service have been cut back in nearly all areas, and academic units have suffered. Staffing levels have dropped, especially among teaching assistants; section sizes have increased; instructional laboratories have been eliminated; supplies and equipment for teaching are purchased less often and in smaller quantities. Unfortunately, larger classes have led to a reduction in the amount of writing students are required to do. Homework assignments in fields such as mathematics cannot be monitored with the same care they once were. Instructional laboratories, where they still exist, now tend to provide only written or oral descriptions of experiments, or computer simulations of them, because of a lack of adequate equipment and supplies. A recent upsurge of interest in foreign languages has resulted in class sizes so large that the amount of individual recitation must be curtailed. To make matters worse, these erosions have occurred at the very time the basic teaching core is being called upon to help in overcoming a decline in the level of basic skills which high school graduates bring with them to college.

In FY 1986 the University requested that a program to strengthen basic instruction be established which would do the following:

1. restore undergraduate instructional quality through reducing class sizes to maximize direct faculty-student learning relationships, increasing writing assignments and increasing support for instructional laboratories;
2. establish a series of innovative curricular offerings in the humanities, basic sciences, social sciences and mathematics; and
3. provide support for the State's elementary and secondary teachers to improve their expertise in math, writing and foreign language instruction.

As a result of funding received in FY 1986, and anticipated for FY 1987, considerable progress has been made this year in attaining these goals.

Indeed, incremental funds provided in FY 1986 were allocated to the humanities and social studies to decrease section sizes and to increase the faculty-to-student and student-to-student relationships in the learning environment. These funds made it possible to increase the numbers of written assignments and feedback from instructors. A campus Honors Program was initiated. Additional resources were used to strengthen international course offerings in Political Science; African Studies; Asian Studies; Russian and East European Studies; Spanish, Italian, and Portuguese; and Latin American and Caribbean Studies. A new course entitled Science, Technology, and Society was initiated which exposed students to the systematic study of how science and technology have transformed society in the twentieth century. Instructional laboratories in the School of Chemical Sciences, and in the Department of Psychology were upgraded and new laboratory sections were added. In FY 1987, further improvements will be made in existing laboratory sections and new sections will be added in the physical, chemical, and life sciences.

UIUC, in conjunction with seven other state colleges and universities, has instituted a voluntary statewide mathematics testing program for high school juniors. The program indicates to the students where their weaknesses are and also provides a wealth of information to the high schools about their mathematics programs.

The English Department is now providing a four-week summer institute to help high school English teachers become more proficient in teaching writing. This effort will also include school visits for consultation and statewide writing conferences.

The Language Learning Laboratory is offering internships to high school and elementary foreign language teachers who want to learn how to incorporate computer-assisted instruction in their classrooms. Introductory workshops will also be offered at various locations throughout the State to demonstrate to high school and elementary teachers the ways in which foreign languages can be taught with computer-assisted instructional methods.

For FY 1988, emphasis will be placed on the most serious problems remaining in the College of Liberal Arts and Sciences: support for the

shift to computer-assisted instruction; bolstering the expense and support staff budgets of units in the humanities and social sciences; reducing instructional loads, making it possible to increase writing assignments and faculty-student interactions; and strengthening laboratory instruction in the behavioral, biological, and physical sciences. Two recent factors have increased the demand on resource support within the College, making it impossible to accomplish these actions without additional incremental State support. One is sheer student demand. The number of students enrolled in LAS is currently the highest in the history of the College; it is 20% greater than it was eight years ago. There was a 5% increase alone from 1985 to 1986. The second factor is an increase in computer technology applied to undergraduate instruction. This has swept the entire college, resulting in increased costs where such technology did exist and in the introduction of new costs in many areas where computers were infrequently employed earlier. The EXCEL project, for example, has provided excellent short-term help, but the College is faced with long-term expense, equipment replacement, software, and support staff needs as a result.

All in all, the combined effect of erosion because of failure to receive inflationary level increases in support, increased student loads, and introduction of newer technology has made it difficult for the College to meet the responsibilities of basic instruction and to make the improvements that are required.

A. Computer-based Instruction and Operations - (\$270,000)

Recently, with a boost from the EXCEL program, significant steps have been taken to move toward computer-assisted instruction in LAS. That it has had a positive impact is clear from several kinds of information. First, Plato-based instruction in the introductory chemistry course resulted in better student performance. Second, substantial improvement in the quality of Business and Technical Writing has been demonstrated with the use of word-processing systems for instruction. These are the only two specific areas that have been using computer-assisted instruction long enough to make it possible to do a formal evaluation of the results. However, more broadly-based improvements are expected with the increased use of computers, and the change will be rapid over the next five to ten years.

While computerization is having a dramatic impact on instructional innovation and quality, it is not without its costs over and above those provided for by the EXCEL Program:

1. The equipment must be maintained and this is done through a combination of service contracts and technical support personnel. Costs of this sort for instructional purposes were virtually unknown five years ago. For example, in the past two years the Department of English acquired 51 microprocessors for rhetoric instruction for up to 360 students per year. Maintenance costs will expand as computer-based rhetoric is extended to more students.
2. Purchase, updating, and development of software is a necessary component of computer-aided instruction as are support systems such as word-processing and communication networks. For example, instruction in computer-based chemistry has existed via Plato for many years. Substantial changes are being made as the Department of Chemistry moves to the use of video disks for purposes of demonstration and simulation. Such changes include software costs. Similarly, expansion of electronic mail, transmission of manuscripts (both within and across institutions), and general availability of word-processing, spread-sheet, and data-base packages all require software acquisition and development.
3. As microcomputer laboratories are developed by various departments, new personnel are required to operate and to maintain those laboratories, and to instruct faculty and students on the use of the equipment and software. The new individuals serve as support personnel to the faculty members who are in charge of teaching the various courses using the microcomputers.
4. Current equipment budgets were not designed for the modern costs of purchasing and replacing computers. Not only does the College have a need to acquire many more microcomputers, but the time will soon arrive when the current equipment must be replaced.

The budget requested to provide additional computer support for instruction throughout the College is shown below.

Academic Staff

6.00 Academic Professionals (systems and software support personnel)	\$ 120,000
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Expense

Commodities (software)	50,000
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Equipment

<u>100,000</u>

TOTAL	\$ 270,000
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B. Operational Support in the Humanities and Social Sciences - (\$150,000)

The lack of expense funds in the budgets of departments in the humanities and social sciences not only adversely affects the quality of undergraduate instruction but also the manner in which faculty are able to meet their obligations to students, to other faculty, and to the departments.

Purchase of audiovisual aids (tapes, slides, films, etc.) is extremely limited. Photocopying is restricted in many departments to administrative uses or is permitted on a strict page-count basis each month for faculty whether for teaching or research. Departments have been forced to cancel equipment maintenance contracts. Long distance telephone calls are not made in some departments even for teaching purposes. Colloquia and lecture series for students and faculty have been eliminated in a number of departments.

Secretarial help for faculty is restricted in many departments and nonexistent in others for both teaching and research. Often faculty members are unable to get secretarial support to help prepare class materials.

To help correct these problems the following funds are requested for FY 1988.

<u>Nonacademic Staff</u>	
4.00 FTE Secretarial Positions	\$ 60,000
<u>Expense</u>	
Commodities	30,000
Contractual Services	<u>60,000</u>
TOTAL	\$ 150,000

C. Increased Student Enrollment - (\$290,000)

Enrollment has increased throughout the College in the past ten years, producing differential pressures among departments. For example, the number of majors has doubled in mathematics, doubled in microbiology, tripled in physiology and biophysics, and tripled in speech communication over the past five to eight years. Substantial general enrollment increases have occurred recently in Asian and Pacific Studies (tripling), in Religious Studies (tripling), and in Speech Communication (doubling). In addition, some Departments (Political Science, Mathematics, Psychology,

History, Classics, and Speech Communication) have chronically had very high loads. Limited internal reallocation of funds has helped alleviate some of these problems, but the increases have been too large and too rapid to manage with current resources. The pressures are not just on instruction (few written exercises, limited instructor-student contact) but also on advising. Large-scale increases in majors require an expansion of departmental advising systems. To cope with these enrollment increases and to improve the quality of the instructional experience, the following support is needed.

Academic Staff

3.00 FTE Assistant Professors	\$	90,000
2.00 FTE Academic Professionals		50,000
8.00 FTE Teaching Assistants		120,000

Nonacademic Staff

2.00 FTE Secretarial Positions		<u>30,000</u>
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TOTAL	\$	290,000
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D. Undergraduate Laboratory Instruction - (\$290,000)

It is expected that funds will be provided in FY 1987 to support undergraduate laboratory instruction in the behavioral, biological, and physical sciences. These funds will support undergraduate instruction, primarily lower division laboratory courses, through the introduction of a few new sections, the reduction of laboratory section sizes, and the provision of some expense and equipment monies. Assuming that support, the current needs include more teaching assistants, to make it possible to offer appropriately-sized laboratory sections, and increased expense and equipment replacement funds.

Costs of animal housing and maintenance have increased substantially with new Federal legislation. The cost of chemicals has increased well ahead of the general inflationary cost spiral, and the College's instructional equipment budget does not permit the College to replace equipment at the rate at which it becomes obsolete or worn out. For example, the School of Life Sciences recently completed an inventory of its instructional laboratory microscopes. Many are in disrepair or are otherwise dysfunctional. The replacement cost facing the School is between \$200,000 and \$250,000. This condition arises because the School equipment budget does

not permit replacement at a rate fast enough to maintain an adequate inventory of functioning microscopes. The budget shown below will provide partial support toward meeting these deficiencies.

<u>Academic Staff</u>	
6.00 FTE Teaching Assistants	\$ 90,000
<u>Expenses</u>	
Commodities	150,000
<u>Equipment</u>	<u>50,000</u>
TOTAL	\$ 290,000

ACADEMIC COMPUTING
(\$1,050,000)

Chicago Program
(\$750,000)

Academic Computing

The Academic Computer Center at the University of Illinois at Chicago operates a large IBM 3081 mainframe computer system. The present system, which came on-line in 1984, serves 25,000 students and more than 3,000 faculty and professional staff. The workload of the Center has quadrupled in less than five years, creating a critical need for additional staff, equipment, software, and expanded Center services. For example, during the period Spring 1983 through Spring 1985, the number of computer "jobs" increased 35.9%; central processing unit (CPU) hours increased 235.6%; connect hours increased 14.5%; and average peak users increased 69.3%. Since Spring 1985, computer usage among faculty has risen 25%.

During the past two years, the Academic Computer Center has expanded the Academic Data Network (ADN) to the entire campus. Although the large number of requests for Computer Center services has led to installation delays, the Academic Data Network now reaches throughout the Campus. Approximately 25 miles of coaxial cable have been installed along with 700 user ports at the Health Sciences Center and an additional 200 user ports at the University Center. In addition, \$2 million in sophisticated data communication has been built into the expanded ADN.

To support the expanded academic computing network, new funds are required to provide increased graphics support and more printing and communications devices and provide user training and computer documentation. The specific expansions will enable the campus to:

1. acquire and install new printers and communications devices plus share communications lines to Urbana;
2. replace a number of existing 300 baud telephone modems with 2400 baud dial-up modems;

3. provide additional disk space for storing data, user data, programs, and system control data;
4. introduce the Unix operating system in response to computer user demand; and
5. expand the Center's ability to write and tailor software for the campus's unique needs.

The University of Illinois at Urbana-Champaign is one of five universities nationwide designated as a site for supercomputing. To utilize fully the University's computer resources, the Chicago campus will develop a supercomputer access facility, providing campus access to the supercomputer. Such access will provide a significant contribution to research activities at UIC. For example, the supercomputer will play a central role in the implementation of the DaVinci project, a proposed \$275,000 program in biomedical graphics to begin in FY 1988. The program will establish a Resource Center on Anatomical Imaging that will bring together the talents of scientists, clinicians, and artists who will use the supercomputer to promote interdisciplinary anatomical research.

Another example of the importance of supercomputing to research activities at UIC is found in the Department of Biocommunication Arts, which plans to recruit an additional faculty member with expertise in computer graphics and medical art. This individual will rely heavily upon access to the supercomputer. The department's graduate students also will receive better preparation for their fields and graduate student recruitment will be enhanced as a result of access to the supercomputer.

In addition to providing access to the supercomputer and supplying much-needed new and replacement equipment, FY 1988 funds will support a number of technical staff members, experienced in software development and training and advising of users, as well as in equipment development and maintenance. Graduate assistants can provide some of the advising and training needs and perform some of the equipment installation and maintenance functions. Expansion of clerical staff will also be needed.

The FY 1988 budget request is listed below.

<u>Academic Staff</u>	
8.66 FTE Academic Professionals	\$ 322,000
5.00 FTE Graduate Assistants	75,000
<u>Nonacademic Staff</u>	
5.00 FTE Clerical	94,000
<u>Expenses</u>	146,000
<u>Equipment</u>	<u>113,000</u>
TOTAL	\$ 750,000

Urbana-Champaign Program
(\$300,000)

Workstation Support and Development System

The University of Illinois at Urbana-Champaign has invested millions of dollars the last few years in computer workstations and supporting software. In FY 1985, more than 2,800 personal computers were purchased or donated for use on the campus. The "computerization of the campus" will undoubtedly continue at a significant pace. UIUC, like many other campuses, has begun to use computers in all aspects of its daily operations: instruction, research, service, and administration. One of the major future challenges will be to provide consultative assistance in developing software and courseware to enhance student learning and to provide more efficient and effective training of the users--faculty, staff, and students-- of this technology.

A Workstation Support and Development System is proposed to facilitate increased applications of computer technology at UIUC. Many related services and support functions already exist, but some are inadequate (e.g., training) or not provided on a campus-wide basis to all faculty and staff (e.g., graphics center, consultation on instructional and courseware design). A coordinated system will inform users of the support services that exist, and communication among staff of the various support services will be enhanced. Some of the proposed services will be centralized, eliminating duplicate services at the college, and/or departmental levels.

The need for a coordinated system of services has been documented in several ways. In a survey of UIUC faculty and academic professionals that was conducted by the Computer-Based Education Research Lab, Computing Services Office, and Instructional and Management Services staff in the spring of 1985, nearly 800 faculty members expressed a strong interest in using computer applications in instruction. One-third reported applications ready for use or already in use, with many transferring experience from PLATO. In subsequent conversations with faculty and deans, a significant number have expressed a desire to learn how to use computer technology in the classroom. Currently, no office provides adequate consultative assistance on courseware design and development or on the appropriate uses of computer-based technology in instruction. While faculty with experience and expertise are informally assisting others in this endeavor, many expressed concern over the time required to assist others adequately. Programs such as EXCEL and MICA have had a direct impact on the use of computers in instruction, but they cannot meet all current needs and will not be funded indefinitely.

The proposed coordinated campus-wide support system will be comprehensive in scope and will include the following types of services.

1. Training Center

Currently no adequate training center exists on the UIUC campus. The center proposed must address a full spectrum of campus needs, including extensive programs for training all support staff on basic software packages, both basic and advanced training for administrative staff as needed or wanted, and basic orientation and start-up training for faculty and students. This center will be supported by a combination of chargebacks, State funding, and vendor support. Negotiations are already underway with major vendors to cover the considerable hardware and software costs for such a center.

2. Software Bank

Users need good advice in purchasing software packages to avoid serious expensive purchasing mistakes. Operational difficulties, unfulfilled expectations, and software obsolescence can be reduced if professionals can evaluate software as it appears on the market. They can then recommend appropriate applications, and can loan software to users on a trial basis. A software hotline will also be instituted and should provide major assistance. Currently many campus units have begun software bank/libraries. While these should be maintained, a campus-wide facility will be more efficient and economical.

Furthermore, the creation of a Software Bank will enable the campus to participate in the Software Exchange Program that is

being developed by the nineteen schools receiving Advanced Education Project (AEP) grants from IBM. (The name of this grant program at UIUC is Project EXCEL.) With IBM's help the nineteen schools have agreed to share software that has been developed as a result of the AEP grants. One copy of each piece of software will be distributed to each school and placed in a library. Faculty members may review the software in the library and place orders for material they find useful. In order to participate in this exchange, each school must make a financial commitment to a central coordinating function that will be performed by the University of Wisconsin and must establish an on-campus site where the software can be received, catalogued, reviewed, and ordered. Because of the number of institutions and projects in the AEP program, the campus believes that participation in this software exchange will be very beneficial to students and faculty.

3. Hardware Resource Center

A central hardware resource center, with a variety of available workstations, will be open to all faculty, staff, and students. This will permit them to try various hardware and software configurations. Staff will be available to recommend hardware for specific purposes, and a hardware loan program for short-term evaluation will be maintained.

4. External Relations and Development

Although considerable success has been achieved in negotiating with computer corporations for computer gifts and special purchase arrangements, more concerted efforts are required in this arena. Discussions with software firms are just beginning. The opportunity for additional free acquisitions or for acquisitions at very favorable rates is tremendous.

5. Computer Resource Classrooms

One central computer classroom has been established for faculty to use to test courseware and software, but it is currently tied to Project EXCEL. Moreover, at least one additional room which includes networked workstations and other appropriate technology, such as video projection, is required to meet existing faculty needs. Such rooms can also be used as training centers for computer-based courseware.

6. Graphics Center

A graphics center which includes state-of-the-art graphics reproduction equipment and software is proposed as an available service facility. Faculty and staff will be able to use the hardware and software on a walk-in basis and will be able to request services relating to graphics.

7. Instructional Design Service

Staff with expertise in courseware and instructional design and evaluation will work with faculty on introducing appropriate microcomputer technology in their courses and on evaluating the use of courseware and microcomputer technology in their courses.

A clearinghouse of available published courseware and networks will be established.

8. Student Assistant Support Center

Student assistants will be hired and trained to provide service support to departments. Students will work directly with and be paid by the academic unit for which they are working, but they will receive consultative backup from the central facility.

The proposed Workstation Support and Development System will require a considerable amount of integration of existing facilities with a number of new and/or expanded services. It has been designed so that radical changes in the current campus structure of existing support services are unnecessary. It will provide an approach which takes advantage of what currently exists and enhances and expands those efforts to meet the current and future needs relating to the computerization of the campus.

It is expected that a portion of the costs related to the proposed Workstation Support and Development System will be obtained by charging users (\$165,000) and from outside sources (\$320,000). However, to get the System operating will require \$450,000 in new State funds. The amount of \$300,000 is being requested for FY 1988 and an additional \$150,000 will be requested for FY 1989. The details of the budget for FY 1988 are shown below.

<u>Academic Staff</u>	
8.00 FTE Academic Professionals	\$ 216,000
<u>Expenses</u>	
Commodities	34,000
Contractual Services	20,000
<u>Equipment</u>	<u>30,000</u>
TOTAL	\$ 300,000

CAMPUS HONORS PROGRAM (UIUC)
(\$140,000)

In FY 1986, a small campus-wide Honors Program will be established to meet the needs of the brightest and academically most ambitious undergraduate students at UIUC. Although the quality of the undergraduate student population on the campus is very high and has been steadily improving, the University has not done as well as it should in attracting the very top students. For example, while approximately 60% of the very good students who apply and are accepted actually register, less than 30% of the top applicants (those who have an ACT composite score of 34-36 and rank in the top 5% of their high school classes) who are admitted actually choose to attend UIUC. In order to attract such students, the campus must offer them a truly exceptional educational experience such as can be provided by this special Honors Program.

The Program will begin in Fall 1986 with approximately 100 freshmen. Each year thereafter, 100 new freshmen will be selected for the Program to produce a continuing group of 400 honors scholars. The Program is administratively attached to the Office of the Vice Chancellor for Academic Affairs under the direction of a faculty director and with the advice of an Honors Advisory Committee consisting of 8 senior faculty members from across campus.

Each student in the Program will have a faculty "mentor." Students will be able to select at least one course each semester from among 8-10 specially designated honors courses which will be taught by outstanding faculty from a wide range of disciplines. Participation in a noncredit extracurricular program involving informal student interaction with outside speakers and notable UIUC faculty is required each semester. Students in the Program will be given access to microcomputers (primarily through the residence halls' computerization program), and faculty teaching in the Program will also be provided with microcomputers. This will enable the Program to establish an electronic communication network through which students will be able to communicate with each other as well as with faculty teaching in the Program. This electronic network will enable faculty to make students aware of current opportunities in their disciplines--such as notable seminars, films, concerts, etc.

Funding for FY 1986 has enabled the Director to organize the Program and to fund development of new courses for both FY 1987 and FY 1988. Funding for FY 1987 (at the same level as for FY 1986) will provide ongoing support for teaching the honors courses (in the form of released time for the faculty), and modest amounts for continued course development, for the extracurricular program, as well as funds to support student involvement in faculty research programs. In addition, to be competitive with other comparable institutions in its effort to attract the best students, UIUC plans to seek private funds to make it possible to provide a \$200 merit scholarship to each student in the Program.

For FY 1988, additional funding is requested to cover the cost of adding 100 new freshmen, thereby doubling the number of students in the Program. Ongoing support in the form of released time for faculty will be required for teaching the 16-20 honors courses offered each semester.

By Fall 1987, space will be set aside for the Honors Program sufficient to house both the administrative activities and some of the classes and non-credit seminars. With a separate honors office and the increase in the number of students and faculty participating in the Program, there will be a need for the support of a full-time secretary and an academic professional program assistant. Funding for this increased staff support is also requested for FY 1988.

For FY 1989, an additional increment of \$200,000 will be requested to develop special interdisciplinary seminars which will involve the participation of faculty from across the campus. While the initial focus of this Program will be primarily on the first two years of the undergraduate experience, interdisciplinary seminars and noncredit extracurricular activities will be developed for juniors and seniors.

These additional funds will also provide support for released time for faculty teaching the interdisciplinary seminar. The non-credit extracurricular program will need to be expanded, and the amount of money available to the support of student research activities will need to be increased.

The details of the budget request for FY 1988 are listed below.

Academic Staff

1.00 FTE Academic Professional (program assistant)	\$	20,000
2.50 FTE Faculty (released time for instruction)		80,000

Nonacademic Staff

1.00 FTE Secretarial		15,000
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Expenses

Commodities		15,000
Contractual Services		<u>10,000</u>

TOTAL	\$	140,000
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BUSINESS, TECHNOLOGY, AND SOCIETY (UIUC)
(\$200,000)

To keep pace with the rapid changes taking place in the current technological society, new skills are constantly required for professional careers in business. Students who hope to pursue a career in business must offer certain basic skills before they can be considered attractive candidates by prospective employers. The increasing number of excellent applicants to the College of Commerce and Business Administration testifies to students' awareness of the need for these skills. The program proposed here will provide a service to students, to the University, and to society by preparing greater numbers of University of Illinois graduates to meet the challenges and demands of today's business world.

While many students major in liberal arts or business, there is a need for a middle ground whereby students of liberal arts and other areas can gain specific skills needed in the business world. This program will make a core of business courses available to LAS undergraduates who want to pursue a career in business, but who prefer to emphasize a liberal arts education rather than a business curriculum. Although liberal arts graduates have many skills which can be assets in business, they sometimes lack technical skills which could make them more attractive to employers. The business core that is being suggested will help provide LAS graduates with the necessary skills to command the good jobs in business. This program offers an opportunity for the two colleges to work together, pooling resources and exchanging expertise. If successful, it will introduce liberal arts students to the realities of the market place in modern society.

Within the College of Liberal Arts and Sciences, the program in French Commercial Studies recognizes the value of placing a practical emphasis on an educational program. The proposed program in Business, Technology, and Society addresses a similar principle--the need to gain skills demanded by the business world--with this difference: it is very broadly focused. Students in all areas of the liberal arts will be served by this program. This project is designed to begin on a modest scale but can be enlarged to serve a wide segment of LAS undergraduates.

The program will offer two components: one advisory, one academic.

1. The Advisory Component

The program will set up an advisory apparatus which will acquaint students with the specifics of the program. The College of Commerce and Business Administration will advise LAS students on the realities of the business market, will identify skills that are desirable for careers in business, and will discuss options and opportunities available to students. One important by-product of this program will be the free and open dialogue between the two colleges on all levels--administrative, faculty, and student.

2. The Academic Component

The courses proposed in this program are already an established part of the CBA curriculum. Because the demand by the College of Commerce and Business Administration students already exceeds college manpower, the capacity to teach non-majors is restricted. The proposed program will establish special sections of core business courses for an agreed upon number of liberal arts undergraduates, thereby guaranteeing non-CBA students a place in CBA courses.

Requirements established by the College of Liberal Arts and Sciences for specific majors will be followed. In addition, students will be required to take a core of business courses. The CBA courses will be established within specific departments in the college and will provide credit toward graduation. A possible list of courses for this proposed business core is as follows:

LAS: Math 134 (or 120 or 135) - Calculus
Math 125 - Linear Algebra
Statistics 100 (or Econ 171 or 172) - Statistics
Econ 101

CBA: Accountancy 201 - Financial
Accountancy 202 - Managerial
Business Administration 202 - Principles of Marketing
Finance 254 - Introduction to Business Financial Management

If students prefer more advanced courses than those suggested, an arrangement can be made with the approval of the program advisor.

The proposed budget for FY 1988 is itemized below.

Academic Staff

3.00 FTE Associate Professors	\$	150,000
.25 FTE Faculty Administrator/Advisor		14,000
2.00 FTE Graduate Assistants		27,000

Nonacademic Staff

.50 FTE Clerical Position		6,000
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Expenses

Commodities		2,500
Contractual Services		500

TOTAL	\$	200,000
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Increments of \$200,000 will also be requested in FY 1989 and FY 1990 to expand this effort.

SERVICES TO ELEMENTARY AND SECONDARY SCHOOLS
(\$290,000)

Initiatives at Chicago
(\$190,000)

Rarely in the history of the nation has concern for educational effectiveness been so dominant a social issue. There is pressure from federal, state, and local agencies to improve schools. Yet, the knowledge base that would provide sound guidance to improvement efforts is only partially developed. Both scholars and practitioners are struggling with the formulation of appropriate strategies for dealing with the crisis in schooling, and leadership in that formulation activity is scattered and disparate. UIC can strengthen its contribution to school improvement through bold and imaginative commitment to becoming a locus of knowledge about teaching, learning, and schooling, and its utilization in helping to improve elementary and secondary education in Illinois, particularly in the Chicago area.

Currently, the College of Education and the campus contribute to these efforts in essentially idiosyncratic ways through the work of individual faculty. There is no organizational entity with the specific mission of urban educational research and development. Clearly, the nation, region, state, and municipality need information about the effective delivery of urban educational opportunity. Equally clearly, there is no such agency to which educational leaders can turn for valid and reliable information upon which to base crucial social decisions.

UIC puts forth two proposals to assist in meeting these needs.

Center for Urban Educational Research and Development - (\$100,000)

The proposed Center for Urban Educational Research and Development, housed within the University of Illinois at Chicago College of Education, will engage in research addressed to critical issues in teaching, learning, and schooling. The Center will provide the framework for developing the highest levels of educational leadership in school organizations,

governmental agencies; and community organizations through collaborative research and the technical assistance of UIC faculty. Given the distinctive mission of UIC to provide educational leadership for the Chicago metropolitan area, the Center places special emphasis on research related to minority education and the preparation of professionals who are responsible for the education of minority youngsters.

The Center will bring together faculty from a variety of disciplines with the objectives of conducting research on learning, teacher and school effectiveness, and teacher preparation; enhancing the doctoral programs in the College of Education; and providing technical assistance to local and state educational agencies. To contribute to improvements in school effectiveness, it is necessary to identify variables that are potentially powerful influences on school effectiveness, develop a sound understanding of the nature and impact of these variables through systematic inquiry, determine the interactive relationships of the variables, and intervene into ongoing school situations in attempts to alter practice toward what personalities, practices, and procedures which are discovered to be closely related to school effectiveness. This sequence of research and development events calls for a multidisciplinary approach, the involvement of persons from a variety of campus units, the active participation of school practitioners at each stage, an organizational entity with strong leaders, and adequate support.

The work of the Center will directly influence teaching through the provision of the latest knowledge about educational effectiveness and through making available to graduate students opportunities to participate directly in knowledge production and utilization efforts. The Center will provide a magnet for educational inquiry that is presently scattered across the College and the campus. This magnet will increase the power of individual faculty and student efforts as a consequence of an ongoing support base, opportunities to interact with other scholars, natural linkages with school settings, and the like.

In terms of the service mission of the University, the Center will act as a clearinghouse for service requests, engage school personnel not just in receiving short-term service but in working with UIC faculty in long-term ways aimed at better understanding and improving schools, develop relationships with schools that result in demonstrations of UIC

contributions to educational practice, and inform policy makers as they engage in decision making with wide-ranging effects.

The proposed budget for FY 1988 is listed below.

<u>Academic Staff</u>	
1.00 FTE Faculty	\$ 32,500
.50 FTE Graduate Assistant	7,500
<u>Nonacademic Staff</u>	
3.00 Clerical	57,000
<u>Expenses</u>	<u>3,000</u>
TOTAL	\$ 100,000

Chicago Area School Effectiveness Council - (\$90,000)

The Chicago Area School Effectiveness Council (CASEC) enables the College of Education at the University of Illinois at Chicago (UIC) and local schools to share their experiences in teaching and learning. CASEC links schools in the metropolitan area with the research, methodological, and policy expertise in teaching and learning that is available from College faculty.

During FY 1986 and FY 1987, CASEC developed a variety of strategies for strengthening the impact of UIC and the College upon school systems in the Chicago area. Among these strategies are school effectiveness forums, large-scale events featuring national and campus experts on schooling issues; problem-solving workgroups of school personnel and UIC faculty dealing with teaching and schooling problems and concerns as they relate to educational improvement; doctoral student liaisons who provide linkages between the schools and the University; modest dissemination efforts aimed at translating new knowledge for practitioner use; and faculty research and development that is directly related to school practitioners concerns and problems as well as to needs for school-based knowledge more generally. More than 50 districts are currently involved in forums and other dissemination activities.

A major component of the Council is the development of the multi-district and UIC relationships for the purposes of knowledge production and knowledge utilization. That is, by establishing ongoing working relationships among the organizations, it will be possible for member districts to

learn from and with one another and UIC faculty and students through engaging in systematic research and development activities. This set of relationships should be in place with six to ten districts by FY 1988. The call for increasing the number of districts will by then be considerable. In order for the number of districts to be expanded, it will be necessary to enlarge the resource base that supports the Council, particularly in terms of faculty release time and graduate student participation.

The objectives of this extension of Council work are to:

1. increase the numbers of UIC-school system ongoing school improvement relationships to 15 participating systems;
2. provide opportunities for 7-9 faculty to engage in Council-related research and development through provision of release time and modest data collection and analysis support;
3. increase the numbers of graduate students with UIC-school system liaison roles;
4. establish a regular quarterly research and development publication focused on necessary knowledge for school practitioners; and
5. through these activities make significant positive impact upon the provision of elementary and secondary education in the Chicago metropolitan area.

The formation and continuing development of CASEC represents a long-term commitment by UIC, and particularly by the College of Education, to work with schools and educators throughout the Chicago metropolitan area to improve learning for pre-college students at all levels. As noted above, CASEC has become operational on a limited basis during FY 1986 and will become more completely so during FY 1987. This proposal extends the resource base of CASEC for broader work in FY 1988. Future requests will be based upon additional opportunities for expanding CASEC's benefits to additional schools.

Academic Staff

2.00 FTE Academic Professionals	\$	46,100
.50 FTE Graduate Assistant		7,500

Nonacademic Staff

.33 FTE Clerical		5,000
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Expenses

		<u>31,400</u>
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TOTAL	\$	90,000
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Initiative at Urbana-Champaign
(\$100,000)

Office of School Research and Improvement

The University of Illinois at Urbana-Champaign has a long history of involvement in school-related issues; however, its participation has not been part of a well-coordinated, campus-wide focus on the schools. An Office for School Research and Improvement is therefore proposed to provide a campus-wide focus that will stimulate and facilitate faculty research efforts on school-related issues, provide the link to schools so critical to such research, provide school contacts to assist teacher education programs on the campus, and serve as a major point of information exchange between schools and the UIUC about mutual problems and possible solutions.

The Office for School Research and Improvement, proposed by the College of Education, University High School, and the College of Liberal Arts and Sciences is designed for two major functions: (1) to be the major focus on the campus for research on problems of schools and instruction in schools, and (2) to be the major outreach arm between UIUC and schools of the region and the State. Initial efforts will involve the initiation and support of school-based research involving faculty from various departments at UIUC with school practitioners and preparing mechanisms for education improvement through information exchange and dissemination activities.

The following are examples of some of the possible major initial research areas of the Office.

Excellence in High Schools

The study of effective elementary schools has been a major research focus of the late 1970's and early 1980's. A variety of important findings, such as the instructional leadership role of the school principal, have emerged. (This finding is reflected in current State reform legislation concerning administrator training.) The level of attention at the secondary level has been minimal, however, in spite of the recent national attention to problems in the quality of the nation's high schools. A project to examine and to address issues of what characterizes an excellent high school and to propose what can be done to produce excellence on a larger scale is needed.

Composition

There has been considerable concern about the quality of student writing and the methods used for teaching writing. A research project about writing should include the study of various aspects of improving

the quality of elementary and high school student writing skills and the instruction of such skills.

Science and Mathematics Instruction

The scientific and mathematical knowledge of students has been a major concern in recent reports on the state of education. Research in this area should include the study of essential principles in science and mathematics, how they are or should be taught, effective forms of demonstration, and key characteristics of the thinking of highly successful science and mathematics students.

Reading

The Center for the Study of Reading, which resides within the College of Education and is funded at the multi-million dollar level largely by outside grants and contracts, will be able to direct its research findings through OSRI to elementary classrooms throughout the State.

Teacher Education

With the current national concern about the quality of teacher education and efforts on campus to strengthen the University's own teacher education programs, it is important to consider teacher education as an area of needed research and inquiry. Studies in this area might consider the impact of present programs on the knowledge and attitudes of future teachers, the effect of field experiences, the quality of "methods" instruction and its link to subject matter preparation, and experimental efforts to improve teacher education.

Other possible topics will include computerized foreign language instruction, the development of critical thinking skills in students, special problems of rural and urban schools, and programs for gifted students. In each case, the research projects of the Office will be strongly school-based with researchers involved in schools and classrooms with teachers and students to study issues of instruction and schooling. School personnel will be involved with UIUC faculty in the planning and implementation of the projects, and cooperating schools will be identified as sites for the research. In addition, broad campus-wide involvement will be promoted. Issues to be studied will typically involve researchers from substantive departments (e.g., the English department for composition, mathematics and various science departments for the study of instruction in those areas), faculty specializing in education, and practitioners at University High School or area cooperating schools.

In addition to ties to cooperating schools for participation in research studies, the Office will develop several types of outreach to schools of the State. Regular newsletters, workshops, and electronic

communication networks will be explored as ways to share problems and concerns and to disseminate research study results.

Special summer institutes will be developed to supplement State staff development efforts. How to keep teachers current in their subject areas has been a major concern and one difficult to address because of the relatively long period of time required for serious subject updating. A portion of the 1985 education legislation provides for staff development but largely within the context of the school year and with limited funds resulting in short-term programs. UIUC can have a significant impact on this difficult problem of subject updating by supporting outstanding teachers from around the State in intensive summer study at the University and by developing portions of such institutes for dissemination around the State, possibly through regional service centers or other teacher education institutions.

Such institutes will run four to six weeks in the summer with one subject each summer (e.g., reading, mathematics, science, art, school administration, English). Teachers will be involved in the planning, development, instruction and refinement of materials for dissemination. Teachers will apply to attend, with the most outstanding selected to receive special housing and tuition stipends. Others might attend with other financial arrangements. There will be follow-up activities as well during the subsequent school year to help teachers implement their new learning in their own classes and to assist other teachers with the material learned.

It is envisioned that the governance of the Office for School Research and Improvement will be shared by the College of Education, University High School, and College of Liberal Arts and Sciences with the major coordinating and administrative function of the Office assigned to the College of Education. To ensure the necessary campus-wide involvement as well as the involvement of school practitioners, an advisory group from the campus constituencies as well as area school personnel will advise on Office activities.

The total costs of this program have been estimated to be \$755,000. The units presenting this proposal are willing to reallocate approximately \$270,000 to the project through faculty reassignments, graduate student

reassignments, and the reassignment of expense funds. This will leave a balance of \$485,000 to be requested from the State.

For FY 1988, \$100,000 is being requested to establish the administrative structure of the Office and to get the project underway. The balance of the funds required, \$385,000, will be requested in FY 1989. The details of the proposed budget for FY 1988 are shown below.

Academic Staff

1.00 FTE Faculty Director	\$	50,000
.50 FTE Academic Professional		15,000
.50 FTE Graduate Assistant		8,000

Nonacademic Staff

1.00 FTE Secretarial Position		16,000
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Expenses

Commodities		4,000
Contractual Services		3,000
Travel		4,000
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TOTAL	\$	100,000
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EXPANDED/IMPROVED PROGRAMS
IV. ENGINEERING REVITALIZATION

ENGINEERING REVITALIZATION
(\$3,200,000)

Chicago Program
(\$1,500,000)

The economic well-being of Illinois depends in part upon the State's ability to attract and retain high-technology industry and to restore the competitive position of the State's extensive base of mature industry. To aid in achieving this goal, the University of Illinois at Chicago has increased its efforts to provide industry with an adequate source of highly qualified engineering graduates. New State funding in FY 1983 through FY 1987 has allowed the College of Engineering to make steady progress toward providing a first-rate engineering education at the University of Illinois at Chicago.

The period of the 1970s and early 1980s was one of crisis for engineering education. Difficulties were experienced in competing with industry to attract and retain qualified faculty. Universities found it difficult to provide adequate incentives for encouraging baccalaureate graduates to pursue graduate studies. Enrollment increases pushed faculty workloads to the breaking point; and obsolete equipment and facilities threatened to undermine research and instructional efforts. Since the early 1980s, many states (including Illinois) have effectively responded to the crisis in engineering education by achieving progress in such vital areas as faculty research productivity, improved student/faculty ratios, and the recruitment and retention of women and minority students.

In the area of faculty research productivity, the faculty continue to experience success in attracting funding from a variety of governmental, private, and corporate sources. Total research grants and contracts attracted by the College totaled \$2.7 million in FY 1985, a 50% increase over the preceding year.

Progress has also been made toward achieving a student/faculty FTE ratio of 13:1. The ratio for Fall 1985 was 15.4:1, down from 18:1 in Fall 1984. Reduction of the student/faculty ratio has been the highest of UIC's

Engineering Revitalization priorities since quality of instruction and faculty research productivity are generally dictated by this number.

The College has made progress in the area of faculty salary competitiveness. Engineering Revitalization funding for FY 1987 (along with scheduled salary increases) will assist the College of Engineering in retaining the comparative faculty salary position among its peer institutions.

The FY 1988 request for Engineering Revitalization represents the fifth year of a multi-year program designed to strengthen the quality of engineering programs at the University of Illinois. Funds allocated for the earlier years of the program have supported the College's efforts to reduce student/faculty ratios, recruit outstanding engineering faculty, and increase the College's research productivity by obtaining up-to-date instructional equipment, remodeling poor quality space, and hiring additional technical and support staff. State funding for Engineering Revitalization in FY 1988 will allow the campus to continue its progress in these areas.

As the College of Engineering is able to augment a very strong existing faculty with additional scientists whose research and teaching interests meet the needs of the curriculum, its capacity to continue as a strong contributor to the economic development of the State of Illinois is enhanced. This contribution is best made through the training of engineers, and through the research efforts which will bring the results of much of current high-technology research to the applications stage in design and manufacturing. The new Joint Pharmaceutical Engineering Center is only one example of faculty research interests joining private sector needs to the advantage of both groups and society as well.

The College of Engineering at the University of Illinois at Chicago has already demonstrated its ability to attract outstanding faculty who are capable of generating significant amounts of external support for their research activities. The anticipated increment in State support for Engineering Revitalization in FY 1988 will maintain high quality engineering education to the benefit of local industry, Chicago, and the entire State of Illinois.

<u>Academic Staff</u>	
16.00 FTE Faculty	\$ 698,000
2.00 FTE Academic Professionals	70,000
5.00 FTE Graduate Assistants	75,000
<u>Nonacademic Staff</u>	
5.00 FTE Clerical	95,000
5.00 FTE Technical	158,000
<u>Expenses</u>	154,000
<u>Equipment</u>	<u>250,000</u>
TOTAL	\$ 1,500,000

Urbana-Champaign Program
(\$1,700,000)

A multi-year plan was initiated in FY 1984 to revitalize the College of Engineering. Its objectives were several:

1. to enhance the University's ability to retain superior engineering faculty members who were being recruited to other institutions;
2. to increase the number of faculty and to meet the pedagogic concerns that had arisen because of the very large increase in enrollment and teaching loads that had occurred during the previous decade, while the number of faculty had remained relatively constant;
3. to provide the support staff and related expenses that would be needed to support this increased number of faculty members;
4. to address a most serious instructional equipment renewal and replacement problem aggravated by the combination of inadequate State appropriations, intensive use, and technological change; and
5. to provide the College with an annual recurring source of funds with which to begin to upgrade aged and inadequate facilities.

The engineering revitalization increment of \$933,000 for FY 1987, when added to the additional increments provided for FY 1984-FY 1986, will bring the College considerably closer to achieving the goals that it set at the outset of the revitalization effort in FY 1984. Special salary increases have made salaries in the College competitive with those in colleges of engineering at peer institutions, reducing faculty turnover and improving

the recruiting environment. Approximately 66% of the total projected funds required to provide additional faculty, support staff, and expense monies will have been provided through FY 1987. Incremental funds provided through FY 1987 for recurring equipment needs amount to approximately 33% of the originally projected need, but with the non-recurring funds provided through the Illinois Engineering Equipment Grant Program, the College is realizing between 50-60% of this need on an annual basis. In addition, \$650,000 in recurring funds have been provided to allow for considerable remodeling to take place each year.

Competitive Salary Maintenance

Several conditions in the engineering job market combined to jeopardize the College's ability to retain superior faculty members in the late 1970s and early 1980s. A shortage of Ph.D.s in engineering and science drove private sector salaries to new highs. A similar shortage of baccalaureate graduates raised beginning salary levels in industry to the point where fewer and fewer of these students were willing to pursue advanced degrees, aggravating the shortage of candidates for university positions.

In addition, UIUC and other premier institutions were subjected to "raiding." Institutions in the Sunbelt and the West competed most effectively for the very best faculty from universities in states like Illinois, which were experiencing several years of financial difficulty. Although the College of Engineering experienced a turnover of approximately twenty-five faculty positions per year, it was able to replace those people in the mid 1970s. However, a gradual net decrease of nearly twenty engineering faculty members occurred during the four years preceding the initiation of the Engineering Revitalization Program. The College's salary position was eroded significantly in FY 1983, but salary deficiency increments made possible by revitalization funds have permitted the College to regain, but not improve, its position relative to its peers. The faculty turnover rate this year was one-third the previous rate.

The highly competitive market for the best engineering faculty is likely to continue for the next five to ten years. Therefore, UIUC must continue to monitor salary and compensation practices at peer institutions to retain the benefits that the program has acquired thus far. The mean salary increases at these institutions ranged from 6% to 22% during FY 1986

and engineering salary rate increases at those institutions generally exceeded the rate increases in salaries of faculty in other disciplines.

The annual rate increases in engineering and science disciplines at peer institutions will probably continue to exceed the generally available rate increases provided to other disciplines on their campuses. Market factors ultimately control levels of compensation. The FY 1988 budget request reflects the concept that the College may require more for salary increases than that provided for the University as a whole in order to keep salary increases competitive with those provided in peer colleges of engineering. The comparative salary situation will continue to be monitored, and supplements will be made if necessary.

Restoration of Student/Faculty Ratios

During the decade of the 1970s, engineering undergraduate enrollment increased by 50%, and graduate enrollment increased by approximately 15%. Similarly, the instructional workload of the College increased by almost 50%. Although the number of teaching assistants increased by one-half during this period, the number of faculty and staff remained constant. Teaching as a proportion of total workload increased, but could not keep pace with enrollment. Therefore, undergraduate class sizes in lecture sessions grew from 83 to 120 at the 100-level, 23 to 94 at the 200-level, and 26 to 38 at the 300-level; lecture discussion sections doubled in size at all course levels; and laboratory sections increased by about 25%. Concerns for the quality of the instruction and the importance of scaling the instructional program to the quality of the student being admitted required that these class sizes be brought in line both with past practice and with widely accepted standards at institutions of similar caliber.

Revitalization funds were appropriated too late to be applied to faculty recruitment in FY 1984, the first year of the program. The teaching load problem was partially addressed by increasing teaching assistants and support staff, while the departments prepared to recruit additional faculty. These preparations produced results during the second and third year. The College has realized an increment of 27.5 additional tenure-track faculty members through the past academic year. For FY 1987, the College and the departments have implemented procedures that should produce an additional twenty new faculty positions. This is to be

accomplished by applying FY 1987 funds and also by converting from teaching assistantships some of the funds allocated previously. The College is well on the way toward a sustained pattern of growth for the first time in approximately two decades. The FY 1988 request will permit the addition of a further 10.00 to 22.00 FTE tenure-track faculty. The range of possible additions will be determined by the amount of funding required to maintain a competitive salary structure for the College of Engineering.

When peak enrollment and teaching load occurred in FY 1980 and FY 1981, the College experienced the first of the net losses in faculty to other institutions, and as a result a limitation was placed on freshman enrollment. Three freshman classes of reduced size were admitted through the fall of 1984, but the admission cycle for the fall of 1985 was modified to return the freshman enrollment and the admission of transfer students to their record high levels. The College had an undergraduate enrollment of 5,301 in the fall of 1985. As successive admission classes are similarly constituted, and as future increments of new revitalization positions become available, the College will sustain the current level of undergraduate enrollment and will proceed to reduce large class sizes.

At least two important benefits accrue to the campus as the College moves toward the completion of the original revitalization plan. First, the return of the enrollment of the College of Engineering to its all-time high of 5,300 will help to provide more engineers who are sorely needed. The second benefit derives from the tradition of the College to support its research activities with extramural funds.

The goal in each addition to the faculty is to employ individuals who are both good teachers and strong researchers. In the case of the junior faculty the College is recruiting, the College examines closely their potential for strong contributions in both of these areas before appointing them. The strategy is to rebuild a major portion of the programs of the College by combining science and function in the new program endeavors.

These contemporary areas are:

1. advanced manufacturing systems;
2. biotechnology;
3. computing systems and software;
4. energy studies;
5. microelectronics; and
6. new engineering materials, their processing and properties.

Through turnover replacement and through the Engineering Revitalization Program, a total of forty-four new faculty appointments have been completed during the past two years. All but four of these appointments represent faculty with expertise in these broad new directions of endeavor for the College.

Equipment Renewal and Replacement

Two forces are behind the need for additional equipment funds. First, the pace of technological advancement has led to the obsolescence of instructional equipment in much shorter time periods than was true a decade ago. Second, the burgeoning student population leads to more intensive use of the equipment in the instructional laboratories. State-appropriated revitalization funds have more than doubled the annual level of expenditure for instructional equipment during the past two years, and to some extent these funds have been leveraged against gifts of equipment, totaling \$15 million last year. The corporate donations to the inventory of modern instructional equipment last year alone exceeded by almost a factor of ten the entire recurring equipment budget provided by the State to the College of Engineering. The goal of the College is to obtain a level of instructional equipment funding equivalent to \$1,250 per baccalaureate degree awarded. The increases through FY 1987, if the non-recurring funding provided through the Illinois Engineering Equipment Grants Program is counted, will move the College slightly more than halfway toward this goal.

Recurring Remodeling Funds

Modern facilities make important contributions to high-quality productivity in teaching and research. Current plans and cost estimates imply a total need of at least \$25 million to accommodate the College's transition to a modern instructional and research base designed around closely controlled environmental conditions, ultra-sensitive measuring devices, and effective computer work stations. There is a general need to upgrade utilities that serve all the laboratories and the desire to design and to shape flexible laboratory and office space that will provide the opportunity for scholars to assemble around problems of common interest.

The College has allocated \$650,000 of the revitalization funds through FY 1987 to meet the remodeling needs of its programs. At the moment,

\$13 million are needed for remodeling that has been specifically identified. All of these remodeling projects can be developed to go forward in the next few fiscal years.

As carefully as the College may manage the expenditure of funds allocated for remodeling, the funds are not adequate for the task at hand. Twenty percent of building space assigned to the College was constructed during the period 1931-1960, and this falls into the category of "aging" facilities. Forty percent of the space is "aged," one-half having been constructed before 1910. The change and growth accompanying the vitality of the faculty requires a marriage of private and public support if the College is to bring the proper facilities on-line as rapidly as possible. Until private sources of support are fully developed, the College must rely on increases in the revitalization appropriation to mark progress through the next few years.

FY 1988 Budget Request

The top priorities of the College of Engineering are reflected in the details of the FY 1988 operating budget request shown below.

Academic Staff

10.00 to 22.00 FTE Assistant Professors*	\$ 925,000
11.20 FTE Graduate Assistants	212,500

Nonacademic Staff

3.00 FTE Technical Positions	75,000
5.00 FTE Secretarial Positions	75,000

Wages

Negotiated Employees	100,000
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Expenses

Commodities	130,000
Contractual Services	130,000
Travel	15,000
Telecommunications	<u>37,500</u>

TOTAL	\$ 1,700,000
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*Precise number will depend on amount of salary enhancement required.

EXPANDED/IMPROVED PROGRAMS
V. MINORITY RECRUITMENT AND RETENTION

MINORITY RECRUITMENT AND RETENTION
(\$840,000)

Chicago Program
(\$305,000)

Expanded Efforts in Minority Recruitment and Retention

The goal of minority recruitment and retention activities at the University of Illinois at Chicago is to provide meaningful access to a quality undergraduate, professional, and graduate education for individuals who have been historically under-represented in higher education. To help meet this goal, a wide range of early identification, recruitment, support, and educational activities are carried out across the campus. Some are organized within specific colleges, others are organized along functional or programmatic lines. The funds requested for FY 1988 will provide for significant enhancement of these activities to move UIC toward the strongest possible position to respond to minority educational needs throughout the Chicago metropolitan area and the State throughout the next decade.

Following a trend which began in the early 1980s, the number of individuals in the traditional college-bound age group continues to decline. Within the college age group, however, the proportion of minorities, especially Blacks and Hispanics, is increasing markedly. By 1994, for example, almost 45% of the 15-19 year olds in the Chicago metropolitan area will be in these two minority groups, an increase from 33% of the total in 1980.

Unfortunately, young Blacks and Hispanics traditionally have not pursued higher education in proportion to their presence in the population. An extraordinarily high number never complete high school. Many who do are ill-prepared for the demands of college. Since reaching its peak in the mid-70s, Black college enrollments have declined. Nationally, still fewer minority students finally graduate, though the number of baccalaureate degrees awarded to minority students has remained relatively constant at UIC since the late 1970s. Unfortunately, only a handful of these students go on to enroll in and successfully complete graduate or professional school.

The UIC response to this challenge reflects the recognition that it requires multiple strategies aimed, ultimately, at the goal of stimulating and supporting the flow of minority students at various points in the educational pipeline. These range from early outreach activities in primary and secondary schools to increased graduate and professional school enrollment. Since the occupational requirements, entry points, expectations, and cultures of our professional schools in fields like medicine, allied health professions and pharmacy vary considerably, many of these activities such as the Urban Health Program are organized and pursued most effectively on a college level. Others, e.g., identification, recruitment, counseling, and educational support of minority undergraduate students generally, are more effectively handled on a functional or programmatic basis by units like the Office of School and College Relations (OSCR), the Office of the Dean of Student Affairs, or the Educational Assistance Program.

Among these functional units, the Office of the Dean of Student Affairs has developed a program aimed specifically at retaining able minority undergraduate students now enrolled at UIC. Termed the Buddy System, the program identifies Black and Hispanic UIC students who are academically and socially successful, and pairs them with incoming minority freshmen and new transfer students. The incoming students are all regularly admitted students. As such, these new students, while more capable than their specially-admitted counterparts, are not initially targeted for the services and support provided by some of the special support and assistance programs on campus.

The Buddy System, begun in Fall 1985, actually serves to further the retention of both members of the pair. The already successful peer mentors maintain involvement in the campus while helping their new student counterparts to adjust to UIC, both in the classroom and socially. Initially developed and operated by existing staff in the Office of the Dean of Student Affairs, the program will be serving more than 150 students by Fall 1988, and a full-time professional staff member will be needed to coordinate the program, select the peer mentors, train them and support their efforts, develop promotional and instructional materials, and plan programs. Graduate assistants will also be used to staff the program and clerical support will be added as well.

The University of Illinois at Chicago comprises 16 colleges offering programs designed for students from the beginning freshman to professional and doctoral degree candidates. Minority students enrolled in a particular college will have educational, motivational, occupational, and social needs peculiar to their discipline or profession, as well as to their general level of study skills. Consequently, each college often requires academic counseling, support groups, educational and career assistance, and program coordination which reflects these distinctive needs.

The College of Medicine at UIC has long been committed to providing access to medical careers for minority students. For over a decade, the College of Medicine has consistently been among the nation's leading public medical schools in the training of minorities. Since the Fall of 1982, the College has ranked first among public non-minority medical schools both in the total number of Black students enrolled and in total under-represented minority enrollment. Although the College has achieved creditable success with respect to its commitment to graduate significantly greater numbers of physicians from the pool of minorities which are under-represented within the medical profession, it must continue to address the issue of increased retention and graduation of students who enter with nontraditional credentials.

Educationally disadvantaged minority students tend to have more difficulty than do non-minority students in negotiating the medical school curriculum. Attrition rates for such students, though markedly reduced of late, still are significantly greater than the attrition rates for non-minority students. If the regional sites of the College of Medicine are to improve the retention of the increased number of minority students enrolled at those sites, each program must have the resources to provide enhanced remediation efforts. Current data demonstrate that at all sites of the College there is a well-defined need to promote more individualized tutorial and review exposure for minority students. Experience in Chicago has already demonstrated the efficacy of such efforts.

The Urban Health Program (UHP) is the vehicle whereby the College of Medicine translates its commitment to minority students into action. In recent years, UHP students have been assigned in proportional numbers to the Basic Science Programs in Chicago and Urbana-Champaign. Since then, an increasing number of UHP students have chosen to pursue their clinical

education at the Peoria and Rockford sites. While programs for supportive services are in place on the Chicago campus, similar types of programs need to be established at the regional sites to serve the larger number of UHP students electing to pursue their medical studies at these regional locations.

In Peoria, new funds will support an academic counselor, bilingual in English and Spanish, who will work with the UHP students, many of whom are Hispanic. The counselor will be expert in analyzing and counseling in the area of study skills, mathematics, writing and reading skills, and in personal counseling as well. Similar positions exist in Urbana-Champaign and Chicago.

The College of Medicine at Rockford has begun to offer academic assistance services to meet the needs of students who are having, or are likely to have, academic difficulties. Skills taught relate to increased learning efficiency and effectiveness and increased performance and include self-diagnosis of content deficiencies, accelerated learning techniques, test item analysis skills, time management and memory improvement. Programs to teach students test-taking skills (test anxiety reduction, relaxation training, memory improvement, general test-taking, etc.), administering and scoring practice examinations, are impossible with current staff and resources. Therefore, an additional individual is needed to expand the variety and quantity of support provided.

In Urbana-Champaign, a formal introductory program of instruction will be offered during the summer prior to matriculation for students identified as likely to experience difficulty with the Basic Medical Sciences curriculum. The four-week program will emphasize study in mathematics and reading/study skills. Such a summer of study enhances the students' likelihood of success within the curriculum. A part-time coordinator and several tutors will be hired to support the program.

The College of Associated Health Professions (CAHP) has developed a comprehensive program for enhancing the success of minority students by addressing the problems these students most frequently experience. The program, at this time, has two major components, both focusing on students before they enter the professional curricula.

The first component, the tutorial program, addresses the quality of the pre-health professional science education and will impact the

competitiveness of minority students in the application process. Tutors in the basic sciences will work with college freshmen and sophomores as they complete the specific course required for admission into CAHP. The tutorial service will be available for University of Illinois and community college students, historically the sources of the majority of the CAHP minority applicants.

Another part of the tutorial program will be a two-week intensive clinical writing workshop for junior-level students enrolled in CAHP. This workshop will provide students with the necessary writing techniques required of all students in the clinical setting and will be held prior to the first required clinical rotation. Upon completion of the academic program in the College, students will be offered a pre-certification review session in preparation for the certification examination.

The second component of the CAHP minority retention program addresses the acclimation of students to the clinical setting. Preceptorships will be arranged for students in their areas of interest the summer prior to their enrollment in the College. The progress of the students will be monitored by College and Urban Health Program staff and the students will receive feedback on their experiences.

In the College of Pharmacy, the institution of the Doctor of Pharmacy (Pharm.D.) as the first-professional degree has meant that the general standards for admission and retention have increased. To ensure that students from all social/economic groups are admitted into the Pharm.D. curriculum, efforts must be increased to recruit qualified minority applicants and to retain them once enrolled.

The Urban School Articulation portion of the recruitment/retention program in the College of Pharmacy focuses on strengthening the professional relationships between urban high school counselors and the College. The number of visitations to urban schools will be increased and students in these schools will be provided the opportunity to visit and participate in the educational programs of the College.

An Academic Readiness Review will be offered to minority students admitted to the College. The review will assess key prerequisite knowledge and, where deficiencies are noted, appropriate remedial instruction will be provided through computer assisted instruction. Once admitted to the College, Peer Counseling Support Services will provide a network for

newly-admitted minority students with advanced minority students in the College.

The Tutorial Assistance Program will provide minority students with secondary instructional delivery of the core curriculum. Upper class students will serve as tutors and will work closely with the faculty member who is providing the primary instruction. Tutorial services may be individualized or offered to small groups based on student needs.

One full-time individual will coordinate the activities of these programs, providing liaison and direction among the components and assuring continuity of services for minority students. The person will work with existing staff as well as provide direct services to students.

The efforts at UIC to recruit minority students and to retain them, once enrolled, really begin well before the potential students reach college age. The Early Outreach Program identifies educationally and economically disadvantaged minority students at the middle and high school levels and provides them with academic enrichment in the areas of science, mathematics, reading, and composition as well as introduces them to the culture of higher education. The program also provides preceptorship experiences which permit students to learn by doing, while working under the guidance of professionals who serve as mentors and role models. An important component of the program is individual and group counseling for students.

Dropped in 1984 because of financial difficulties, the middle school component of Saturday College was restored in FY 1986 when Early Outreach received \$50,000 in new State funds. Through this component of Saturday College, 100 seventh and eighth graders participate in monthly forums, exposing them to college requirements for and potential careers in the health professions. The eighth graders are involved in academic enrichment activities in mathematics, science, reading, and composition as well as in health-related forums and workshops. A comprehensive counseling program is available for both the students and their parents.

New funds in FY 1987, totaling \$79,000, will enable further development of the summer preceptorship program and the initiation of a modified Summer Bridge program for high school seniors, facilitating their transition to college. Expansion of the Summer Bridge program, now entirely

non-residential, to include a two-week campus residency is anticipated with FY 1988 funds.

Adding a residency component to the six-week Summer Bridge program will help graduating high school seniors make the transition from home and a supervised environment, to college where students are expected to function independently and take responsibility for their actions. The on-campus residency will introduce students to college life and help them to identify and use campus resources. In addition, the program provides students with a preview of college math and a short course to further develop their writing skills. The final emphasis of the program helps students improve their study skills and ability to manage their time and finances. Additional academic staff are needed to develop and administer the expanded Summer Bridge Program. Tutors/counselors are also required to instruct the students and serve as residence hall counselors during the residential portion of the program.

Funds requested for the expanded minority recruitment and retention efforts are listed below.

<u>Academic Staff</u>		
5.00 FTE Academic Professionals	\$	153,000
1.00 FTE Graduate Assistant		15,000
<u>Nonacademic Staff</u>		
1.00 FTE Clerical		16,000
<u>Wages</u>		80,400
<u>Expenses</u>		30,600
<u>Equipment</u>		<u>10,000</u>
TOTAL	\$	305,000

Initiatives at Urbana-Champaign
(\$535,000)

Although the vast majority of the undergraduate students admitted to UIUC are among the very best in the State, there are several hundred students, largely minority students, who are admitted on a special basis. These students, because of their relatively marginal academic performance and other factors, will very probably be "at risk" when placed in competition with the students at UIUC. The campus administration is developing two new related programs in an attempt to improve the retention rate of the students in this group.

Summer Bridge Program - (\$175,000)

During the summer of 1986, the College of Liberal Arts and Sciences will initiate a six-week Summer Bridge Program, as part of the regular summer session, that will strive to improve the academic potential of each participant by strengthening and sharpening cognitive skills in mathematics and writing, by improving study skills, and by building confidence and self-esteem.

Generally, students selected to participate in this pre-college program will have scores of 15 or below on ACT mathematics and English sub-tests. Prior to acceptance into the Bridge Program, each prospective participant will be carefully screened and interviewed. The initial phase of the program will include fifty students, and will be funded on a temporary basis with nonrecurring funds for the summer of 1986. The funds being requested for FY 1988 will put the Program on a permanent basis and an additional \$200,000 will be requested for FY 1989 to allow the College to expand the Program to include approximately 120 students for the summer of 1988.

Small classes will be held in mathematics and rhetoric. The academic program will be rigorous, and every effort will be made by the Bridge faculty to inspire students to develop the needed basic skills in these areas. The courses will be standard credit courses offered as part of the regular summer session. Each participant will take a series of placement tests to determine which particular courses will best suit his/her academic needs.

The Bridge students will have access to tutorial assistance for all the courses in which they are enrolled. Also, they will be taught how to study, how to read with the efficiency needed in college-level classes, and how to discriminate ideas, analyze thoughts, and draw logical conclusions.

Bridge participants will be housed in a group in one of the University residence halls. The Bridge Program will provide housing and meals for all participants. The Program will also provide all course textbooks and a stipend of \$500 to each student to replace lost summer earnings. Students will be responsible for the costs of travel to and from the campus. Financial aid will be available to qualified participants.

The proposed budget for the summer of 1987 is shown below:

<u>Academic Staff (summer only)</u>		
.50 FTE Faculty Director	\$	4,000
.75 FTE Administrative Director		5,000
10.00 FTE Teaching Associates and Teaching Assistants		43,000
5.00 FTE Graduate Assistants, Tutors and Residence Hall Supervisors		8,000
2.00 FTE Academic Professionals (advisors)		7,000
<u>Nonacademic Staff</u>		
.50 FTE Secretarial Position		1,500
<u>Expenses</u>		
Housing and Meals		60,000
Student Stipends		25,000
Contractual Services		13,000
Commodities		6,500
Travel		2,000
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TOTAL	\$	175,000

Transitional Program - (\$160,000)

It is clear that the participants in the Summer Bridge Program will require some additional special help beyond their first summer if they are to succeed at UIUC. Therefore, a follow-up program entitled the Transitional Program is being proposed, to complement the Bridge Program.

The Transitional Program will be administered by the same personnel in the College of Liberal Arts and Sciences who will be directing the Summer Bridge Program. The Program will include approximately 100 freshmen in its first year, and those students will remain, for the most part, in the

Program during their second year. Thus, by the fall of 1988 there will be approximately 200 students in the Program.

The Office of Admissions and Records (OAR), working with the directors of the Transitional Program, will be responsible for making the final decision on which students will participate in the Summer Bridge Program and eventually in the Transitional Program. Those students with an ACT score below 15 in both mathematics and English or below 12 in either mathematics or English will be the principal participants in the Transitional Program.

The students entering the Program will be guaranteed that they can transfer to the curriculum of their choice if they have attained at least a 3.00 cumulative grade point average and have met the necessary preliminary course requirements.

All students will be assigned personal advisors who will meet with them on a weekly basis, will help them with their study habits, will advise them on the courses to take, will direct them to appropriate academic support services, will make sure they use their time wisely, etc. It is believed that the relationship developed between the advisors and the students will be extremely important in helping the students to achieve success.

Students will receive diagnostic testing to ensure that they begin their course work at the proper level. Their study skills will also be evaluated when they first arrive on the campus. At the end of each semester all participants will be evaluated again to determine their progress, or lack of it, so that appropriate plans can be made for the students' next semester.

Sections of many common freshmen and sophomore courses will be specially tailored for students in the Transitional Program. The course content will remain the same, but students will be required to do more writing. They will also meet in smaller sections (8-15 students) and will probably meet more frequently than students in the regular course sections. Every effort will be made to see that they get the support they need.

If the special course sections are not filled in every case, students in the Educational Opportunities Program will be asked if they would like to participate. There is no guarantee that these special course sections will improve the students' performance, but because the faculty members

teaching the sections will be selected with care, because the sections will be smaller and will permit more personal attention to the students, etc., there is reason to believe the results can be very rewarding.

Additional funds will be required to support the administrative and advising structure of the Program. Also, more funds will be needed to operate the smaller course sections.

The details of the budget for FY 1988 are shown below.

Academic Staff

.50 FTE Faculty Director	\$	22,000
.75 FTE Administrative Director		27,500
2.00 FTE Academic Professionals (advisors)		38,500
2.00 FTE Faculty		60,000

Nonacademic Staff

.50 FTE Secretarial Position		8,300
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Expense

Commodities		3,000
Contractual Services		700

TOTAL	\$	160,000
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An additional \$100,000 will be requested for FY 1989 to add the second year of the Program.

Principal's Scholars Program - (\$200,000)

Historically, many minority students have been insufficiently prepared for college programs that require a science and mathematics background. As a result, the post-secondary choices of these students have been limited. The Principal's Scholars Program (PSP) was initiated at UIUC, with the cooperation of the Ada S. McKinley Educational Services Agency, to address this problem.

PSP is a significant component of the UIUC effort to increase the statewide pool of adequately prepared minority high school graduates. Since its inception in 1975, students, parents, teachers, principals, and staff members involved in the Principal's Scholars Program have maintained a serious commitment to the Program and its goals. In FY 1985 the Program reached an enrollment of nearly 2,400 students in twenty-six participating high schools and organizations throughout Illinois. Negotiations are presently underway to add more schools and students to the existing base.

In the past year, the Program has extended its commitment to a number of junior high and middle schools in the Chicago and downstate areas through a series of special meetings designed to recruit qualified students into the Principal's Scholars high school programs. These pre-high school sessions introduced some 300 seventh- and eighth-grade students to a range of career planning issues and provided an increased awareness of extended educational possibilities.

The notable achievements of the Principal's Scholars Program can be largely attributed to a series of motivational components that encourage a student's successful participation and completion of the Program's high school curricula. The development of strong competitive skills is a key asset to those minority students pursuing nontraditional academic and professional careers. Principal's scholars have the opportunity to demonstrate their abilities in highly competitive environments through a series of competitions sponsored by the Program and by a number of outside agencies and institutions. In FY 1985, some seventy-five students performed with distinction in state, regional, and national competitions in science, mathematics, English, and speech. In fact, Principal's Scholars competing among some forty students in the National Student Science and Engineering Competition in Greensboro, North Carolina, took first, second, or third place in every category in which they entered.

Other contests hosted by outside agencies included the Junior Engineering Technical Society's design competition in Chicago, the Illinois State Architecture Competition at the Urbana-Champaign campus of the University of Illinois, a mathematics contest at the University of Illinois at Chicago, the annual Chicago Student Science Fair at the Museum of Science and Industry, and the Shakespeare Scholar's Panel Competition.

Principal's Scholars students who do not participate in these competitions are encouraged to take advantage of the educational opportunities such events provide by attending as many of them as possible. Transportation is provided to many of these competitions.

To supplement their studies in English, art, drama, foreign languages, and social sciences, many students in or visiting Chicago have seen exhibits at the Museum of Science and Industry, the Field Museum, the Planetarium, the Art Institute, the Oriental Institute, the Chicago Board of Trade, and the Lyric Opera. Others have visited historical

neighborhoods such as Graceland and the Pullman area. Students have attended plays such as The Philanthropist, Arms and the Man, and CATS at Chicago's Court and Shubert Theatres. Many students visited the DuSable Afro-American Museum in Chicago. Students from Crane High School participated in a Spanish Folk Contest held at Dunbar High School.

Educational opportunities outside the classroom have included a range of special summer programs, college fairs and tours, and company tours. Last year, approximately 40 students attended a four-week PSP summer program at UIUC and eight others participated in summer programs on the campus in leadership and mathematics. Two students from Fenger High School attended the CLOSE-UP Program, a week-long look at government in Washington, D.C. More than 1,200 students visited the campuses of the University of Illinois at Urbana-Champaign, the University of Iowa, Southeast Missouri State, Illinois State University, Purdue University, Northwestern University, and Southern Illinois University.

Visiting plant sites and touring industrial facilities have been ways for students to better understand how skills learned in the classroom are applied in the work place. This past year, for instance, Kraft, Incorporated hosted sixty students at a spring computer orientation and tour. Other companies sponsored similar events.

Parents of Principal's Scholars students become active partners in their children's education by providing a home environment that supports the high level of academic challenge present in the Program by attending meetings and programs and by serving as chaperones on trips. Together, students and their parents participate in a number of Program activities, including career orientation meetings and regular reviews of academic performance.

During FY 1985, nearly 100 parents participated in six different student/parent/staff meetings and programs, demonstrating their commitment to the Program's goals and providing the encouragement necessary to help their children succeed in the Program's advanced high school curricula.

The Program's highly qualified and committed staff create an uncommon environment for each student's personal and intellectual growth. From classroom teachers, coordinators, and principals in each participating high school to administrative personnel on the UIUC campus, the personal

interest and enthusiasm expressed by Program staff members represents one of the Program's most essential motivational components.

At the high school level, principals are responsible for determining the effectiveness of the Program; for selecting at least one coordinator to manage the school's participation; and for establishing policies relating to the amount of time and resources that can be allocated to the Program.

At the University level, administrative personnel act as liaisons to industrial and business funding sources; advise the administrative and support staff in participating high schools; provide assistance in the coordination of meetings, programs, and projects; and with University of Illinois faculty members, coordinate the development of summer programs.

In the past year, sixty teachers, coordinators, and principals participated in a range of staff development conferences, workshops, and institutes sponsored by PSP. These activities were supported by representatives in private industry, the University of Illinois at Urbana-Champaign, and other educational institutions and professional associations.

Professional development programs attended by PSP staff members last year included the American Association for Counseling and Development in New York, the National Council of Teachers of Mathematics Conference in San Antonio, Texas, and the Illinois Association of College Admissions Counselors in Springfield.

The \$137,000 appropriation for the Principal's Scholars Program in FY 1986 made it possible to centralize the Program in the Office of the Vice Chancellor for Academic Affairs, giving it the increased visibility it deserved. The new funds also made it possible to hire additional personnel and to increase services to the participating schools. Efforts to include more schools in the Program were initiated, and it is expected that such efforts will be broadened considerably if the expected \$200,000 increment for FY 1988 is forthcoming. A final increment of \$100,000 for FY 1989 will make it possible to support the Principal's Scholars Program in the majority of those high schools in the State with large minority populations, and it will also make it possible to expand the fund-raising efforts required to involve more businesses and companies in supporting the programs of PSP. The new incremental funds for FY 1988 will make it possible to more than double the size of the four-week summer program on the UIUC campus for PSP students. More workshops can be provided for the participating high school

teachers. Additional opportunities will be made available for students to use microcomputers and to develop study and test-taking skills. It will be possible to begin to collect data on the participants to evaluate their progress in the Program, even after they proceed on to the college of their choice. All of these features, and more, will be added to those activities and services that are already being provided.

Recent discussions with school administrators in the Rockford schools indicate that they will soon be joining the Program. Other schools in the State have submitted inquiries about the Program, and as soon as additional staff are available, all of these inquiries can receive a proper response and those schools can be incorporated in the Program. It is significant to note that the Program is now receiving national attention and is seen as an excellent model.

The proposed budget for FY 1988 is itemized below.

Academic Staff

1.00 FTE Assistant Administrative Director	\$	32,000
1.00 FTE Academic Professional		20,500

Nonacademic Staff

1.00 FTE Secretarial Position		17,000
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Expense

Commodities		10,000
Contractual Services		9,500
Telecommunications		1,000
Travel		10,000

Summer Program

110 Students		<u>100,000</u>
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TOTAL	\$	200,000
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EXPANDED/IMPROVED PROGRAMS
VI. EQUIPMENT REPLACEMENT

EQUIPMENT REPLACEMENT
(\$2,000,000)

Although higher education is a labor intensive enterprise, it is heavily reliant upon equipment to achieve its instructional, research, service, and support objectives. The limits of scientific discovery and instructional innovation are still determined by the faculty and scientists who direct the University's research and instruction efforts; however, the availability of up-to-date equipment is essential to utilize their knowledge and talents fully. Similarly, student access to modern scientific and technical equipment must be maintained if the quality of their educational experience is to remain high. Even students enrolled in traditionally non-scientific programs must have the benefit of exposure to computers and other types of microprocessors which are commonly used in all sectors of society.

Similarly, a University is dependent upon various other types of equipment, some of it technologically sophisticated, the remainder of a much more mundane character, which are utilized to maintain and enhance the institution's ability to provide a safe and comfortable environment in which students, faculty, and staff can live and work.

A comprehensive and detailed equipment inventory survey and analysis is nearing completion, and its results will be distributed to interested parties during the fall of 1986. The following summaries, however, provide a glimpse into the need that exists at both the Chicago and Urbana-Champaign campuses. This need is now even more pronounced due to the appropriation reduction in the FY 1987 budget by 3% below the Governor's original recommendation level.

Initiatives at Chicago
(\$1,000,000)

Equipment has historically been an essential ingredient of UIC's scientific advancement, and its importance to modern research has grown dramatically over the past two decades. Technological developments, especially in the electronics industry, have occurred at an extremely rapid

pace, resulting in a correspondingly swift development of new and improved instrumentation. With improved production and quality control techniques, microelectronic circuitry can now be economically produced and utilized in a myriad of scientific instruments. Maintaining a comprehensive and up-to-date inventory of University equipment has been difficult, due in part to the limited financial resources available for equipment acquisition and to the accelerated rate of technological obsolescence which characterizes modern instruments. To help establish a sound base of financial support for equipment acquisition, the University has requested incremental funds during the past several years under programs related to equipment deficiencies or equipment replacement. Funding of these programs has occurred at a more modest rate and at a lower cumulative amount than total needs require. Nonetheless, the University has increased its State funded equipment base substantially in past years, and these funds have helped arrest the decline in the availability and quality of University equipment. In addition, the University has been successful in attracting major equipment grants from industry, especially those which have provided personal computers and other specialized computers for a variety of innovative instructional applications.

Despite some recent arresting of growing equipment deficiencies, the University recognizes several areas of equipment need: (1) instructional/research; (2) safety; and (3) miscellaneous equipment. The following gives examples of critical equipment needs which cannot be addressed with existing equipment budgets.

The clinic equipment in the College of Dentistry was installed during the building construction completed in 1972 and 1975. The equipment has been in continuous use by students in the third and fourth years of their dental education since that time. It has been maintained and repaired over the years but has reached a point where repair parts are unavailable because either the companies who manufactured that equipment are no longer in business or the companies are no longer required to provide repair parts (10 year maximum). Since that time there has been cannibalization of very limited numbers of items and retrofitting of other companies' products to continue operation.

Without properly functioning equipment, students are not able to provide timely clinical care to their patients and they experience delays

in completing minimum educational requirements. Time of patients is also wasted when they must return for a second visit or be relocated to another dental chair not being used by another dental student. It also undermines the confidence of the patient in the clinic and the University. Patients may choose to seek dental care elsewhere, denying students clinical experience required for graduation and certification as dental practitioners. Quality of clinical education suffers because students are not learning in clinics with state-of-the-art equipment.

Most experts would put the useful life of clinical equipment at approximately ten years with a maximum of 15 years. The federal government places an eight year use on its dental equipment. Repair and maintenance costs for existing dental equipment were approximately \$90,000 in FY 1985.

The time for systematic replacement of all clinic and clinic support equipment has been reached. The College proposes to replace current equipment over a five year period using both State funds and dental student fees allocated to the College of Dentistry specifically for clinic equipment replacement.

The Academic Computing Center at UIC has identified the need for acquiring state-of-the-art computing equipment for the campus. In addition to requiring the regular use of computers in the classroom, many universities are becoming increasingly involved in joint university/ business arrangements to promote student competency and familiarity with standard forms of computer hardware and software. The College of Business Administration at UIC needs to have a microcomputer laboratory if it is to offer its students proper training for the world of business. The College has proposed the development of a microcomputer laboratory with 50 laboratory workstations, interconnected to a minicomputer. The laboratory would be available to all students and faculty of the College. Faculty of the College could begin to add microcomputer software applications to course requirements, thus exposing students to computer applications which have become the standard in the world of business work.

A chronic backlog of requests for computer installations on the Academic Data Network plus a growing need for better maintenance to the current 12 mile-long cable trunk system has created a need to recruit 2 FTE cable technicians/engineers for the Academic Computer Center. Moreover, since all large IBM computing systems are using or planning to use the

Virtual Telecommunications Access Method (VTAM), efforts must be made to facilitate a transition to VTAM. Ultimately, communications with the Academic Computer Center, new printers and communications devices, and shared communications lines to UIUC would benefit from a transition to VTAM.

UIUC, and the supercomputer facility, have a network linking mainframe computer systems based on "Pronet" hardware and software. As part of UIC's support for supercomputer users, a branch of Pronet will be located in Chicago. Pronet provides remote logon and file transfer facilities to small and medium mainframe systems at a relatively low cost. Establishing Pronet would benefit the University as a whole by providing a communications network which would join both campuses and augment the existing Sytek network.

Academic Computing and the College of Architecture, Art and Urban Planning (AAUP) have joined forces to plan a microcomputer lab and computer aided design facility for all of the units in the College. The Computer Aided Design program (CAD) will provide microcomputer terminal access for all students, faculty, and administrators for teaching, research, and administration; provide computer aided design facilities for integration with the existing programs in architecture, design, urban design and planning, and environmental technology; provide a CAD facility that is at least equivalent to the current level of activity in the design professions to provide staff and equipment for the development of applied research and service programs in the architecture and design professions.

In recent years, just as architecture and the visual arts have become dependent on electronic data processing and computer aided design, the planning field has become increasingly microcomputer oriented. The proposed program will provide the opportunity for advanced level electronic technology in the classroom and for faculty engaged in research activity. In addition to teaching and research, the CAD facility will provide support for interdisciplinary projects and courses within the College, and between the College and public and private entities in the Chicago area.

The duration and timetable for implementing the AAUP academic computer program is Fall quarter 1987 through Spring quarter 1991. Microcomputer and computer aided design skills courses will be implemented in Fall 1987. Over the following four years, the use of computers for both data

processing and design will be integrated into the major courses in architecture, art and design, and planning. Advanced seminars in computer aided design, computer aided graphic visualization, robotics, and product development will be initiated, starting in Spring 1988.

The new computer program for the College will provide for the integration of microcomputer and CAD processes in the existing curriculum as well as provide the basis for the development of an applied research and service program for faculty and students in CAD, computer visualization, and physical planning and technology. Initially, the new computer facilities will be used primarily for academic work. All of the Architecture and Design students will take an introductory course in computer aided design and students at both the undergraduate and graduate levels will be expected to utilize the computer facility as an integrated part of both studio and technical courses. At the graduate level, the computer facility will provide the basis for both advanced academic work and applied research in Architecture, Design, and Urban Design methodology. This program and facility will serve 500 undergraduate and 150 graduate architecture students, 300 undergraduate and 50 graduate Design and Industrial Design students, and 150 graduate students in Urban Planning. Existing faculty will participate heavily in the program to insure the total integration which is the goal of this program. Additional equipment funding will be required to support the development of this plan.

Faculty and student researchers from across the campus use the Bioinstrumentation Facility, the Biostatistics Facility, the Electron Microscope Facility, the Environmental Stress Facility, the Instrument Shop Facility, the Scientific Computer Workstation, and the Spectroscopy Facility, all functionally part of the Research Resources Center (RRC). The Center, however, is stretched beyond its functional equipment limits in a number of areas. In order to more fully meet present needs, the following are examples of state-of-the-art equipment required by RRC.

1. A High Voltage Electron Microscope, which would enable investigators to view molecules and atoms. This 300KV instrument would be used by researchers from the fields of engineering, biology, chemistry, and medicine.
2. A 500 megahertz High Field Nuclear Magnetic Resonance Spectrometer which would be used by biologists and chemists to achieve better and higher resolution images and shorten experimentation time.

One particular example of how this machine would be used is in the monitoring of drug interactions.

3. Two Mass Spectrometers would allow more sophisticated research work including the identification, examination, and measurement of elements in animal and human tissue which would be of interest to Environmental Health, Geology, and Preventive Medicine researchers. By adding a Laser Micro Probe to the Spectrometers, even more sophisticated research work can be performed.
4. An X-ray Diffractometer is needed to provide x-ray images of crystals and microchips. Chemists and engineers at UIC are presently using one which is very old and needs to be replaced.

In addition to the instructional and research equipment needs outlined above, the campus is in dire need of more mundane supplies such as furniture, classroom equipment, and transportation vehicles. These supplies directly affect the efficiency and appearance of the University and allow for the University to better attract and retain both students and faculty.

Initiatives at Urbana-Champaign (\$1,000,000)

The relationship between scientific advances and the development of more sophisticated instrumentation is quite strong and certainly well documented throughout history. The invention and refinement of such instruments as the electron microscope and the mass spectrometer have contributed significantly to the knowledge of the physical properties of inorganic matter and the biochemical composition of living organisms. In fact, the contribution of these instruments to society extends far beyond the facilitation of basic scientific research into practical and applied problems of medicine, manufacturing, and materials testing. Such applications, in turn, have had a pronounced impact on local and national economies.

Maintaining a comprehensive and up-to-date inventory of equipment for instruction and research has been difficult because of the limited financial resources available for equipment acquisition and because of the accelerated rate of technological obsolescence which characterizes modern instruments. UIUC strives to fund the vast majority of its research equipment from outside grants and contracts, and is quite successful in

that attempt. However, the campus still needs to establish a sound base of financial support for the acquisition of instructional equipment. Incremental funds for instructional equipment purchases have been requested during the past several years. Limited funding has been provided in response to these requests, and UIUC has increased its State-funded equipment base substantially over the last four years. In addition, the campus has been successful in attracting major equipment grants of personal computers and other specialized computers from industry for a variety of innovative instructional applications.

In spite of the success in recent years in obtaining additional support to finance instructional equipment acquisitions, the problems of technological and functional obsolescence which plague the existing equipment inventory remain. Further, escalating equipment prices and an expanding equipment market have combined to diminish the impact of new funds targeted for modernization of laboratory equipment. Overall, it is clear that an instructional equipment deficiency of substantial size still exists. It is a deficiency which can be attributed to three factors: (1) new technology--expansion of the equipment market to include new devices which were previously impossible or impractical to produce; (2) technological improvements--vastly improved existing equipment with expanded applications; and (3) functional obsolescence--the cumulative effect of continued long-term use which results in a gradual deterioration of the instruments.

Equipment has historically been an essential ingredient of scientific advancement, and its importance to modern research and instruction has grown dramatically over the past two decades. Technological developments, especially in the electronics industry, have occurred at an extremely rapid pace recently, resulting in a correspondingly swift development of new and improved instrumentation. With improved production and quality control techniques, microelectronic circuitry can now be economically produced and utilized in a myriad of scientific instruments. Instruments which formerly were operated by human researchers are now controlled by minute microprocessors, which are often integral to the machines themselves. Advances in laser and magnetic resonance imaging technologies have also contributed to the design and construction of a new generation of instrumentation useful to biotechnology research and surgical procedures. Devices such as the laser scanning fluorescent microscope, the NMR mass spectrometer, and the

fluorescent cell sorter, have only recently become or are about to become commercially available to universities. Literally every scientific and technical field of study is confronted annually with a growing array of new instruments and devices which are products of new discoveries and innovations in the instrumentation industry. In some cases, entirely new fields of study are created when major technology and instrumentation advances are made.

In addition to equipment which represents new methods of measuring and analyzing materials and processes, a number of instruments which employ an older technology have been improved to better serve modern research methods. Examples of technologically improved equipment include electronic digital balances, micro-processor ionalyzers, spectrophotometers, and a variety of computer-controlled graphic equipment. Through use of microprocessors many of these devices are more reliable, portable, and/or more accurate than the first generation products. The improved instruments, in many cases, can make an immediate and significant contribution to research productivity and the quality of the results obtained. Many pieces of technologically improved equipment are currently needed to enhance efforts already underway rather than simply to replace an earlier model of a device that has worn out.

The distinction between purely research equipment and equipment used for instruction is becoming progressively more difficult to identify. Most of the equipment identified above functions in a dual role. It is especially important that students in graduate and professional programs have exposure to, and preferably experience with, state-of-the-art equipment used in their particular fields of study. Upon graduation, students will be expected to perform effectively as practitioners and scientists in external environments which rely regularly upon similar equipment. The University simply cannot adequately prepare these students for future work without adequate equipment resources.

Even at the undergraduate level, the need for exposure to and experience with highly sophisticated equipment is growing. While undergraduate instructional equipment needs may vary in degree from those of graduate programs in that the necessary equipment is somewhat less esoteric and expensive, the items are usually required in larger quantities. The availability of modern equipment for undergraduate laboratories is as

important to maintaining the quality of undergraduate instruction as equipment is to maintaining the quality of graduate and research programs. Examples of undergraduate laboratory equipment needs range from oscilloscopes to desk-top computers and from microscopes to scintillation counters. Virtually all of these types of equipment are sufficiently available in industry and experience with them is a basic expectation for undergraduate degree holders seeking employment.

Currently there are thousands of pieces of electronic equipment inventoried by instructional units on the UIUC campus. While the age of these devices can range to beyond 50 years in age, the average age of the entire inventory is slightly over 11 years. There are many different types of equipment within the scientific equipment category, and it is difficult to determine an average useful life or average condition of the inventory as a whole. Most of the highly sophisticated scientific equipment on the market today is considered to have a useful life of four to eight years. Applying the upper limit of this range to the existing inventory suggests that, on an average, most items are obsolete and should be replaced.

While it is clear that not all instructional equipment at UIUC is obsolete, it is equally clear that a substantial portion of the inventory is either functionally or technologically deficient. Preliminary estimates indicate the replacement value of these obsolete items could exceed \$100 million.

EXPANDED/IMPROVED PROGRAMS
VII. LIBRARY IMPROVEMENTS

LIBRARY IMPROVEMENTS
(\$600,000)

Initiative at Chicago
(\$300,000)

To continue the development of collections to support the instructional and research needs of the campus, the UIC Library will require incremental funds totaling \$300,000 in FY 1988. These funds will support the expansion of the book budget, a program of automated collection assessment, and the hiring of a bibliographer to coordinate collection development.

The Library will continue to develop collections of significance to the campus in its efforts to become a research Level I university. This will include the acquisition of materials documenting advances in new technologies and in disciplines in which significant additions to new knowledge are being made daily. They include biomedical and pharmaceutical engineering, computing and imaging, molecular and cellular biology, genetics, gerontology, and the neurosciences.

The Library will continue to strengthen its collections for those disciplines which recently established or are expected soon to establish Ph.D. programs or for which research centers are planned. These include anthropology, Black studies, criminal justice, education, business (including international commerce), and the history of architecture and art. Of particular significance are publications relating to all aspects of minority and third world cultures (e.g., architecture, health, economics, politics) and include publications dealing with Latin America, Cuba, the Caribbean, Africa, and Asia. The expansion of national universities, research institutes, and publishers in the underdeveloped world is receiving increased attention by western scholars. Libraries must build collections in these areas or risk becoming increasingly parochial during a period when the publications of these regions are becoming of much greater significance to UIC faculty and students.

Given the strong interdisciplinary relationships existing among programs on the campus and the requirements for materials at all campus sites, the Library's collection development officers will acquire materials

according to a principle of centralized facilities/decentralized access, yet maintain traditional centers of collection strength. Implicit in this design is a commitment to improving the quality of document delivery systems and the creation of a collections development program which systematically manages the acquisition of library materials for all campus library service points.

Automated collection assessment will allow the Library to compare authoritative machine-readable databases with its own online catalog. This comparison will enable the Library to identify and acquire selectively in those areas where enhancement is required. As a general principle the Library will place emphasis on purchases in areas where there are significant achievements being made in scholarly output, research, and grant generation. Funds for the automated collection assessment program will support a half-time programmer and a full-time clerk. The remainder will support the acquisition of software and access to comparative databases.

The funds requested in FY 1988 are listed below.

<u>Academic Staff</u>	
1.00 FTE Academic Professional	\$ 32,000
<u>Nonacademic Staff</u>	
.50 FTE Technical	13,000
1.00 FTE Clerical	15,000
<u>Expenses</u>	22,000
<u>Equipment (Serials; Monographs)</u>	<u>218,000</u>
TOTAL	\$ 300,000

Initiatives at Urbana-Champaign
(\$300,000)

The UIUC Library has identified a number of high-priority concerns and program ventures which it would like to begin addressing in FY 1988. However, if it is to take action in these areas, it must receive appropriate incremental funding.

Biotechnology Materials - (\$165,000)

The University Library has traditionally collected literature dealing with the topics of genetic engineering; gene regulation, replication, recombination and repair; immunity, antibody and hormone action; fermentation; cell biology and transplantation; waste treatment, and chemical engineering. Given the broad scope of the subject area and the wide dispersion of faculty and students involved, necessary duplication of materials is a major, burdensome financial problem. In recent years the ravages of inflation, devaluation of the dollar, and explosive growth of biological literature have made it impossible for the UIUC Library to meet the burgeoning demands for biotechnology teaching and research materials. The major new biotechnology initiatives that are now emerging will only exacerbate the existing problem.

Increases in biotechnology research activity and curriculum expansion are reflected in increasing: circulation, reshelving requirements, time-consuming interdisciplinary reference demands, sophisticated computerized information retrieval, and document delivery pressures. In general, increased activity in the multidisciplinary field of biotechnology has not been matched by an increase in Library personnel and resources.

To address this problem, the following funds are being requested for FY 1988.

<u>Academic Staff</u>	
1.00 FTE Assistant Professor (Librarian)	\$ 28,000
1.00 FTE Graduate Assistant	13,200
<u>Nonacademic Staff</u>	
1.00 FTE Technical Assistant	15,000
<u>Wages</u>	8,800
<u>Equipment</u>	
Serials, Monographs, and Technical Reports	<u>100,000</u>
TOTAL	\$ 165,000

Undergraduate Library - (\$135,000)

The Undergraduate Library has a long history of providing bibliographic instruction to undergraduate students. It offers students, most of whom are freshmen, instruction in research skills and strategies, enabling them to plan and to implement efficient research steps using appropriate resources; and it familiarizes them with the organization of the Library and its resources.

During FY 1986, approximately 350 classroom sessions were taught in the Undergraduate Library. These were attended by more than 4,000 undergraduate students. The sessions (in many instances) included hands-on instruction in the use of the online catalog and various reference tools as well as individual aid to students requiring help with term paper research.

Many units on campus have contacted the Undergraduate Library requesting help with various instructional efforts that involve library research techniques. Many of these activities relate to "back to the basics" efforts involving more writing and research assignments. The Library does not have the necessary personnel or resources to respond to these requests.

In addition, there is a need to adopt more of the new technology of optical disks in the Undergraduate Library. The electronic information provided in this manner allows students to retrieve information quickly and efficiently and is updated more readily than many printed indexes. The existing equipment (two terminals) used to access the electronic information is in constant use and additional equipment should be added.

The resources required to provide the additional services for FY 1988 are listed below.

Academic Staff

3.00 FTE Assistant Professors (Librarians)	\$	85,000
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Equipment

Optical Disk Technology		<u>50,000</u>
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TOTAL	\$	135,000
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RESOURCE MATCHING

RESOURCE MATCHING
(\$2,120,000)

One of the most important and productive methods for universities to acquire costly high-technology equipment is to secure grants from outside sources. In many cases, equipment can be procured for only a fraction of its market value. The benefits of such grants are shared by the donor and the recipient. The corporate donor is rewarded by enhanced recognition of its products, as well as by the exposure to and the training of future users of its products. Federal or State agency donors are rewarded by supporting instruction and research that can facilitate favorable social, economic and educational changes. The University benefits from the increased accessibility to sophisticated research and teaching equipment for a broader base of faculty, staff, and students.

UIUC has been extremely successful in acquiring millions of dollars worth of equipment in the last few years, and it expects to be even more successful in the future. However, there are considerable operating and maintenance costs tied to these gifts. It is the position of the University that these gifts add to the total pool of resources available to the University and the State. The State should therefore provide the necessary funds to operate and to maintain the equipment that the University has been able to obtain. It is clear that the State will reap a tremendous return on any such investment.

UIUC does not expect the State to provide matching resources for all the gifts it receives, but it does need help with major projects. Examples of such projects are described on the following pages.

National Center for Supercomputing Applications - (\$1,000,000)

In many disciplines, faculty are discovering that large-scale computer simulations are an indispensable tool. These disciplines include astrophysics, high energy and many-body physics, materials and biomolecular research, atmospheric sciences, computer-aided design, structural analysis, computer science, and fluid dynamics. Many of the problems studied in these disciplines have been and still are beyond the reach of computers currently available. The technology and the theory that are required to create a network of cooperating computers are now being developed. This

activity is giving birth to the multi-processors or supercomputers that will make it possible to handle large-scale research problems of heretofore intractable complexity.

The University of Illinois at Urbana-Champaign has long been a leader in computer design and construction. The famous ILLIAC series of computers was designed and built at Urbana-Champaign during the 1950s and 1960s, and in recent years, the campus has become the focal point for the most exciting and innovative research in the area of supercomputer architecture, software, and algorithm development. For example, the Cray X-MP, one of the most advanced supercomputers currently being designed and produced in the United States was designed by a former Ph.D. student of the Laboratory for Advanced Supercomputers in the Department of Computer Science. Department faculty have enjoyed close working relationships with all of the supercomputer manufacturers in the United States, including Cray, ETA (the supercomputer subsidiary of Control Data Corporation), Control Data Corporation itself, and Denelcor.

The University is prepared to make a dramatic and decisive move toward realizing a major breakthrough in computing in American universities. The University's Center for Supercomputing Research and Development, which has already received more than \$10 million in Federal grant support, will team with the Center for Supercomputing Applications to provide the UI with supercomputing leadership unmatched at any university in the nation. The centers are bringing together, in a university setting, many of the world's best scientists, engineers, computer designers and computational algorithm developers. They have at their disposal the best computational facility that current technology permits. They interact in seminars and in their work, sharing expertise and insights. As a result of the academic environment this center is producing, the University fully expects major breakthroughs in scientific and engineering problems, new computer algorithms, software, designs, and theory, and the preparation of an entire new generation of researchers and graduate students skilled in the use of supercomputers.

The NSF grant for supercomputer applications has brought to UIUC the most advanced supercomputer that can be made readily accessible to scientific and engineering researchers. This supercomputer possesses extremely high-speed processing capabilities over a wide range of applications, yet

it is compatible with a mature and widely-used software base. The super-computer is part of a fully-integrated system including adequate mass storage, graphics, and hard-copy facilities and a high-speed work station network.

Currently, only national laboratories possess such integrated super-computer facilities. The national center at the University of Illinois is modeled on the best elements present in these national laboratories and is being developed with close cooperation with the staffs of those facilities. The Center is a dedicated basic research facility used intensively to solve scientific and engineering research problems which require large-scale computer simulations.

The supercomputer eventually will be used continuously by approximately 25 to 50 research groups at the Urbana-Champaign campus. For each Illinois professor in these research groups, there are an average of two off-campus collaborators and three graduate students who will also be active users. The facility is now available to outside users through a Visitor's Program that is an integral part of the proposal submitted to the National Science Foundation. The Visitor's Program is now beginning to bring to the Center world leaders in applying supercomputers to frontier fields and it allows them to use a portion of the Center's supercomputer time.

As mentioned earlier, the grant from the National Science Foundation requires cost-sharing by UIUC. To match the \$44 million in support from NSF, UIUC is to allocate a total of \$800,000 from campus resources for each year of the five-year funding period. In addition, the NSF commitment calls on UIUC and the State of Illinois to provide additional recurring resources, amounting to \$1 million in the first year of the grant, \$2 million in the second year, \$3 million in the third year, and \$4 million in the fourth year and each year thereafter. The University's FY 1987 budget contains the second \$1 million in support of this commitment.

In FY 1987 the National Center for Supercomputing Applications will be introducing its first upgraded version of Cray X-MP supercomputer, maintaining state-of-the-art computing at UIUC. The NSF has chosen the University to be the center of its national networking hub; therefore, another task to be accomplished in FY 1987 will be establishing that network via telephone lines and satellite.

The NCSA has an aggressive and unique program to couple the benefits of the personal computer revolution with the supercomputer revolution. In FY 1986 it began developing a comprehensive computing environment in the Interdisciplinary Research Center featuring desktop workstations networked to each other and to the Cray X-MP. In this facility, top researchers from Illinois and the rest of the nation will begin to come together in FY 1987 in a "paperless research laboratory" to explore new applications of both supercomputer and workstation use.

This project has received support from industry in the form of equipment donations valued at about \$1.5 million as of the spring of 1986. Additional funds will be required for the support of the workstation-to-supercomputer program.

The budget for FY 1988 represents the third of the four \$1 million increments required to achieve a total recurring budget of \$4 million for the NCSA by FY 1989. The details of the FY 1988 increment are listed below.

Academic Staff

3.00 FTE Academic Professionals	\$	75,000
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Expenses

Commodities		50,000
Telecommunications		25,000
Contractual Services		850,000
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TOTAL	\$	1,000,000
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Managing Information Systems to Achieve Competitive Advantage--Project MICA - (\$350,000)

International Business Machines (IBM) recently sponsored a nationwide competition for major equipment and software grants based on proposals for the Program of Support for Education in the Management of Information Systems (MIS). MIS is a very rapidly growing area in which the business community currently is leading the academic community. The University of Illinois is one of thirteen winners in this competition.

As one of the foremost business schools in the nation, the UIUC College of Commerce and Business Administration has long recognized the importance of the computer as a tool in all aspects of the business curriculum and the need for a strong, broad-based program in the management of

information systems. The IBM Program fits perfectly into the College's long-range plans to apply the computer to its instructional programs and to provide more computer support to the faculty for research purposes. Project MICA, developed by the College, requests approximately \$2.7 million from IBM over a period of five years. Included in the MICA proposal was the promise of an ongoing UIUC contribution. The first portion of that amount, \$290,000 for technical support and maintenance of laboratory equipment, was expected to be provided by the State in FY 1987. However, with the last minute reduction of the University's appropriation by the Governor, this amount will be reduced. The campus will attempt to find funds from non-recurring sources to supplement actual FY 1987 appropriations to meet these needs.

The campus has also provided \$410,000 for remodeling the space required to accommodate the laboratory. For FY 1988, \$350,000 is being requested to support academic programs including curriculum development and research made possible by state-of-the-art computer facilities. The funds will also allow the College to link the laboratory to external data bases necessary for teaching and research.

Changes in information technology will involve virtually every manager in the management of information systems. The College is redesigning its graduate curricula so that modules addressing critical issues in information systems management are incorporated in all core courses and in most elective courses.

The MICA proposal addresses four issues that are especially important:

1. designing and redesigning information systems capable of creating competitive advantages by adding value to products and services, by anticipating and designing appropriate responses to threats and opportunities, and by creating a productive, humanly satisfying work environment;
2. managing organizational and individual user impacts of information systems by studying the ways technology changes job functions and employee motivation and interrelationships;
3. improving the power of work stations through advances in modeling, simulation, and artificial intelligence; and
4. assuring privacy, security and data integrity.

Five new courses that focus exclusively on the management of information will also be developed:

1. Advances in Information Technology
2. Information Systems Management
3. Information Technology and Organizational Innovation
4. Decision Support Practicum
5. Applications of Knowledge-based Decision Support System.

The faculty will work in partnership with leading corporations to conduct research and to develop curricula in information systems management. The initial Corporate Partners are listed below:

1. Arthur Andersen & Company
2. American Hospital Supply Corporation
3. IBM
4. Natural Gas Pipeline Corporation of America
5. Northern Trust Bank
6. Motorola
7. State Farm Insurance

Each of these companies is a leader in some aspect of managing information systems. The College also is collaborating with several University departments (the Department of Computer Science, the Department of Psychology, the Aviation Research Laboratory, and the Supercomputing Center) that have advanced programs of research and teaching related to managing information systems.

One innovative plan linking the Departments of Business Administration, Accountancy, and Computer Science already is underway. The plan will allow business students to interact with computer science students through a network, using graphics design and communications tools to describe business problems in terms of information systems requirements. Over several semesters students will interactively create and test prototype systems. This plan exemplifies the kind of innovation and leadership the College intends to pursue through Project MICA. By providing future managers with the experience of a comprehensive computing system, the College expects to produce managers and specialists capable of bridging major communication gaps between line managers, functional specialists, and application designers.

The budget for the funds required as the College's final contribution to the MICA Project is provided below.

<u>Academic Staff</u>	
1.50 FTE Faculty	\$ 90,000
2.00 FTE Academic Professionals	65,000
4.00 FTE Teaching Assistants	88,000
 <u>Nonacademic Staff</u>	
2.00 FTE Secretarial Positions	32,000
 <u>Expenses</u>	
Commodities	15,000
Telecommunications/Data Base Use Fees	50,000
Contractual Services	<u>10,000</u>
 TOTAL	 \$ 350,000

The Arnold O. and Mabel M. Beckman Institute for Advanced Science and Technology - (\$770,000)

The Beckman Institute, funded by a \$40 million gift from the Beckmans and \$10 million from the State of Illinois is expected to become fully operational in December 1988. The interdisciplinary programs that will eventually occupy this preeminent facility are already taking shape. Efforts are now underway to secure large-scale grants to support certain research teams that are expected to form part of the core of the Beckman Institute. Much needs to be done so that a strong scientific and administrative support structure can be in place to serve these programs when the Institute opens.

At the Beckman Institute, researchers will enjoy a comprehensive electronic communications environment characterized by the transmission of voice, data, and image signals both within the Institute and between facility occupants and their counterparts elsewhere on the campus and, indeed, elsewhere in the world. It is essential that planning for this environment be initiated immediately. Experts need to be appointed to ascertain the needs of potential Institute researchers and to develop strategies for obtaining the hardware and software necessary to create communications networks capable of meeting these needs. In many cases, it will be necessary to integrate certain aspects of these systems into the building design process. Campus and national data bases and communications systems relevant to the work of Institute researchers need to be identified and protocols for gaining access to them need to be developed. Hardware acquisitions need to be coordinated in order to take advantage of volume

discounts not only in the initial purchase price of equipment, but also in such matters as site licenses, maintenance costs, etc.

Three experts are needed to accomplish the planning for electronic communications. Funding on the order of \$150,000 is also needed to purchase data base subscriptions, and some critically needed hardware and software which will, when the Institute is in operation, greatly enhance the capability of various workstations to interact with each other and with the electronic media elsewhere.

The Beckman Institute will house many specialized scientific support facilities, including magnetic resonance imaging (MRI), position emission tomography (PET), multiarray recording, neuromagnetic recording, high voltage electron microscopy, electron spin resonance (EPR) and confocal tandem microscopy. As is the case for the electronic communications area, considerable planning needs to precede the establishment of these facilities in order to have them on-line when the building opens. While specifications for these laboratories will be largely the responsibility of the faculty members who will employ them as research tools, a substantial amount of research into vendors, space and other physical requirements, and capabilities of the instrumentation can be carried out by knowledgeable academic professional scientific personnel.

Although it is expected that most equipment will be purchased with the aid of external funds, it will be necessary to provide partial matching funds if UIUC is to be successful in attracting external funding. The amount of \$400,000 has been budgeted for this purpose. This amount of State resources can return an investment of between \$500,000 and \$2,000,000 worth of equipment. Proposals for these items of equipment will be submitted well in advance of the Beckman Institute, and it will be important to have identified required matching funds. Three academic professional scientists should be appointed to oversee the initial equipping of these facilities.

As a center for the most advanced and creative research on several fronts, the Beckman Institute will be continually facing the challenge of self-renewal and change to meet the demands of a rapidly changing research scene. Thus, there will be a recurring need for matching funds for new equipment purchases and for maintenance funds for the existing equipment base.

UIUC is now mounting a vigorous search to identify a director for the Beckman Institute and to have that individual on campus by the fall of 1986. To the extent that Beckman Institute programs are successful in beginning to operate in advance of the opening of the facility, some provision needs to be made for managing these programs. It is expected that certain large block grants of the kind now coming onto the federal support scene will be sought by groups that will make up the Beckman Institute. A fiscal manager and an administrative assistant, as well as clerical help, are needed now and will be important to assure that such programs are adequately administered. Funds are requested to support these positions. The campus administration will provide funds for the director and other administrative personnel until FY 1988 when the Beckman Institute will become operational. The Beckman Institute represents one more example of a situation where a major outside gift has created a demand for additional operating and support funds from the State. Again, it is clear that an investment by the State in response to this request will pay handsome dividends.

The details of the budget being requested for FY 1988 are as follows:

Academic Staff

6.00 FTE Academic Professionals (three telecommunications/computing personnel and three scientists to handle equipping the facility, etc.)	\$ 240,000
2.00 FTE Administrative Support Staff	60,000

Expenses

Commodities	35,000
Contractual Services	35,000

Equipment

400,000

TOTAL	\$ 770,000
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SPECIAL SERVICES FUNDING

COUNTY BOARD MATCHING
(\$100,000)

Under the County Cooperative Extension Law, amended in 1979, the State, through the University of Illinois, is required to provide appropriations from the Agricultural Premium Fund (APF) to match allocations from county sources in support of County Extension work. The State money supplements county funds at a matching rate of 50/50.

County or multi-county Extension councils are established according to guidelines approved by the University of Illinois Board of Trustees. The councils submit budgets to the appropriate county governing board. The county executive councils forward proposed county or multi-county budgets to the Director of the University of Illinois Cooperative Extension Service for review and approval. Local funds are paid to the University of Illinois to be held in county trust accounts and are used with the APF matching funds in a manner consistent with the approved budgets. Trust funds are used to pay costs such as rent, utilities, some salaries, program materials, and local travel of the more than 100 County Extension offices.

The State Agricultural Premium Fund (APF) allocations for FY 1979-FY 1987 are shown in the following table. The increase in the APF State matching fund rate for fiscal years FY 1980-FY 1984 was mandated by a change in State law, requiring a shift in the State's contribution from 25% to 50%. In FY 1985, the General Assembly approved a one-time transfer of \$245,000 to cover salaries associated with Extension's Rural Route program. In FY 1986, the General Assembly approved a permanent transfer of \$400,000 of previously appropriated County Board Matching funds to support the Rural Route effort. In both FY 1985 and FY 1986 it was clear that the initial appropriation for County Board Matching purposes exceeded the amounts which the counties had achieved, due to generally depressed conditions in Illinois' agriculture economy.

AGRICULTURAL PREMIUM FUND COUNTY BOARD MATCHING

<u>Budget Year¹</u>	<u>County Sources</u>	<u>APF State Match</u>	<u>Change in APF Allocations</u>	<u>Total</u>
1978-79	\$2,351,400 (75%)	\$ 783,800 (25%)		\$ 3,135,200
1979-80	2,539,500 (70%)	1,088,300 (30%)	\$304,500	3,627,800
1980-81	2,546,700 (65%)	1,371,300 (35%)	283,000	3,918,000
1981-82	2,550,000 (60%)	1,700,000 (40%)	328,700	4,250,000
1982-83	2,600,000 (55%)	2,127,300 (45%)	427,300	4,727,300
1983-84	2,800,000 (50%)	2,800,000 (50%)	627,700	5,600,000
1984-85 ²	2,845,000 (50%)	2,845,000 (50%)	45,000	5,690,000
1985-86 ³	2,990,000 (50%)	2,990,000 (50%)	144,000	5,980,000
1986-87 ³	2,997,300 (50%)	2,997,300 (50%)	7,300	5,994,600

¹Numbers reflect agreed upon budgets for counties and budgeted APF County Board Match funds, with the exception of 1986-87, which are estimates.

²Change from previous listing reflects decrease in local funds offered as match for APF County Board Matching money; \$244,000 one-time shift to support Rural Route programs approved by legislature and Governor Thompson in 1985 regular legislative session.

³Change from previous listing. Reflects decrease in local funds offered as match for APF County Board Matching money; \$400,000 shift to support Rural Route program (recurring basis) approved by legislature and Governor Thompson in "veto" session of legislature (fall of 1985).

Incremental funds for FY 1988 are requested in the amount of \$100,000 to match anticipated revenues from Illinois counties. Note that the University may only match the funds actually received up to the limit appropriated by the State. Should local allocations to the trust accounts not reach the anticipated levels, the University may request and receive no more than the amount sufficient to match the funding level actually received from the counties.

FIRE SERVICE INSTITUTE
(\$49,300)

Since the passage of the Illinois Fire Service Institute Act (Public Act 81-1147, effective July 1, 1980), the University of Illinois has received a direct appropriation from the Fire Prevention Fund for the operation of the Institute. Previously, monies had been received through a contract with the Office of the Illinois State Fire Marshall. The monies received from the Fire Prevention Fund are used for three major purposes:

1. To continue conducting programs of training and education for paid and volunteer fire fighters and officers on campus and at regional and local sites throughout Illinois.
2. To provide adequate teaching and training facilities for the Institute.
3. To permit program growth and improvement.

The additional funds will be required to meet anticipated salaries and operational costs. As the new facilities presently being constructed and projected are completed, additional operational and maintenance costs will be incurred.

Based upon current revenue projections, growth of approximately 5% is projected for the Fire Prevention Fund for FY 1988, raising the total in the fund to \$8,281,560. The University of Illinois' share of this amount (1/8) would be approximately \$1,035,195. The FY 1987 appropriation is expected to be \$985,900, resulting in a total increment of \$49,295 available for FY 1988. These funds will support salary and cost increases for existing Fire Service Institute programs.

DIVISION OF SERVICES FOR CRIPPLED CHILDREN
(\$250,000)

The Division of Services for Crippled Children (DSCC) provides hospital services and medical braces and appliances to meet the medical needs of children in Illinois whose families could not otherwise afford to secure them. Approximately 30% of the funding for DSCC programs has been derived from Federal Block Grant funds received by the State of Illinois. Under the effects of the proposed Gramm-Rudman-Hollings (GRH) legislation, or other similar Federal budget reductions, funds for the Block Grant program will be reduced. DSCC staff estimate that its Block Grant fund allocations could be reduced by 21% if the GRH provisions stand unchanged. Without these funds, a 15% staff reduction will be necessary to balance DSCC's FY 1988 budget. A reduction of this magnitude will jeopardize the quality of medical care for the 30,000 children served by DSCC.

Projected reductions in Block Grant funds stemming from the GRH legislation are shown in the table below. The amounts are based on an annual deficit reduction of approximately \$55 billion. If the current Federal deficit increases, the amounts of the annual reductions will also increase resulting in larger cuts than those shown in the table.

Projected Gramm-Rudman-Hollings Reductions
(\$000)

Federal Fiscal Year	Available Funds	Projected Reduction	
		\$	%
FY 1985	5,177.7		
FY 1986	4,955.1	222.6	4.3
FY 1987	3,914.5	1,040.6	21.0
FY 1988	3,092.5	822.0	21.0

In planning for such dramatic losses in revenues, there has been a major focus on measures which will result in significant reductions in expenditures in the budget planning process. For FY 1987, the budget has been established at a level sufficient to support basic operations which are essential to DSCC's core program of services for handicapped children. Through actions which will result in a more efficient operation and the Block Grant funds carried forward from previous years, DSCC expects to be able to absorb projected reductions to Federal program funding by cutting

back services. The Federal funds carried forward from previous fiscal years had been set aside for support of a program to automate many of the administrative functions of the Division. Through past efforts of office automation and improved communications among Division offices throughout the State, expenditure reductions have been possible.

The Division staff projects that after three consecutive years of significant Block Grant reductions under GRH, the cumulative impact on DSCC will be a loss of approximately \$2.1 million in Federal program funds. A reduction of this magnitude simply is too great to be covered by more efficient programs. Program reduction will be required and will be manifested in staff layoffs involving key personnel in case management. Quality of care will be affected, and the Division will have to identify programs for elimination. Many children who now are given an opportunity for a better quality of life through Division services will be denied support.

Although these reductions will not be affected upon any single program per se, the Division, which is a labor intensive operation, would respond by eliminating 14.0 nonacademic FTE. With the proposed request, the lost Federal Block Grant funds would be restored in part with State funds.

<u>Nonacademic</u>		
7.0 FTE Nursing/Medical Consultants	\$	125,000
7.0 FTE Clerical		<u>125,000</u>
TOTAL	\$	250,000

UNIVERSITY OF ILLINOIS HOSPITAL REQUEST

SPECIAL ADDENDUM
UNIVERSITY OF ILLINOIS HOSPITAL
(\$10,000,000)

Mission of the University of Illinois Hospital

Every academic unit within the University must maintain a threefold mission of teaching, research and service to the citizens of the State. The University of Illinois Hospital fulfills this mission by:

- Teaching 1,324 undergraduate and 575 graduate medical students, and 1,595 students in the health professions, who require a clinical setting offering a full range of health care experiences for their learning and training;
- Conducting Research activities by University faculty members and graduate students, along with technical support staff and other support services to augment clinical operations and increase the body of biomedical knowledge;
- Providing public service by delivering high quality health care to Illinois citizens without regard to their ability to pay for the services they receive.

The University of Illinois Hospital's structure as an academic health center places it in a category with approximately 115 other major teaching hospitals in the country. Together, these academic health centers comprise less than 2.5% of the more than 4,800 non-federal acute care hospitals in the nation.

Recent studies of academic health centers have found that they share a number of common characteristics which distinguish them from nonacademic or nonteaching hospitals. Beyond the obvious inclusion of teaching and research activities with the patient care functions typical of any hospital setting, academic health centers share these characteristics:

- Far more patients treated in academic health centers are financially needy than are those in nonteaching hospitals.
- Although the members of the Council of Teaching Hospitals of the Association of Medical Colleges operate fewer than 20% of the

nation's hospital beds, they account for almost half of all deductions from revenue claimed by hospitals for charity care and more than one-third of those for bad debt."¹

- They are located predominantly in urban areas--a geographical factor directly correlated with higher wage levels and costs for all hospital services than those experienced by hospitals in less urban areas.
- Academic health centers provide more specialized care than other hospitals. As a result they attract patients with a broader spectrum of diseases; patients with greater severity of injury or illness; and the majority of the nation's patients in need of ultra-specialized care (e.g., transplants, treatment of severe burns, prolonged neonatal care, etc.).
- Academic health centers conduct much of the nation's clinical health research. While major projects are often supported with funds from agencies outside the hospital, much of the preliminary study and initial research required to compete successfully for outside funding must be supported from within the academic health center.
- Because of their major metropolitan locations, academic health centers tend to draw patients with what has been termed greater "social severity" than those at nonteaching hospitals. Social severity refers to the illness or injury for which these patients seek care, the generally lower standard of living of these patients (affecting both the opportunity for full and rapid recovery and the chances for recurrence of illness or injury), and the inability of the patients to pay for their health care, whether from personal resources or third-party mechanisms.
- In terms of the nation's 100 largest cities, public academic health centers are responsible for 11% of the total volume of care, yet they account for 31% of the total uncompensated, or charity care.² (See Attachment #1.)

The University of Illinois Hospital exhibits virtually all of the characteristics of academic health centers just noted, especially the provision of large amounts of uncompensated care.

State Appropriations for the University of Illinois Hospital

The State of Illinois, recognizing that UIH fulfills multiple missions within the State, has provided direct appropriations to support Hospital activities. However, the allocation of the State appropriation to the Hospital has remained relatively steady for the past 15 years. (See Attachment #2.)

For much of its history, State appropriations provided virtually the sole source of support for UIH. During the past two decades, however, the nation's health care industry has undergone dramatic changes. One of the most significant is the manner in which the health care of the poor and aged is financed. Passage of Federal Medicare and Medicaid legislation in the mid-1960's provided for partial reimbursement of the cost of health care for many of the aged and needy.

That reimbursement, when supplemented by payments received from third-party insurers, was sufficient to permit the Hospital to transfer its operating revenue stream from one of almost total reliance on State appropriations (96% in FY 1964) to self-generated income (87% in FY 1986) as shown in the table below.

University of Illinois Hospital Revenue By Source
(\$ Millions)

	<u>State Appropriations</u>		<u>Hospital Income*</u>		<u>Total</u>	
	<u>\$</u>	<u>% of Total</u>	<u>\$</u>	<u>% of Total</u>	<u>\$</u>	<u>%</u>
FY 1964	7.2	96.0%	.3	4.0%	7.5	100.0%
FY 1969	7.9	63.2%	4.6	36.8%	12.5	100.0%
FY 1974	9.4	30.6%	21.3	69.4%	30.7	100.0%
FY 1979	11.2	20.9%	42.3	79.1%	53.5	100.0%
FY 1986 (est)	15.5	13.1%	103.1	86.9%	118.6	100.0%

*Represents income from patients or from third-party payors, whether insurance, Medicare/Medicaid, or other sources.

This dramatic shift in sources of support for the Hospital has meant that UIH has become much more vulnerable to changes in funding policies among Federal Medicare/Medicaid or similar State programs such as the I-CARE program, insurance reimbursement rates, and competitive pricing generated by HMO's.

Despite a significant change in the sources of its support, UIH has continued to serve a patient population which--like that of many other urban academic health centers--contains an inordinately high proportion of financially needy persons.

UIH as a Provider of Uncompensated Care

The following table presents a variety of information concerning the inpatient mix at the University Hospital in FY 1984. (A similar pattern exists for outpatients in the clinics.) The five major patient categories shown below are defined in Attachment #3.

University of Illinois Hospital
Patient Mix
FY 1984

<u>Category</u>	<u>No. of Patient Days</u>	<u>% of Patient Days</u>	<u>(\$1000's) Collected</u>	<u>% of \$ Collected</u>	<u>Collections Per Patient Day</u>
Medicare	31,225	20.1%	\$19,013	24.8%	\$609
Medicaid	42,560	27.3%	24,895	32.5%	585
General Assistance	<u>12,646</u>	<u>8.1%</u>	<u>1,274</u>	<u>1.7%</u>	<u>101</u>
Subtotal	86,431	55.5%	\$45,182	59.0%	\$523
3rd Party Insured	34,052	21.9%	\$30,279	39.5%	\$889
Other/Self/No-Pay	<u>35,258</u>	<u>22.6%</u>	<u>1,195</u>	<u>1.5%</u>	<u>34</u>
Total	155,741	100.0%	\$76,656	100.0%	\$492*

*Average direct costs per patient day were \$628.

Three essential facts emerge when the UIH patient mix is reviewed:

- Almost four out of every five patients served by the Hospital were needy (55.5% covered by Medicare/Medicaid/MANG plus 22.6% Other/Self/No-Pay).
- Only about one out of every five patients (21.9%) were covered by third-party insurers. Yet they provided about 40% of UIH revenues.
- The Other/Self/No-Pay category is essentially no-pay (1.5% collections vs. 22% patient days). This group of patients has come to be known as the "medically indigent."

Consistent with national trends, shifts in patient mix at UIH since FY 1984 have increased the proportion of care provided to the poor and near-poor.

A recent study by the American Hospital Association (AHA) reported that by 1983 "nearly 33 million Americans were without private health insurance or were not covered by governmental health benefit programs."³ Who are these medically indigent Americans? Contrary to what might initially be thought, the AHA found that nearly two-thirds (20.9 million persons) of the total group at risk had some source of employment, or were tied in some way to employment.⁴ They comprise a group of employed but uninsured or marginally employed Americans. The group includes about 4.1 million uninsured dependents of working persons, and a much larger group of 16.8 million employees without insurance plus their dependents. The final one-third--about 12 million persons--are unemployed, either temporarily or long-term, but are not yet eligible for Medicare.

Perhaps more startling than the absolute size of the medically indigent population is that it has emerged despite the presence of a Medicaid program which many have assumed was in place to meet the health care needs of the poor. The AHA study reports that "...by 1984 Medicaid covered less than 40 percent of the poverty population." Even more crucial, "In 1984, barely one-quarter of Medicaid's expenditures went to pay for acute medical care provided to the poor who were not eligible for Medicare."⁵

Very generally, the Medicare program is intended to serve the health insurance needs of the elderly, the blind, and the disabled, while Medicaid was designed to provide health insurance for the poor. Yet the AHA data reveal that 75 percent of Medicaid expenditures for 1984 covered services for persons already eligible for Medicare--the elderly, blind or disabled, thus creating a critical gap affecting a growing number of persons not eligible for Medicare and not covered by Medicaid. Many Illinois citizens, particularly those in the Chicago area, falling into this "critical gap" are cared for in large numbers at the University of Illinois Hospital.

Measuring the Amount of Uncompensated Care

In the past, charity care was possible because Medicare and third-party insurers reimbursed at after-the-fact cost recovery rates which, when supplemented by the State appropriation to the Hospital, were sufficient to provide "cost transfers" for unreimbursed care provided to financially

needy patients. The change from retrospective payment based upon costs to prospective payment based upon DRG's (diagnosis-related groups), along with the growing emphasis upon health care cost control by employers who fund third-party insurers, have combined to reduce drastically the ability of all hospitals to transfer costs from paying patients to charity care. The UIH, because of its location, has fewer paying patients and more charity care than do many other hospitals. It is no longer able to "shift" costs for charity care to other sources, and this situation will not change in the immediate future--indeed, it may well become more severe. The result is that UIH provides large volumes of uncompensated care, which now threatens the fiscal base of its overall support.

Two recent analyses measure the dollar value of uncompensated care delivered by UIH and compare it to direct and indirect State support. One, a very recent study of the University of Illinois Hospital conducted by an external auditing firm places a figure of \$50 million as the amount of bad debt/charity care provided in fiscal 1986 at full billable rates, or about \$15 million more than is now received from the State from both direct and indirect sources. (See Attachment 4 for description of indirect State support for UIH.)

Second, using an "expense" methodology established in 1985, the Hospital provided \$10.8 million of unfunded care in FY 1986, beyond the \$15.3 million available from the State appropriation and roughly \$20 million in indirect support. The \$10.8 million represents costs--not billable charges--incurred by the Hospital but not funded by any available reimbursement mechanism.

It is clear that \$10 to \$15 million in unreimbursed services provided to medically indigent patients--those without the ability to pay for care they receive--represents a critical fiscal danger to the University of Illinois Hospital.

Fiscal Impact on UIH of Uncompensated Care

With this serious and growing segment of unreimbursed service, it is not surprising that the University Hospital's cash expenditures exceeded cash revenues, (including the State appropriation) by \$11.9 million in fiscal 1986. In effect, an opening cash balance of \$6.1 million became a cash deficit of \$5.8 million at the close of FY 1986. Reductions in

workforce and other cost containment measures have been taken, and will continue during the coming year, to assure that appropriate patient care is provided in as efficient a manner as possible. However, an infusion of approximately \$10 million is needed simply to restore the Hospital's working cash balance to approximately the level of adequacy attained in FY 1986.

Review of Alternatives

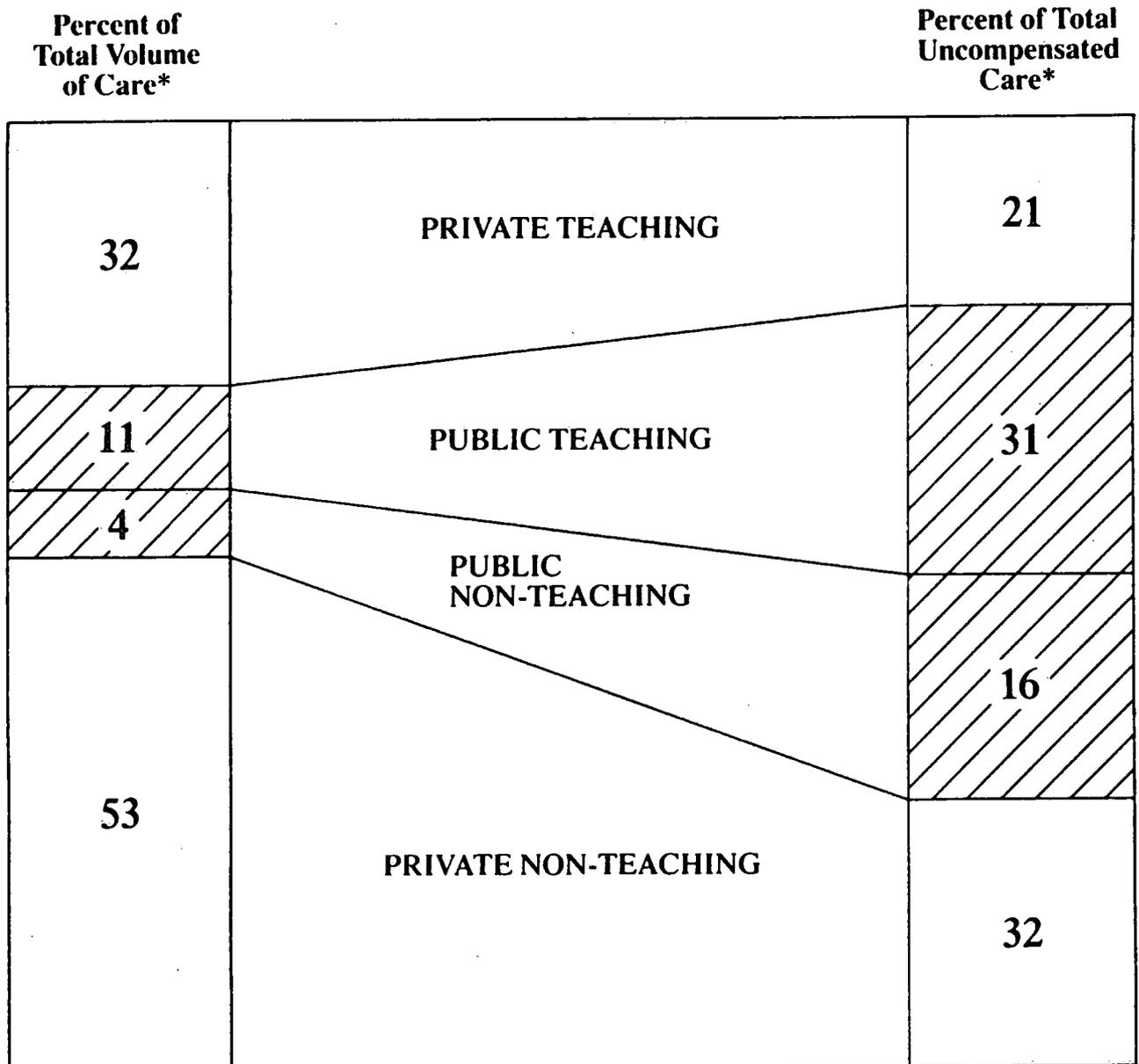
The University of Illinois is committed to ensuring that the Hospital does all it can to operate efficiently and effectively. Realistically, however, it appears that it will be difficult to maintain even the Hospital's current proportion of paying patients; and reimbursement policies with respect to the large portion of Medicare/Medicaid patients are likely to become more stringent rather than more generous. The University can continue to serve the large numbers of patients that fall through the social welfare safety net only: a) by achieving an increase in the State appropriation and/or b) by having the safety net closed in some manner at the national level, providing the medically indigent with a source of support for the health care they require. While the latter solution may be commendable, movement in that direction does not seem to be on the horizon in an era of multi-billion dollar Federal deficits, automatic deficit reduction requirements, etc.

An alternative solution, to reduce drastically the numbers of charity patients, or to provide such care only in case of emergencies, might be suggested. Some private, and in certain cases even public hospitals which do not have teaching/research missions, have taken that very course of action. However, such an action is not open to the University of Illinois Hospital for two crucial reasons. First, it would seriously reduce the health care opportunities for thousands of persons with no financial resources to secure health care and with no other viable source of free service. And second, it would seriously affect the mix of clinical experiences and teaching opportunities available for health professions students at the University of Illinois. The long term effects of that erosion in the quality of medical education plus the immediate impact of removing vital health care services from Illinois citizens makes such an alternative irresponsible.

Summary

The State of Illinois has two reasons to increase appropriated support for the University of Illinois Hospital. Unless and until some restructuring of current financing mechanisms occurs at the national level, Illinois will be confronted with a growing number of medically indigent patients who have been caught by the drive for reduced health care costs and the growing economic competition among health care providers. For humanitarian reasons alone, Illinois public policy must find a way to serve these persons, easing the financial burden they represent to one of the few institutions willing and able to meet their health care needs. Equally important, the State must recognize the need to maintain a diverse and complex clinical training environment for the education of hundreds of health professionals at the University of Illinois. An FY 1988 budget increment of \$10 million, combined with continuing efforts to manage existing resources efficiently and effectively, will permit the University of Illinois Hospital to meet both objectives.

SHARE OF UNCOMPENSATED CARE: 100 LARGEST CITIES 1982



Notes: Teaching hospitals are defined as COTH member hospitals. Uncompensated care is defined as charity and bad debt.

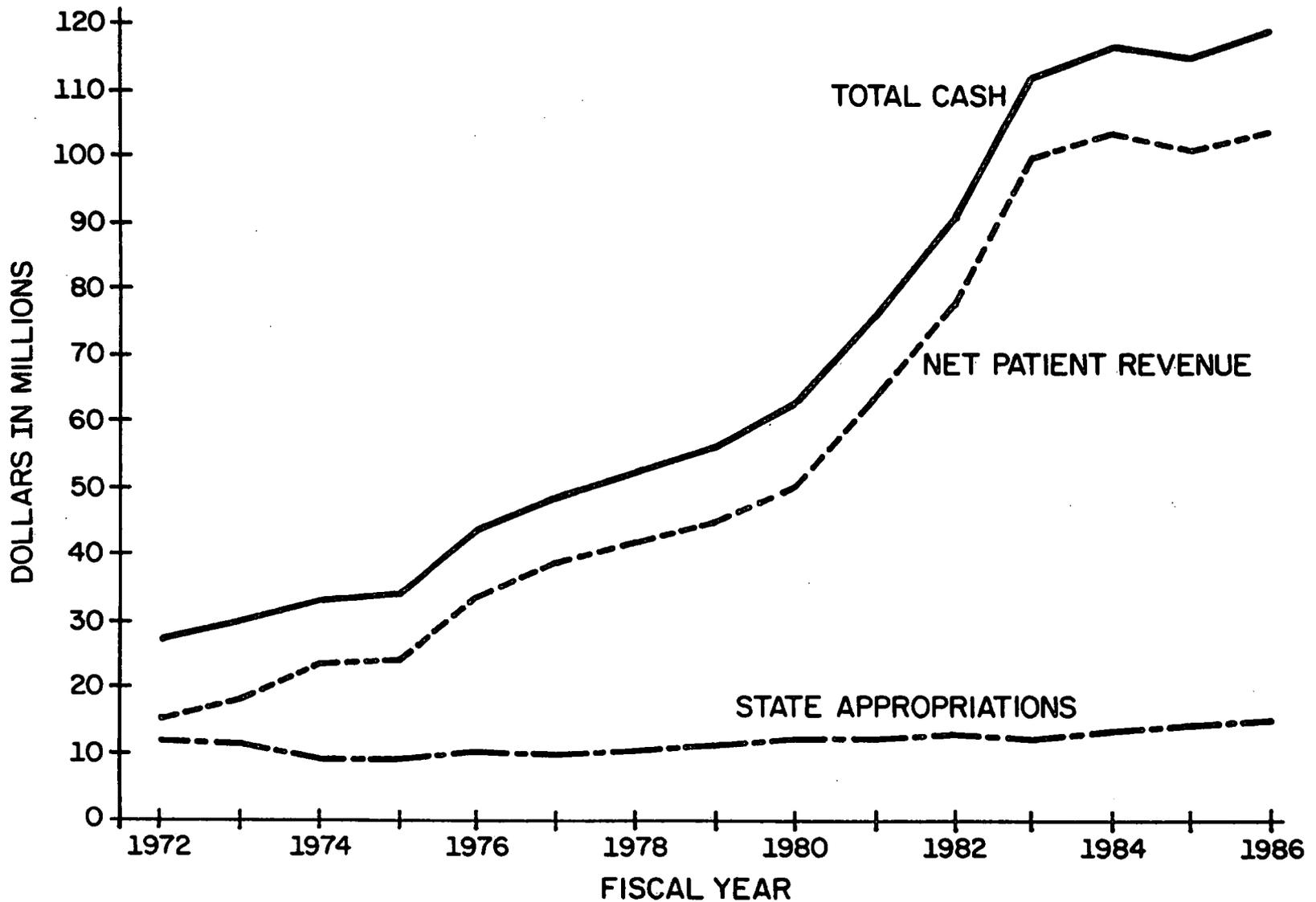
Source: Urban Institute and American Hospital Association, "Survey of Medical Care for the Poor and Hospitals' Financial Status, 1982." (Data runs produced for the Task Force by the Urban Institute and Lewin and Associates. Data are weighted for nonresponses. See Appendix B for further discussion.)

*Percent of total volume of care and percent of total uncompensated care are based on adjusted patient days. Adjusted patient days for uncompensated care were estimated based on average hospital charges per adjusted patient day.

Source: The Commonwealth Fund, Prescription for Change: Report of the Task Force on Academic Health Centers, (New York: Harkness House, 1985), p. 11/15.

UNIVERSITY OF ILLINOIS HOSPITAL

APPROPRIATIONS, NET PATIENT REVENUE & CASH



ATTACHMENT 3

1. Medicare - primarily elderly patients covered under the Federal Social Security program.
2. Medicaid - primarily Public Aid recipients, e.g., under Aid to Families with Dependent Children (AFDC), paid for jointly by Federal and State funds.
3. General Assistance - or Medical Assistance - No Grant (MANG) qualifiers as being medically indigent.
4. Third-Party Insured - by Blue Cross/Blue Shield or other commercial insurers.
5. Other - primarily self-pay, or as can be seen by the table, essentially no-pay. These individuals, usually called the "working poor", do not qualify for Federal or State assistance, but are not insured and do not have the resources to pay for extensive health care.

ATTACHMENT 4

Indirect support consists of costs funded by the University which are used by but not charged to the Hospital, such as purchasing, security, utilities and some general administrative functions. General administrative costs are calculated on a complex step formula from the Central Administration to the campus to the Hospital. Other costs such as utilities are allocated to the Hospital based on a square footage basis. In 1986, these cost/charges are estimated at approximately \$20 million.

NOTES

- 1 Neal A. Vanselow, "Academic Health Centers: Can They Survive?" Issues in Science and Technology, Summer, 1986, p. 56, citing Mark S. Levitan (Statement of the Association of American Medical Colleges before the National Council on Health Planning and Development, Washington, D.C., March 8, 1982).
- 2 The Commonwealth Fund, Prescription for Change: Report of the Task Force on Academic Health Centers, (New York: Harkness House, 1985), p. II/15.
- 3 American Hospital Association, Cost and Compassion: Recommendation for Avoiding a Crisis in Care for the Medically Indigent, Report of the Special Committee on Care for the Indigent, (Chicago: American Hospital Association, 1986), p. 1.
- 4 Ibid., p. 44.
- 5 Ibid., p. 46.

APPENDICES

RETIREMENT

The level of funding of the State Universities Retirement System has been a source of significant concern during the past several years. As a result of legislation passed in 1967, annual appropriations for the system are required to cover the projected costs of future benefits plus interest on the existing unfunded liability. This statutory level of funding has never been reached and, in effect, part of the retirement costs of current employees has been shifted to future years.

There was, however, some movement towards an improved level of retirement funding from FY 1979 through FY 1981. In each of those years the State's contribution was at or above the gross payout level of funding. At that level, the State's contribution covers all of that year's benefits and administrative expenses. The system is then able to add the employee contributions and interest and dividend income to the system's assets to provide future benefits.

The improved funding was, unfortunately, short-lived. As the State's economy worsened, so did the funding for the Retirement System. From FY 1982 through FY 1986 funding dropped significantly below the gross payout level. While these reductions are seen as necessary to prevent disastrous cuts in operating funds, it must be remembered that the State is borrowing against the future. Eventually the State will have to make up for those cuts; the longer it waits to meet these obligations, the more it will cost and the greater the impact will be on the operating budget of the University.

The University will continue to analyze the State's funding of the State Universities Retirement System. The fiscal soundness of the system is an issue of considerable importance to the institution and its staff.

It is a matter of long-standing policy of the Board of Trustees of the University of Illinois that the request for incremental funds for Retirement be set at the amount needed to achieve the statutory funding level. The University's FY 1987 Retirement appropriation is \$36,997,449. Based on data from SURS, the estimated statutory level for FY 1988 is \$135,500,000. Therefore, an increment of \$98,502,551 is requested for FY 1988.

APPENDIX II

BASES AND CALCULATIONS FOR
FY 1988 CONTINUING COMPONENTS INCREASES
(Dollars in Thousands)

I. Salary Improvement

A.	FY 1986 Personal Services Base:	\$388,982.6
B.	FY 1986 Annualization :	4,529.1
C.	FY 1987 Personal Services Base:	\$415,124.9
D.	Calculation for FY 1988 Increment	

1. Annualization of FY 1987 Increases (5.5%)

$$\begin{aligned} & (\text{FY 1986 Base} + \text{Annualization}) \times 92.5\% \times 5.5\% \times 2/12 = \\ & (\$388,982.6 + 4,529.1) \times .925 \times .055 \times 2/12 = \$ 3,336.7 \end{aligned}$$

2. FY 1988 Increase (7%)

$$\begin{aligned} & (\text{FY 1987 Base} + \text{Annualization}) \times 95\% \times 7\% \times 10/12 = \\ & (\$415,124.9 + 3,336.7) \times .95 \times .07 \times 10/12 = \$23,189.7 \end{aligned}$$

3. Total Request (1 + 2) = \$26,526.4

E. Fringe Benefit Improvements (2%)

$$\begin{aligned} & (\text{FY 1987 Base} \& \text{Annualization}) \times 95\% \times 2\% \times 10/12 = \\ & (\$415,124.9 + 3,336.7) \times .95 \times .02 \times 10/12 = \$ 6,625.6 \end{aligned}$$

II. General Price Increase

A.	FY 1987 Base	:	\$72,394.2
B.	FY 1987 Percentage Increase	:	4.5%
C.	Calculation (\$72,394.2 x .045):	:	\$ 3,257.7

D. Note: The General Price Increase Base includes the following objects of expenditure: Contractual Services, Travel, Commodities, Equipment, Telecommunication Services, Operation of Automotive Equipment, Awards & Grants, Hospital and Medical Services and Appliances, Permanent Improvements CES Expenses, and Prairie State Games.

III. Utilities Price Increase

A.	FY 1987 Base	:	\$34,556.9
B.	FY 1987 Percentage Increase	:	9.45%
C.	Calculation (\$34,556.9 x .0945):	:	\$ 3,264.8

IV. Library Price Increase

A.	FY 1987 Base	:	\$ 7,113.1
B.	FY 1987 Percentage Increase	:	12.0%
C.	Calculation (\$7,113.1 x .12)	:	\$ 853.6

FISCAL YEAR 1988 CAPITAL BUDGET REQUEST

FY 1988 CAPITAL BUDGET REQUEST

Introduction

The University's FY 1988 capital budget request is comprised of two major sections: (1) regular capital and (2) Build Illinois. Remodeling continues to be a high priority for FY 1988, and provisions to fund a substantial portion of those needs are included in both the regular and Build Illinois portions of the budget. Equally important, the FY 1988 request reflects the need to begin planning activities for a number of major new building and large scale remodeling projects. Twelve of the thirty projects included in the FY 1988 request call for planning funds. It is especially important that planning for future projects occurs even while major construction and remodeling activities are underway for projects already planned, so that a reasonably orderly process of facility remodeling and space additions can be maintained over a multi-year period.

The regular capital segment of the request includes remodeling, renovation, and new construction projects necessary to support the University's ongoing programmatic activities. Each project in the request has been reviewed by the campus and University administrations and integrated into a set of University capital budget priorities. The priority list represents an assessment of the relative need for each project as compared to other capital improvement needs across both campuses. In addition, the priority list reflects a level of funding which meets the University's highest priority needs, yet is realistic and defensible when compared to other pressing State needs.

Now, more than ever in the past, the emphasis of many projects in the capital list is oriented toward the areas of high technology and biotechnology, leading toward the enhancement of the economy of Illinois. To this end, the University's needs are more urgent than those of the past few budget cycles. The advancement of high technology research is occurring rapidly at other outstanding institutions with well equipped laboratories and research centers. The University must support its finest faculty with state-of-the-art facilities and equipment if it is to continue its leadership role in scientific and technological research.

Appropriations from the Build Illinois Repair and Renovation Program have provided the University with \$7.8 million annually for the past two

years to fund minor repair and renovation projects. The program funding is to continue through FY 1990 and its overall impact on restoration of space quality at the University will be significant. The creation of a continuing source of revenues for minor remodeling projects has eliminated the need to include SR³ project proposals in the regular capital budget request. The types of projects which will be financed from this program include: realignment of space to meet changing programmatic needs, remodeling to restore old or heavily utilized facilities, and replacement and retrofitting of building and campus utility systems. The \$500,000 ceiling per project that existed for previous appropriations has recently been removed, allowing for more flexibility in selecting projects to be included for remodeling. While an initial list of proposed projects is included in this request, some minor changes in project scope, or some changes among projects included for FY 1988 may occur, as program priorities shift during the coming year.

Emphasis of the FY 1988 Regular Capital Budget Request

The programmatic emphasis of the FY 1988 capital request continues to focus primarily on the advancement of research and instructional efforts in science and engineering disciplines. During the past three years, the University has conducted a vigorous and successful campaign to attract public and private funding support for improvements in its physical facilities, particularly laboratory buildings. The recently approved Digital Computer Laboratory Addition at Urbana-Champaign and the Engineering Laboratory Addition in Chicago are two examples of new appropriations for facilities to support high technology research and educational efforts. Other examples of this program's success include the Beckman Institute building, the Microelectronics Research Center, the Federal Biotechnology facility, and the Animal and Dairy Science Addition. Together, these six new facilities represent an investment of \$152.8 million in science and engineering buildings.

Although substantial funding has been obtained for expansion of high tech/biotech initiatives in engineering and agriculture programs on both campuses, additional funding is necessary to establish an appropriate "critical mass" of modern laboratories and support areas, especially in the life sciences, the chemical sciences, and the clinical sciences. The

FY 1988 Capital Budget Request contains several projects which complement facilities which are currently being designed or are under construction, and it contains two projects which are important to complete projects previously funded. In fact, the first seven projects in the FY 1988 Capital priority list either complement or are intended to complete high tech initiatives funded in previous years. Furthermore, the top two projects, the Clinical Sciences Building in Chicago and the Life Sciences Research Lab in Urbana, emphasize the commitment the University of Illinois has to these programs. Equally important, these facilities improvements support areas which have received substantial attention in the academic program components of recent operating budget requests.

Within the 30 projects that comprise the FY 1988 Request, 17 relate to high technology or biotechnology, three deal with safety and reliability of campus facilities, eight are targeted toward expanded and replacement facilities, and the final two are for site enhancements. Overall, the FY 1988 request totals \$57.8 million in regular capital with an additional \$9.8 million requested for remodeling under the Build Illinois program. Complete descriptions of the projects that make up the FY 1988 request are included in the latter portion of this section.

The data which follow summarize the current request in tabular form and provide an update of current and historical capital appropriation activity. More specifically, Table 1 provides a summary of projects in priority order, by campus with cumulative totals. Table 2 provides a breakdown of the request by budget category and by campus; and Table 3 illustrates the financial impact of the FY 1988 projects on future year requirements. Table 4 details the cost per square foot that is anticipated for the new buildings and major remodeling projects requested for FY 1988.

Status of Ongoing Projects

To understand the direction and emphases of the FY 1988 request, it is important to view the request in the context of past capital appropriations, especially those which were recently approved by the Governor and General Assembly for FY 1987. Table 5 provides a summary of actions on capital budget requests from FY 1983 through FY 1987 and Table 6 shows the construction status of each University appropriation from FY 1984 to FY 1986.

Recently \$52.4 million was appropriated for FY 1987 regular capital projects with an anticipated appropriation of an additional \$22.3 million for the FY 1987 Build Illinois projects. The projects included in the FY 1987 appropriation bills are shown below along with their respective funding levels.

Regular Capital

Chicago

Engineering Laboratory	\$22,499,900
Energy Conservation	296,400

Urbana-Champaign

Utilities Upgrade	9,410,000
Digital Computer Lab Addition	17,417,400
Motor Pool Relocation	1,990,000
Pollution Control Equipment	<u>800,000</u>

TOTAL	\$52,413,700
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Build Illinois

Build Illinois

Animal & Dairy Sciences Facility	\$14,500,000
R & R Projects	<u>7,834,000</u>

TOTAL	\$22,334,000
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All University Total FY 1987	\$74,747,700
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An additional \$3,560,000 in Transportation Bond funds was appropriated for construction activities at Willard Airport, bringing the grand total FY 1987 capital appropriation for all State sources to \$78,307,700.

Note that the Build Illinois appropriation for the Animal and Dairy Sciences Facility at the Urbana-Champaign campus is insufficient to complete the project as planned and requested. Therefore, \$1,998,100 is requested in FY 1988 to complete the project that was approved and partially funded in FY 1987.

TABLE 1
UNIVERSITY OF ILLINOIS
FY 1988 CAPITAL REQUEST
PRIORITY LIST
(Dollars in Thousands)

Priority	Campus	Project	Budget Category	FY 1988 Request	Cumulative Cost		
					University	Chicago	Urbana
1	C	Clinical Sciences Building	REMD	\$ 7,883.0	\$ 7,883.0	\$ 7,883.0	
2	U	Life Sciences Research Lab	PLAN	1,800.0	9,683.0		\$ 1,800.0
3	U	Utility Infrastructure Upgrade	UTIL	3,689.0	13,372.0		5,489.0
4	C	Art and Architecture Building Addition	PLAN	667.0	14,039.0	8,550.0	
5	U	Campus Land Acquisition	LAND	1,500.0	15,539.0		6,989.0
6	U	Environmental Sciences Building	REMD/EQUIP	4,250.0	19,789.0		11,239.0
7	C	Alumni Hall (Phase 2)	REMD	4,024.0	23,813.0	12,574.0	
8	U	Noyes Lab Remodeling	PLAN	200.0	24,013.0		11,439.0
9	U	English Building Remodeling (Phase 3)	REMD	3,360.0	27,373.0		14,799.0
10	C/U*	Administrative Computing Elec. Improvements	UTIL	1,919.0	29,292.0	14,493.0	
11	C	Associated Health Professions	REMD	3,900.0	33,192.0	18,393.0	
12	U	WILL Radio & TV Building	BLDG	10,350.0	43,542.0		25,149.0
13	C	Engineering Science Library Addition	PLAN	425.0	43,967.0	18,818.0	
14	U	Federal Research Facility	SITE/EQUIP	1,275.0	45,242.0		26,424.0
15	C	Remodel College of Medicine West (Phase 1)	PLAN	414.0	45,656.0	19,232.0	
16	U	New Commerce Building	PLAN	1,500.0	47,156.0		27,924.0
17	C	HSC Campus Emergency Distribution	UTIL	1,190.0	48,346.0	20,422.0	
18	U	Vet Med Basic Sciences Building Remodeling	PLAN	250.0	48,596.0		28,174.0
19	U	Campus Landscape Improvements	SITE	150.0	48,746.0		28,324.0
20	U	Sanitary Sewer System Upgrade	PLAN	90.0	48,836.0		28,414.0
21	C	Remodel Pharmacy Building	REMD	2,111.0	50,947.0	22,533.0	
22	U	Art Painting and Pottery Lab	BLDG	662.0	51,609.0		29,076.0
23	U	Nuclear Physics Lab Addition	PLAN	350.0	51,959.0		29,426.0
24	C	Upgrade Campus Fire Alarm System	UTIL	794.0	52,753.0	23,327.0	
25	U	Mechanical Engineering Building Remodeling	REMD	2,950.0	55,703.0		32,376.0
26	C	College of Business & Continuing Educ. Bldg.	PLAN	850.0	56,553.0	24,177.0	
27	U	Main Library Remodeling	PLAN	160.0	56,713.0		32,536.0
28	U	Outdoor Instructional/Rec. Facilities	SITE	85.0	56,798.0		32,621.0
29	U	Pilot Training Facility	BLDG/UTIL	932.8	57,730.8		33,553.8
30	U	Campus Police Building	PLAN	90.0	57,820.8		33,643.8

Build Illinois Requests

**	C/U	Repair & Renovation Program (Phase 3)	REMD	7,834.0
**	U	Completion, Animal/Dairy Science	BLDG/REMD	1,998.1

*Because this project serves the needs of both the Chicago and Urbana-Champaign campuses, the cost may be applied on an equal basis to both. For the purpose of this table, the entire project cost will be included under Chicago.

**Build Illinois projects are non-prioritized.

TABLE 2
 SUMMARY OF THE FY 1988 CAPITAL BUDGET REQUEST
 BY CAMPUS AND CATEGORY
 (Dollars in Thousands)

<u>Category</u>	<u>Chicago</u>	<u>Urbana-Champaign</u>	<u>Total</u>
1. Buildings, Additions, and/or Structures		\$11,864.8	\$11,864.8
2. Land		1,500.0	1,500.0
3. Equipment		375.0	375.0
4. Utilities	\$ 3,903.0	3,769.0	7,672.0
5. Remodeling	17,918.0	10,260.0	28,178.0
6. Site Improvements		1,435.0	1,435.0
7. Planning	2,356.0	4,440.0	6,796.0
TOTAL	\$24,177.0	\$33,643.8	\$57,820.8

†

TABLE 3
UNIVERSITY OF ILLINOIS
FUTURE FUNDING IMPLICATIONS OF THE FY 1988 CAPITAL REQUEST BUDGET
(Dollars in Thousands)

Priority	Campus	Project	Budget Category	FY 1988 Request	FY 1989 Costs	Cost for FY 1990 and Beyond
1	C	Clinical Sciences Building	REMD	\$ 7,883.0		
2	U	Life Sciences Research Lab	PLAN	1,800.0	\$30,982.0	\$1,500.0
3	U	Utility Infrastructure Upgrade	UTIL	3,689.0	908.0	1,950.0
4	C	Art and Architecture Building Addition	PLAN	667.0	11,507.0	1,250.0
5	U	Campus Land Acquisition	LAND	1,500.0	1,480.0	3,020.5
6	U	Environmental Sciences Building	REMD/EQUIP	4,250.0		
7	C	Alumni Hall, Phase 2	REMD	4,024.0	3,212.0	300.0
8	U	Noyes Lab Remodeling	PLAN	200.0	2,000.0	3,500.0
9	U	English Building Remodeling (Phase III)	REMD	3,360.0		4,200.0
10	C/U*	Administrative Computing Elec. Improvements	UTIL	1,919.0		
11	C	Associated Health Professions	REMD	3,900.0		2,676.0
12	U	WILL Radio & TV Building	BLDG	10,350.0	700.0	
13	C	Engr/Sci Library Addition	PLAN	425.0	6,895.0	1,012.0
14	U	Federal Research Facility	SITE/EQUIP	1,275.0		
15	C	Remodel College of Medicine West (Phase I)	PLAN	414.0	3,726.0	5,000.0
16	U	New Commerce Building	PLAN	1,500.0	24,000.0	1,000.0
17	C	HSC Campus Emergency Distribution	UTIL	1,190.0	200.0	1,000.0
18	U	Vet Med Basic Sciences Building Remodeling	PLAN	250.0	2,500.0	
19	U	Campus Landscape Improvements	SITE	150.0	1,100.0	2,750.0
20	U	Sanitary Sewer System Upgrade	PLAN	90.0	810.0	
21	C	Remodel Pharmacy Building	REMD	2,111.0	1,244.0	1,412.0
22	U	Art Painting and Pottery Lab	BLDG	662.0	45.0	
23	U	Nuclear Physics Lab Addition	PLAN	350.0	5,475.0	300.0
24	C	Upgrade Campus Fire Alarm System	UTIL	794.0	600.0	1,200.0
25	U	Mechanical Engineering Building Remodeling	REMD	2,950.0		
26	C	College of Business & Continuing Educ. Bldg.	PLAN	850.0	16,800.0	2,350.0
27	U	Main Library Remodeling	PLAN	160.0	1,600.0	
28	U	Outdoor Inst./Rec. Facilities	SITE	85.0	270.0	610.0
29	U	Pilot Training Facility	BLDG/UTIL	932.8	155.0	
30	U	Campus Police Building	PLAN	90.0	1,300.0	
TOTAL				\$57,820.8	\$117,509.0	\$35,030.5

*Because this project serves the needs of both the Chicago and Urbana-Champaign campuses, the cost may be applied on an equal basis to both. For the purpose of this table, the entire project cost will be included under Chicago.

TABLE 4
 COST PER SQUARE FOOT OF NEW BUILDING AND MAJOR REMODELING PROJECTS BY CAMPUS

	<u>Project Cost*</u>	<u>Gross Square Feet</u>	<u>Assignable Square Feet</u>	<u>Efficiency ASF/GSF</u>	<u>\$/GSF</u>	<u>\$/ASF</u>
<u>CHICAGO</u>						
New Buildings						
Art & Architecture Bldg. Addition	\$12,174,000	69,120	41,200	.60	\$176.13	\$295.49
Major Remodeling						
Clinical Sciences Building	7,883,000		67,998			115.93
Alumni Hall	4,024,000		22,626			177.85
Associated Health Professions**	3,900,000		109,400			35.65
Remodel Pharmacy Building	2,111,000		16,800			125.65
<u>URBANA-CHAMPAIGN</u>						
New Buildings						
WILL Radio-TV Building	10,350,000	53,350	32,350	.60	194.00	319.94
Art Painting Pottery Lab	662,000	12,000	10,000	.80	55.17	66.20
Pilot Training Facility	932,800	10,200	8,500	.83	91.45	109.74
Major Remodeling						
Environmental Science Building	3,950,000		36,730			107.54
English Building Remodeling	3,360,000		22,500			149.33
Mechanical Engineering Building Remodeling	2,950,000		15,450			190.94

*Project Cost Excludes Movable Equipment.

**Electrical and Mechanical System upgrade only.

TABLE 5
HISTORY OF RECENT CAPITAL BUDGET REQUESTS

	<u>FY 1983</u>	<u>FY 1984</u>	<u>FY 1985</u>	<u>FY 1986</u>	<u>FY 1987</u>
<u>Campus Requests</u>					
Chicago	\$ 7,330,000	\$11,146,900	\$17,775,400	\$26,253,500	\$19,564,400
Urbana-Champaign	7,821,100	9,884,600	23,032,100	18,556,500	39,148,900
TOTAL	(\$15,151,100)	(\$21,031,500)	(\$40,807,500)	(\$44,810,000)	(\$58,713,300)
<u>IBHE Recommendations</u>					
Chicago	\$ 3,244,900	\$ 4,289,300	\$ 4,255,400	\$11,712,800	\$ 8,869,100
Urbana-Champaign	5,715,200	5,635,500	10,447,500	9,140,000	29,718,800
TOTAL	(\$ 8,960,100)	(\$ 9,924,800)	(\$14,702,900)	(\$20,852,800)	(\$38,587,900)
<u>Appropriation¹</u>					
Chicago		\$ 660,000	\$ 757,700	\$14,112,800	\$22,499,900
Urbana-Champaign		350,000	4,378,800	20,045,300	28,817,400
TOTAL		(\$ 1,010,000)	(\$ 5,136,500)	(\$34,158,100)	(\$51,317,300)
<u>Appropriations for Special Projects</u>					
Food Production Research	\$ 750,000	\$ 2,254,500	\$11,116,100	\$ 600,000	--
Energy Conservation	15,000,000	4,549,200			296,400
Build Illinois - R & R				7,834,000	7,834,000
Build Illinois - Major Projects				1,700,000	14,500,000
Fire Service Institute				2,600,000 ²	--
Beckman Institute				10,000,000	--
Pollution Control Equipment					800,000
TOTAL	(\$15,750,000)	(\$ 6,803,700)	(\$11,116,100)	(\$22,734,000)	(\$23,430,400)
<u>Total University of Illinois</u>					
Appropriation	\$15,750,000	\$ 7,813,700	\$16,252,600	\$56,892,100	\$74,747,700

¹Excludes Food Production Research and Energy Conservation.

²The Fire Service Institute will make an annual payment of \$218,400 for a period of 24 years to the State of Illinois for debt service associated with this appropriation.

TABLE 6
STATUS OF CAPITAL PROJECTS
FY 1984 - FY 1986
AS OF AUGUST 1986
(Dollars In Thousands)

	<u>Project Cost</u>	<u>Estimated Completion</u>	<u>Status</u>
FY 1984 Appropriations			
<u>Chicago</u>			
Roof Replacement - Peoria School of Medicine	\$ 202.9	8/84	Complete.
Hazardous Waste Incinerator	457.1	N/A	Project on hold.
Energy Conservation - Chicago	<u>1,533.9</u>	9/86	40% complete.
Subtotal	\$ 2,193.9		
<u>Urbana</u>			
Microelectronics Center Planning	\$ 350.0	1/89	Program statement completed 3/85.
Agricultural Engineering Research Lab Remodeling	404.5	8/85	Construction commenced 3/85.
Veterinary Medicine Animal Room Facilities	1,850.0	4/87	\$1.2 million of funds released. 1% complete.
Energy Conservation	<u>3,015.3</u>	N/A	53% complete.
Subtotal	\$ 5,619.8		
FY 1984 TOTAL	\$ 7,813.7		
FY 1985 Appropriations			
<u>Chicago</u>			
Pharmacy A/C Planning	\$ 433.2	N/A	Design.
Library Renovation Planning (Includes Relocate OAR)	<u>324.5</u>	N/A	Design.
Subtotal	\$ 757.7		
<u>Urbana</u>			
Plant Sciences Greenhouse Complex	\$11,116.1	3/88	Contracts awarded by CDB.
Utility A/C System Animal Science Lab	354.6	5/86	10% complete.
Roofs various buildings	524.2	4/86	Civil Engr. Bldg. roof 90% complete; Bevier Hall roof 80% complete; Law roof started in Spring '86.
Microelectronics Center	<u>3,500.0</u>	5/89	Planning.
Subtotal	\$15,494.9		
FY 1985 TOTAL	\$16,252.6		

TABLE 6
(Continued)

	<u>Project Cost</u>	<u>Estimated Completion</u>	<u>Status</u>
FY 1986 Appropriations			
<u>Chicago</u>			
Pharmacy Building Remodeling & AC	\$ 5,218.0	N/A	Unreleased.
Office of Admissions & Records	1,149.8	N/A	Coordinated with Library renovation.
Engineering Research Building (planning)	2,400.0	9/89	A/E Selection.
Library Renovation	5,345.0	N/A	Unreleased.
Build Illinois	<u>3,284.9</u>	7/86	Partial release.
Subtotal	\$17,397.7		
<u>Urbana</u>			
Fire Service Institute	\$ 2,600.0	11/87	Unreleased.
Swine Research Center	1,745.3	12/87	Funds released 4/30/86.
Environmental Sciences Building	3,500.0	3/88	Unreleased.
Computer Lab Addition	1,100.0	3/89	A/E selection.
Animal & Dairy Science Lab	1,000.0	12/88	A/E selection.
Microelectronics Center	13,700.0	5/89	Const. Documents. Bids anticipated 4/87.
Food for Century III	600.0	6/86	Unreleased.
Beckman Institute	10,000.0	12/88	4,000 released, const. document.
Build Illinois	4,549.1	6/87	Partial release.
Orr Farm Purchase	<u>700.0</u>	7/88	50% complete.
Subtotal	\$39,494.4		
FY 1986 TOTAL	\$56,892.1		

FY 1988 CAPITAL PROJECTS
CHICAGO CAMPUS

Clinical Sciences Building Remodeling - (\$7,883,000)

The College of Medicine at the University of Illinois at Chicago is in the midst of a long term effort to improve both the quality and the amount of medical research which its faculty conducts. For the past five years, the College has been actively recruiting department heads and a core group of faculty who are committed to the expansion of the College's overall level of research, to the improvement of the College's competitive ability to attract research support from external agencies, and to maintaining the excellence which has characterized its teaching programs. In the past three years alone (FY 1983 - FY 1985), research expenditures in the College of Medicine have increased more than 25% and now exceed \$10 million accounting for nearly one-quarter of the total research expenditures for the entire Chicago campus.

While the College has made good progress in its efforts to expand research activity, the recruitment program is by no means finished. As scientific knowledge expands, new fields of research are continually being developed; and the College must also develop research expertise in these new areas if it is to improve its competitive position among the nation's major research institutions.

Modern facilities are essential to achieve excellence in medical education and research. Good researchers can be attracted and retained only if adequate facilities are available to support their research efforts. The facilities must be designed to accommodate recent advances in scientific research which is now heavily reliant upon sophisticated equipment and instrumentation. Further, laboratories must be properly configured, and they must be specifically equipped with more extensive utilities services than are currently available in most existing space. Overall, it must be recognized that in the area of health-related research, there are few needs which are more important or more urgent than providing adequate research space.

The College of Medicine at Chicago occupies parts of ten buildings at the Health Sciences Center. Only one-third of this space was actually designed and built for academic and research purposes; the remaining

two-thirds was designed for other activities. While some remodeling has occurred (the Genetics Center suite in the College of Medicine - East Tower, for example), a great deal of the space remains unsuited for medical research activities. This is the case with space in the Clinical Sciences Building which was formerly a hospital-patient care facility. Consequently, major remodeling is needed if this space is to be useful in developing the College's medical research programs.

As the mode of teaching in the College of Medicine has changed from that of utilizing the talents, knowledge, and expertise of practicing physicians and surgeons to that of full-time teaching faculty with research interests, the need for larger amounts of various types of facilities has grown. Yet, the College's acquisition of space at the Health Sciences Center has come largely as a result of new buildings being built for the College of Dentistry, the Library of the Health Sciences, and the University of Illinois Hospital. Consequently, the need for remodeling and upgrading of space for College faculty and researchers has been a continuing matter, and in FY 1988 represents the highest capital budget priority for both the Chicago campus and the University.

What can be accomplished in terms of research findings and medical advances, as well as support funding for sponsored research endeavors if a continuing program of facilities remodeling, upgrading, and modernization is funded can only be imagined at this time, but a simple straight-line projection indicates at least a \$700,000 increase in sponsored research per year for the College of Medicine alone.

The Clinical Sciences Building (CSB) is a 14-story 207,000 GSF structure which housed the University Hospital prior to construction of the Replacement Hospital in 1981. Floors 1 through 4 are, at present, utilized for various hospital functions--ambulatory clinics, service laboratories, medical records and hospital patient accounts. Floors 5 through 14 have been assigned to the College of Medicine; floor 4 will be subsequently assigned to the College as other space becomes available for various hospital functions.

The College of Medicine has assigned this space to three major clinical departments and intends to create therein a modern, up-to-date academic and scientific research facility.

It was ascertained by a consulting A & E firm that the building's electrical and mechanical systems, first installed in the 1950's, would be inadequate to support the kinds of equipment and research activities planned for the 1990's. Therefore, funds were requested and appropriated to renovate or replace major plumbing, piping, and electrical risers in the core areas of the building. Funds for this project were released during FY 1986, and the new installations will become available to serve new laboratories and research service facilities in the near future.

However, as space is remodeled and upgraded, lateral distribution systems for each floor must be planned and installed to connect the new risers to various points of use. New mechanical rooms must be created on each floor to serve remodeled space with central heating, ventilation, air-conditioning, and electrical power. New central public restroom facilities must be created, and this work must be accomplished concomitant with corridor and space remodeling.

Floors 5 through 14 have been assigned to the College of Medicine Departments of Surgery, Medicine, and Pediatrics to serve as primary academic and research space. These departments are themselves subdivided into sections or divisions, and insofar as possible, these sections or divisions have been assigned contiguous space on the various floors. This project will not only upgrade mechanical and electrical systems throughout the floors, but will create new and, in some cases, refurbish existing facilities for these units (i.e., modern research laboratories and support facilities, faculty and administrative offices, and upgraded corridors). As new restrooms are developed, many old facilities that served the former inpatient functions of the space will be remodeled and the space converted to academic and research uses. While each floor contains approximately 10,000 square feet--including corridors, mechanical rooms, and stairwells, the assignable space that will result as the remodeling project is completed will total about 6,800 assignable square feet per floor.

It should be noted that some remodeling has already been accomplished, or has been planned and funded. Therefore, the total project for remodeling and upgrading of floors 5 through 14 (100,000 GSF), originally estimated to cost upwards of \$10 million, has been reduced to the requested sum of \$7.9 million.

The College of Medicine has been held back from development of its full potential in service and scientific research, primarily because of a lack of appropriate physical space. Major areas of societal concern, almost of necessity, have been neglected because there is no space in which to locate people and activities. Major fields of research endeavor have been bypassed because of a serious lack of research laboratory facilities, principally in the clinical departments.

The Departments of Medicine, Surgery, and Pediatrics, with their many subdivisions and sub-specialities, have been especially hard hit by these space shortages. With construction of a new hospital building, and the acquisition of vacated former hospital space by the College of Medicine, at least a part of this space deficiency can be remedied, if remodeling funds can be made available to adequately remodel and upgrade the Clinical Sciences Building. The Departments of Medicine, Surgery, and Pediatrics have been moving ahead with plans to consolidate their endeavors, to fill in missing areas of research and academic pursuits. For example, the Division of Surgical Oncology, of the Department of Surgery, with a significant space assignment in the Clinical Science Building (CSB), will be able to bring together a core of researchers and equipment that will result in doubling or tripling of its present effort in researching the causes and potential cures of cancer. With the remodeled CSB space, the Department of Pediatrics will be able to begin or expand treatment and research efforts in a number of areas heretofore almost completely neglected - Neonatal Nephrology and Pediatric Cardiology, to name only two. The space commitment to the Department of Medicine, with a complement of some 70 active academics and researchers, will just begin to match the space allocations of other "Big Ten" universities.

Direct research support grants, and research training contracts awarded to the College of Medicine faculty annually, bring many millions of dollars into the University of Illinois at Chicago Health Sciences Center. These funds fully or partially provide salary support for hundreds of people, with additional funding support for the research equipment and supplies to conduct the research projects and training programs. (Note: College of Medicine direct research grants and training contracts totaled approximately \$12.2 million in 1983; and indirect cost reimbursement funds totaled \$4.3 million in 1983, for a grand total of \$16.5 million.)

Physical facilities adequate to pursue today's highly sophisticated research in clinical medicine are certain to make the College of Medicine more competitive in its efforts to attract external funding to support medical research. Completion of the Clinical Sciences Building remodeling will directly affect research activities in the following areas:

1. Department of Medicine, Hematology Section
2. Department of Medicine, Hypercalcemia of Malignancy
3. Department of Medicine, Tumor Metastasis Laboratory
4. Department of Medicine, Tumor Cloning Laboratory
5. Department of Medicine, Section of Rheumatology
6. Department of Pediatrics
7. Department of Surgery

No capital project is of greater importance to the facilities needs for the University of Illinois at Chicago for FY 1988 than is the long awaited remodeling of the Clinical Sciences Building.

Art and Architecture Building Additions-Planning - (\$667,000)

The College of Architecture, Art and Urban Planning (AAUP) has an established reputation for outstanding academic programs. For example, the Department of History of Architecture and Art is currently the largest and most diverse undergraduate program in architecture and art history in the United States. The department includes faculty with expertise in film, photography, and design. Another example of the College's outstanding programs is the School of Urban Planning and Policy. The School of Urban Planning and Policy is officially recognized by the American Planning Association and currently maintains a distinguished and productive faculty. In fact, outside support for the School's research has grown from \$344,000 in 1980 to \$707,000 in 1984. Yet, despite its progress and outstanding academic programs, the College continues to lack adequate physical facilities.

The Architecture and Art Building was originally programmed and designed to be constructed in two phases. The second phase, approximately 60% of the total required space, which would have included faculty offices, seminar and classrooms, a resource center and gallery, and additional instructional laboratory space, was never built. Since the completion of the first phase of the building, the programs in Architecture, Art and Design, and History have doubled in size, both in terms of students and faculty. In addition, there are now major graduate programs in

Architecture and Art and Design which were not part of the original curricula. (There is also a new graduate program in the History of Architecture and Art that starts in FY 1987). In 1977, the College of Architecture and Art and the College of Urban Science merged to form the current College of Architecture, Art, and Urban Planning, which also includes the Center for Urban Economic Development, and the Nathalie Voorhees Center for Neighborhood and Community Improvement. There was no additional space acquired to provide for this merger or for the Centers.

Since 1978, UIC graduate programs in Architecture and Art have grown to over 200 students with no increase in physical facilities. The graduate program has been accommodated by giving up faculty offices and locating students in unheated stairwells and other inadequate spaces. These physical facility problems were pointed out as major discrepancies in three separate accreditation visits to Architecture, Art and Urban Planning during the last two years.

The College is in a considerably stronger qualitative position than it was five years ago in all areas except equipment and physical facility resources. During the last five years, it has recruited both outstanding full time and adjunct faculty to take advantage of the rich human resources of the Chicago metropolitan area. Both permanent and adjunct faculty continue to gain national and international acclaim through awards and publication of their work. Chicago dominates the national scene in architecture, and the School of Architecture dominates the Chicago scene in architecture exhibits and competitions. In 1985, faculty and alumni received eight of the ten local American Institute of Architects Honor Awards, and for the last five years they have received thirty-six of the fifty-two awards. The Art and Design faculty continue the strong visual arts tradition of Chicago, and have won three Guggenheim scholarships and eight NEA individual artist grants. This faculty recognition is also growing in History and Planning, where members of the faculty have been appointed as curators in major museums, and as commissioners in the Chicago City government.

The proposed final phase of expansion for the Architecture and Art building provides for two additions to be added to the north and south of the existing building at locations which were made for additions in the original building planning and construction. The north section will

consist of four floors plus a basement and will contain faculty and administrative office space. The south section will consist of five floors plus a basement and will contain faculty and administrative offices, seminar and classroom space, instructional laboratories, and special use areas, including a slide library and computer facilities.

These additions to the Architecture and Art Building will not only provide the space necessary to properly accommodate the programs in the College, but it will also bring the faculty, students, and administration (now in six different locations) into one building. This project, in addition, will make available to the rest of the campus approximately 29,600 square feet of space in the Behavioral Sciences Building, Henry Hall, Jefferson Hall, and University Hall, where there are also critical space shortages. The current lack of proximity between units makes it virtually impossible to stimulate joint programs and faculty and student interaction. This is becoming even more critical as the programs in Architecture, Urban Planning, and the centers increase their interdisciplinary activities related to public and private entities in the City of Chicago.

The existing space in the Architecture and Art Building without the additions will not provide the kind of flexible spaces that are needed for the College programs either now or in the future. These proposed additions will provide 41,200 NASF of new office, classrooms, laboratories, and special use areas needed to match the growth of needs of the College of Architecture, Art, and Urban Planning.

Alumni Hall Remodeling, Phase 2 - (\$4,024,000)

The campus has adopted a plan to complete the renovation of this structure as a permanent academic and office facility. As noted above, initial renovation was begun with endowment and other local funds. In FY 1985, an energy conservation project funded a new chiller to retrofit the existing air-conditioning systems.

In FY 1986, a major capital budget renovation project (\$1.15 million) was approved for the campus to relocate the Office of Admissions and Records and the School and College Relations Office from the Library into Alumni Hall. This project is the first phase of a major renovation plan to convert the south wing of the building to a student services facility

accommodating Admissions and Records, School and College Relations, Student Placement Services, Alumni Career Center, Dean of Students, Student Financial Aid, Student Employment, Student Legal Services, Student Development Services, Foreign Student and Staff Affairs, and Student Accounts Receivable.

To plan effectively for the student services renovation plan, the architectural firm of O'Donnell, Wicklund, and Pigozzi was employed to conduct a total building study and develop a "Master Building Renovation Plan." The study, undertaken cooperatively with the Office for Capital Programs, the Physical Plant Department, building users, the College of Architecture, Art and Urban Planning and the Campus Administration, identified all building use plans, building service needs, and building infrastructure requirements. The approved plan proposes a three phase remodeling program of which phase one consists of approved FY 1986 and FY 1987 projects, phase two is the request for FY 1988, and phase three is to be requested for FY 1989.

Key to the building renovation plan is construction of a central service and transportation core, installation of new heating, ventilation, and air-conditioning systems, electrical upgrading, code corrections, window replacement, and structural repairs. These improvements are essential support to the proposed space remodeling. The following table summarizes the remodeling components of the three-phase plan.

	Phase 1 FY86/FY87	Phase 2 FY88	Phase 3 FY89
Admissions & Records move Architectural, HVAC, Plumbing, Electrical Structural and Related	\$1,433,700	\$	\$
Code Corrections	215,600	438,000	
Window Replacement	125,000		330,900
Printmaking Shop	195,000		
Career Placement	56,000	318,400	
Electronic Visualization	230,000		
Service Core	201,000	3,267,600	199,300
Student Services Architectural, HVAC, Electrical, Structural and Related			1,321,100
General Work and Art & Design HVAC and Electrical			1,360,700
TOTAL	\$2,456,300	\$4,024,000	\$3,212,000

This building renovation plan will provide a fully useable facility, able to serve the long-term needs of the campus. Equally important, it will permit the reassignment of 40,000 square feet of vacated space across the campus to critically important academic program development.

Administrative Computing Electrical Improvements - (\$1,919,000)

This project provides for the installation of facilities to generate autonomous emergency electrical power for the Administrative Computer Center located in the Roosevelt Road Building. Power conditioning to computers as well as an uninterrupted power source will be provided; thus, eliminating undesired electrical harmonics and unstable voltage levels. This facility will also provide the standby electrical power necessary to prevent the loss of data that would occur in the event of a power outage of either the local utility company's electrical service or the power distribution network that serves the building.

The project calls for the installation of two complete UPS (uninterrupted power source) units, one with a rating of 400 KVA and the other with 675 KVA, which will provide power for a duration of fifteen minutes when the normal power is at fault or lost. The 400 KVA UPS Drive will be wired to the Hi-Frequency System and the 750 KVA Drive will support all other computer facilities including the air-conditioners used to cool the computers. These two UPS Drives will be in service at all times; consequently, all incoming electrical power will be properly filtered by these systems to provide clean power for computer operations. Furthermore, as part of the project, two diesel engine driven generators with a synchronized controller will be installed to provide full capacity operation when the normal source of electrical power fails. This system will remain in continuous operation until the normal power source is restored.

When completed, this project will provide adequate electrical protection for the University's administrative computer center to guard against sudden loss of power, which could cause both loss of key data and damage to computing equipment. It will also protect against the loss of power for prolonged periods of time which would cause serious disruption of all major administrative processes supported by the Computer Center (Payroll, Purchasing, Student Record Systems, Hospital Systems, etc.).

Associated Health Professions Building Remodeling - (\$3,900,000)

The 1919 W. Taylor Street Building is an "H" shaped eight story building, constructed in the early 1950's. The building has approximately 183,000 GSF and 109,000 NASF. The facility houses the Sickle Cell Program, the Division of Services for Crippled Children, the Family Practice Program, a new Child Care Center, and three curricula of the College of Associated Health Professions: Occupational Therapy, Physical Therapy, and Bio-Communication Arts.

The 1919 W. Taylor Street building, also includes some space previously used for patient care activities which is no longer needed for that purpose. The building, therefore, provides the logical site for the College of Associated Health Professions.

The College of Associated Health Professions is currently located in several buildings within a three block area. Communication barriers among faculty, students, and the administration exist on both interdepartmental

and intradepartmental levels. Relocating the departments to one building will facilitate greater interdisciplinary collaboration in research and in service. In addition, consolidation will create a more efficient use of space in the scheduling of classes and conferences, more efficient use of research and teaching equipment, and a substantial reduction in faculty and staff travel time between locations.

Since the building was first acquired in June of 1975, the need for a major upgrade has been evident. The current phase of the Taylor Street Building Upgrade represents the latest effort to correct building deficiencies and provide additional usable facilities for the College of Associated Health Professions.

Earlier upgrades to the facility provided electrical power to floors 2, 3, 4, 5, and 6 with funds totalling \$338,000 in FY 1979 and FY 1980. New Commonwealth Edison services, transformers, switchgear and related appurtenances, and vertical distribution of power to each floor of the building all were provided. Although current building occupants are adequately supplied with electrical services as a result of the FY 1979 and FY 1980 projects, future occupants under the planned reconfiguration will be unable to fully utilize the newly provided electrical services without the installation of electrical control panels and supplemental wiring to service new program requirements.

The overall project proposed for FY 1988 is the first of two phases required to restore and upgrade the building for permanent use. This phase addresses four distinct components:

1. Electrical power distribution;
2. Installation of a central air conditioning system;
3. Space remodeling for the College of Associated Health Professions;
and
4. Window replacement.

The FY 1988 phase of the building upgrade will complete previously initiated electrical work by installing electrical control panels and providing supplemental wiring to service program requirements. This phase will also include purchasing and installing a central air-conditioning system to provide chilled water to floors 1, 2, 3 and 4. The specific requirements will include the following: 1) a 300 ton chiller; 2) a cooling tower; 3) condensate pumps and piping; 4) chilled water pumps; 5) chilled water risers; 6) chilled water valves; 7) electrical connections;

and 8) controls. The space remodeling will convert the former kitchen area to research laboratory areas for metabolism research, collaborative research for Physical Therapy and Nutrition, and Kinesiology. The 2nd floor remodeling will accommodate the anatomical imaging research program, and the 6th floor remodeling will accommodate the relocation of the department of Medical Records Administration.

The second phase of work will address distribution of the air-conditioning system, elevator renovations, code corrections and the balance of the electrical distribution and window replacement work that was initiated with FY 1987 funding.

Engineering Science Library Addition Planning - (\$425,000)

Since the early 1970's, many academic programs at the University of Illinois at Chicago have grown from primarily undergraduate instructional programs to strong and vigorous research programs with significant graduate enrollments. The programs affected include Biological Sciences, Chemistry, Engineering, Geology, Mathematics, and Physics. Since the early 1970's, UIC's Library also has grown from an essentially undergraduate resource to a major research library that contains over 1.3 million volumes and currently receives 15,000 serial titles. In the past eight years, Main Library collections alone have grown by 48%; circulation has grown by 53%; and the number of users entering the Library each year has grown 20%.

As the only major public research library in the Chicago metropolitan area, the UIC Library has the opportunity to serve as a major scientific and technological research and service center for industry and business throughout northern Illinois. In addition to providing critical support to the academic programs at UIC, the strength of the Library in the fields of science and technology can become the central component in a vast array of scientific and technological information services for new high technology companies that reside in the Research Technology Park and indeed for the entire industrial and business community. The growing emphasis on research, graduate education, and service to the important industrial and business sectors in Illinois brings an increased need for on-site access to the engineering and science collections. Thus, library usage by the various research oriented constituencies is characterized by intensity, immediacy, and increased frequency. The proposed Engineering and Science

Library will enable the Library to satisfy the increased demand for library services and extend the normal operating hours for campus library services.

The proposed Engineering and Science Library addition will be constructed onto the existing Science and Engineering Laboratories (SEL) Building. The construction will provide 30,000 net assignable square feet (NASF) including 22,000 NASF in stack space, 6,000 NASF in seating space, and 2,000 NASF in services and office space. The building addition site will place critical library support adjacent to the many research laboratories in SEL. The Engineering and Science Library addition will have the added advantage of being accessible from the Science and Engineering Offices (SEO) Building which houses most of the engineering and mathematics faculty.

The Engineering and Science Library will be constructed with a single entrance for enhanced control of traffic and greater security for the library materials and will allow 24 hour access by faculty and graduate students from the research laboratories within SEL. The stack areas will be planned to provide high density storage systems in order to maximize the size and accessibility of the collections to be housed. The stacks will provide space for approximately 360,000 volumes, 80,000 of which will be designated as active research collections, with the remaining 280,000 classified as retrospective collections. Seating will be provided for 240 readers. The facility will be planned and constructed to accommodate and exploit advances in the automation of information services and the application of modern computing technology to search and retrieve from national databases.

Presently, the 213,000 volumes in the engineering and science collections are scattered over five locations in four different buildings. The combined total net assignable space in the facilities is 28,300 sq. ft., including seating for 122 persons and service space. Eighty-seven thousand volumes are housed in the Science Library, a facility carved from space originally constructed as laboratory, seminar, and office space on the third floor of the Science and Engineering South (SES) Building. Another 21,000 volumes are shelved in a basement storeroom and are available through a paging system which currently handles an average of 300 requests per month.

The mathematics research collection, amounting to 22,000 volumes, has been shelved in approximately 2,400 square feet of space in SEO but seating in the area is limited to 22 persons. Most of the engineering research collections and a large portion of the science periodicals are shelved on the fourth floor of the Main Library. Additional materials, mostly retrospective research collections, are shelved in temporary space in Alumni Hall, accessible only through the paging service.

The present card catalog will be replaced with an on-line machine readable card catalog accessible by means of terminal devices from remote locations. Within the next year, electronic access to bibliographic records for the Library's holdings in engineering and science will be possible from terminals located anywhere on campus via the Administrative Data Network (ADN). The net effect of these developments will be a reduction of required on-site space for technical processing and other library staff operations, thereby freeing space for seating and shelving of collections. Utilization of high density storage will permit the Library's entire engineering and science collections to be housed in a single location within a 30,000 NASF area. A mix of immediately accessible open stacks for current and heavily used materials and on-demand retrieval of lesser used and older materials will permit efficient and rapid retrieval of library materials.

Remodel College of Medicine West-Phase I-Planning - (\$414,000)

The Basic Medical Sciences departments which currently occupy space in the College of Medicine West have little or no opportunities for expansion in their present configuration. Remodeling of existing space constitutes the only feasible method of providing new laboratories and research space. Although researchers in the medical sciences departments are well-funded and highly motivated, they face a major deficiency of adequate modern facilities.

The heads of the Basic Medical Sciences departments have identified a number of important research goals which they hope to achieve during the next five years. Some of these goals involve developing research programs for which presently antiquated and obsolete laboratories are completely inadequate. For example, the Department of Biological Chemistry plans to develop data which help to explain how the primary nucleotide sequence can

signal the intricate phases of differentiation seen with embryonic organogenesis. Special facilities required to conduct the department's planned research are presently unavailable. If the Basic Medical Sciences departments remain unable to satisfy their own basic research requirements, then the College will face the risk of failing to attract new, young, and vigorous faculty.

To build the College of Medicine's Basic Medical Sciences departments and to strengthen its research efforts, remodeled and renovated facilities are required. The remodeling of the College of Medicine's East Building during the middle and late 1970's illustrates the long-standing recognition of the need to remodel the College of Medicine's research facilities. Since the required remodeling has been completed, the research productivity of the faculty and researchers who occupy the remodeled space has increased. In addition, the increase in the research productivity of the College has promoted not only the reputations of individual researchers but the University of Illinois, as well. Without remodeled research facilities, successful research could not have been possible.

The primary need for the College of Medicine West facility is for a major program of renovation, remodeling, and upgrading. The program must first involve a major planning effort where the building systems structure and appointments are examined by architectural and engineering experts and then a subsequent program of requirements is developed. Space remodeling should be considered as a second phase of the project - to follow upgrading of the building systems and envelope (walls, windows and roof).

The College of Medicine West Tower (CMW) is comprised of two buildings (908 & 909) built in 1925 and 1930, respectively. The buildings contain 229,100 gross and 124,117 net square feet of space and are located on the University of Illinois at Chicago's Health Sciences Center at Polk and Wolcott Streets. The buildings were constructed as academic and library facilities for the Colleges of Medicine and Pharmacy and were fully utilized in the Medicine and Pharmacy programs until the 1950's when a new College of Pharmacy Building was constructed.

The buildings are currently being used by the College of Medicine Administration, and by five departments of the College (Anatomy, Biological Chemistry, Pathology, Pharmacology, Physiology, and Biophysics) for faculty offices and instructional activities. The remodeled space will continue to

be used, although much more efficiently, by the same departments. The building systems now in place include radiant (steam) heat and constant-volume air circulation. With the exception of small, specific areas (i.e., lecture rooms and classrooms) which are served by fan-coil chiller units with chilled water from a central source, the buildings are without central air-conditioning. A number of large, noisy, and inefficient window air-conditioners, which are costly to operate, are now in place.

The building systems must be converted to a variable air volume central heating and cooling operation. New electrical circuitry must be provided as well as a new plastic pipe, treated water system. Furthermore, the existing manual elevators require code compliant automation. The initial phase of the upgrade will provide a mechanical service tower that will house support utilities at each floor in the building including heating and air-conditioning equipment, medical gas systems, water systems, and electrical power. Local floor distribution of the systems shall be accomplished as the individual floors are upgraded.

The present interior space configuration includes faculty and administrative offices, research laboratories, service rooms, and teaching facilities. The rooms and spaces are essentially as they were built and appointed 50-60 years ago. No major remodeling has ever been done in the CMW. What is needed initially, in addition to building systems upgrading, is for the building envelope to be upgraded. A second phase will upgrade the present interior space into new, modern academic facilities suitable for the research plans now under consideration.

HSC Campus Standby Electrical Distribution-Phase III - (\$1,190,000)

The proposed Campus Standby Electrical Distribution Project for the Health Sciences Center represents the third phase of a multiphased program to provide autonomous standby electrical power to health care and research laboratory facilities. Upon completion of the project, the University will be in compliance with State, local, and national requirements which govern standby electrical power for health care and research facilities. The distribution of standby electrical power in the event of a prolonged power outage of the local utility company will provide electrical service to the connected buildings.

The initial phase of the program will furnish and install a third 1100 KVA standby generator at the Central Refrigeration Plant of the Health Sciences Center. Phase 1 is scheduled for implementation in FY 1987.

The second phase of the project will install a new multicell high voltage cable duct between the existing generator facility located at the Central Refrigeration Building of the Health Sciences Center to the Clinical Sciences Building. This Phase 2 project will be funded by allocation of local funds.

Phase 3 of the project, requested herein, includes the installation of a new double ended switchgear to be located in the Clinical Sciences Building and to provide the cable interconnections to the existing standby facilities located in the Clinical Sciences Building, Clinical Sciences North, Illinois Surgical Institute, Campus Health Services, and the Neuropsychiatric Institute.

Phase 4, the final phase of this project, will be to add a fourth 1100 KVA emergency generator that will be dedicated to academic research activities. This project will be included in the capital request for FY 1989.

Remodel Pharmacy Building - (\$2,111,000)

Since the Pharmacy Building was constructed, there have been major changes in the programs of the College of Pharmacy. A new pharmacy curriculum, the Doctor of Pharmacy degree program, was approved for implementation in the Fall of 1984. The new doctorate curriculum is a six year program composed of 2 years pre-pharmacy and 4 years of professional education. Previously, the faculty of the College taught several basic science courses (e.g. physics, organic chemistry, histology, anatomy, etc.). In the new curriculum, these courses are a component of the pharmacy requirements and can be acquired at most undergraduate campuses (e.g. Chicago and Urbana). The undergraduate curriculum has undergone significant changes with much less emphasis on wet laboratory instruction and greater emphasis on the social, behavioral/administrative and biological sciences, and the professional practice of pharmacy. As a result of this major curricular change and the corresponding reduction in class size, there is no longer a need for the large laboratories designed in the early 1950's. Some of these laboratories should be modernized into smaller, more flexible laboratories and offices for computer applications and faculty

research. With the increased emphasis on high technology research among its faculty, there is a serious need to convert unneeded undergraduate laboratory space into areas where high technology research can be conducted by students and faculty.

Another high priority goal of the College is to increase the level of research funding from external sources, including pharmaceutical corporations and international organizations, such as the World Health Organization. Completion of this capital improvement project will also make the College more competitive in attracting research project money sponsored by the National Institute of Health, the National Cancer Institute, and the National Science Foundation.

Over the past several years, a significant amount of campus and College funds have been used for research renovation projects in the College of Pharmacy. In addition, funds have been provided to the College via both the Renovation for Excellence and the Build Illinois programs. Remodeling has occurred to support new or expanded programs in endorphin research, bioassay and tissue culture research, mass spectrometry research, and NMR research.

The College of Pharmacy faculty and administration have recently prepared a space plan for all College of Pharmacy space. This plan is comprised of a four-phase redevelopment and renovation program for this building.

- Phase 1 is comprised of the renovation of the building HVAC systems, the Pharmacy Practice Simulation Laboratory, and the Computer Applications and Robotics Laboratory, all approved for funding in FY 1986.

- Phase 2 of the plan, requested for FY 1988 and described herein, addresses the remodeling needs of the highest priority office and research laboratory areas.

- Phase 3, scheduled for FY 1989 will address the need for new flexible student laboratories and classroom space.

- Phase 4, scheduled for FY 1990 will address lecture room and office renovations in the basement and first floor.

The projects described below are a direct result of this study and have the highest programmatic priority. Four of the areas (Rooms 237, 304, 346, and 404) are large undergraduate laboratories which need to be remodeled

as faculty office and research space. Rooms 501-510 are graduate research laboratories which need to be modernized for conducting high technology research. Room 133, a former manufacture pharmacy area, is to be remodeled for offices and research laboratories for the Clinical Pharmacokinetics laboratory. Room 237 will be remodeled for the Department of Pharmacy Practice. Room 304 will be remodeled for the Program for Collaborative Research in the Pharmaceutical Sciences. Room 346 will be remodeled for the Department of Pharmacodynamics, and Room 404 will be remodeled for the Department of Medicinal Chemistry and Pharmacognosy. A total of 16,800 net assignable square feet is involved in this remodeling phase.

Upgrade Campus Fire Alarm System-Phase I - (\$794,000)

The existing building fire alarm system at UIC consists of various types of manufactured alarm systems. Many of the alarm systems within the buildings fail to comply with applicable regulations, codes, and ordinances.

The proposed project represents the initial phase of a multiphased program aimed at consolidating and upgrading the building alarm systems at UIC. The program's goal is to provide an upgraded state-of-the-art building alarm system for the campus. The upgrade will include the following: (1) an installation of a state-of-the-art central monitoring station designed to accommodate the fire reporting systems located at all UIC buildings (the monitoring unit will be located at the main Police and Watch Station located in the Services building), (2) the upgrading of the internal fire alarm reporting systems in University Hall, the Main Library (east), the Clinical Sciences Building, and the College of Medicine East Tower to meet all codes and local fire ordinances, and (3) to provide new interconnecting cable to all campus buildings connected to the new monitoring station.

College of Business Administration and Continuing Education Building - Planning - (\$850,000)

Programming, design, and construction of a new building is proposed to house the College of Business Administration and a Continuing Education Center for the Chicago Campus. The College of Business Administration (CBA) at the University of Illinois at Chicago is adopting significant research and graduate training initiatives to expand the potential of the

College as a productive participant in the revitalization and growth of the Illinois economy. Specifically, the CBA is developing organized research programs in the areas of commodities and futures trading and of international business and trade. These programs will encompass theoretical and applied approaches to critical issues and problems with particular emphasis on those factors which influence the economic and social fabric of the State of Illinois. In addition, these expanded research programs will have a direct impact upon the instructional programs within the College at both the advanced undergraduate and graduate levels. Graduate students will benefit from practical as well as enhanced instruction through participation in the research projects. Special efforts will also be made to disseminate the knowledge developed in these programs to the broader public through publications, lectures, seminars, and workshops, as well as direct communication with government organizations, private firms, groups, and individuals through executive training programs.

The College will build on a strong instructional foundation already established among the 90 FTE faculty and will augment this faculty strength with appointments of nationally recognized scholars with significant records of accomplishment in the two areas of research. The end result will be a faculty with top-rank instructional and research strengths.

Continuing Education programs of the University of Illinois at Chicago have special meaning of service to the six million people in the Chicago metropolitan area, and the broader reaches of the health sciences programs in Peoria and Rockford areas. Opportunities for new initiatives in degree and non-degree, credit and non-credit programs are evolving with many exciting possibilities for the future.

Continuing professional education in the health sciences is well established in the Chicago, Peoria, and Rockford areas, and is expected to increase in scope with new developments in the sciences and technologies, professional recertification requirements, interdisciplinary training, national and international programs, and dissemination of knowledge obtained from research. Over the past year, a total of 86 programs were provided with a combined attendance of 6,275 registrants (includes both credit and non-credit students).

Continuing professional education in business, arts and sciences, and engineering is equally promising. In the past year, a total of 325 courses

were provided with a combined attendance of 5,500 persons. With the development of new initiatives in international commerce, commodities and futures research, molecular biology, supercomputer applications, technology park, the high technology corridor, and other University and private developments, the prospects for educational offerings are significant.

Most of the continuing education programs offered by the campus are conducted in rented facilities in Chicago, the suburbs, and other metropolitan areas. Programs conducted on campus are few due to the need to compete for meeting space with ongoing classes and other student and staff programs. A self-contained continuing education center with offices, meeting rooms, food service facilities, and guest rooms will provide a base of operation for continuing education programming services and facilities which will establish the campus as the focal point for its continuing education activities.

The College of Business Administration will require approximately 60,000 net assignable square feet of offices, classrooms, and special facilities to meet its current and projected program needs. Continuing Education will require about 40,000 net assignable square feet of offices, meeting rooms, and food service and guest rooms facilities. This combined total of 100,000 net assignable square feet converts to approximately 167,000 gross square feet of building space. A cost of \$20 million is estimated to design, construct, and furnish the complete facility.

Funds are requested at this time to initiate the programming and design process. The College of Business Administration is optimistic about its prospects of attracting private contributions for building construction. The continuing education facilities are supportable in part by private donations and in part by revenue bonds. A financial plan for this combined-use facility will be developed as part of the programming and design process.

FY 1988 CAPITAL PROJECTS
URBANA-CHAMPAIGN CAMPUS

Life Sciences Research Laboratory Planning - (\$1,800,000)

Scientists are now able to isolate, study and move biological genetic information. The very first industrial application of these activities involved the isolation of the genetic information, or gene, for human insulin. This breakthrough came at a critical time, because trends showed that the number of people with diabetes in the population was increasing faster than the consumption and supply of porcine and bovine pancreas from which the life saving drug insulin is isolated. Therefore, the need for a new source of insulin was essential.

It once took 500,000 sheep to provide less than 1 milligram (1/32 of an ounce) of the growth hormone somatostatin. Now it is possible to produce twice that amount in under 24 hours, in less than the space occupied by a one half-gallon container of milk.

Likewise, the clotting factor required by hemophiliacs and the bovine growth hormone to stimulate weight gain in cattle are presently under genetic development. Overall, there are presently over two dozen products in clinical trials which are the product of recombinant DNA technology.

Other major developments are also underway. One of the most notable of these, and one which has major implications for global food production, involves the ability to genetically engineer important cash crops or to use the products of crop production in new and imaginative ways.

Right now, the very first experiments involving the introduction of foreign genetic information into humans are being planned. Retroviruses are a class of viruses which cause cancer in humans and other animals. These viruses have been disarmed and will not cause cancer; however, their infectious properties remain intact. The object will be to correct specific genetic defects not in the germ cell line and, therefore, not in an inheritable fashion, but in the somatic line. Examples of diseases that respond to such techniques are Lesch-Nyhan disease, adenosine deaminase (bubble baby syndrome), Tay-Sachs (hypercholesterolemia) etc. Such procedures will be implemented with human subjects within a year to two, perhaps even before the end of 1986. Other well-publicized examples of the use of this technology involve the release of genetically engineered organisms into the environment in order to detoxify chemical wastes, to digest oil spills, and

to prevent ice crystal formation when crops are exposed to temperatures slightly below the freezing point.

Aside from the direct health-related implications of genetics research, recent scientific discoveries are extremely important to the economics of the State of Illinois. Estimates currently available suggest that by the turn of the next century, direct industrial sales emanating from such work will be in the neighborhood of \$64 billion. There are currently over 300 new companies engaged in biotechnological research. Established companies have invested heavily in this new area. DuPont has just dedicated a new \$85 million biological research laboratory and, of its several hundred million dollar annual budget for research, biological research is the fastest growing area. Monsanto dedicated a new \$150 million biological research facility and is spending over \$400 million a year on research, over half of which is in life sciences. In addition Upjohn, Searle, Eli Lilly, Abbott, Pittsburgh Plate Glass, Kodak, W. R. Grace & Company, and Corning Glass, are also placing heavy emphasis on biological research. At Princeton, Michigan, Michigan State, Indiana, Maryland, Rutgers, and Berkeley, to mention only a few, new basic life sciences research facilities are currently underway. Based upon the rapid advancement of basic life sciences research, it would appear that over \$64 billion in annual industrial sales related to new biotechnological discoveries may be generated by the year 2000.

The companies mentioned previously are coming to UIUC and other top institutions in the country to hire young scientists and support staff to work in these new areas of research. The University cannot compete with industry for these people on a purely monetary basis, since industrial salaries are typically far above those of public higher education. Further, industry has proven it can meet researchers' laboratory needs and it is capable of providing ongoing research support for new investigators. The University struggles in each instance to recruit a new faculty member and establish his or her research laboratory. Its facilities are outmoded and shop-worn and do not readily adapt to new research activities. By and large, the requisite space is qualitatively and quantitatively insufficient to support the required new research initiatives.

Buildings which were planned and constructed just 30 years ago were designed prior to the current biological revolution. The use of

radioactivity for biological experiments, the growth of animal and plant viruses, tissue culture facilities, large scale fermentation facilities, sterile rooms, transfer rooms, etc., were virtually unknown 30 years ago and represent an ongoing need in today's research environment. Life sciences research, particularly in the areas of molecular and cell biology, genetics, virology, biophysics, and microbiology is highly technique oriented, relying on the use of the most sophisticated equipment.

For the next several decades, it is anticipated that basic life sciences research will profoundly effect numerous other disciplines important to the campus. To be competitive, proper facilities must be available in order to attract and to keep the best faculty and students such that the full impact of this research will remain at this campus and within the State of Illinois.

The School of Life Sciences has experienced a severe space shortage for the past decade, and the shortage currently approximates 80,000 assignable square feet (ASF). This deficit will be decreased to 75,000 ASF in FY 1987 with the completion of the Burrill Hall Addition Annex. However, the space problems of the School of Life Sciences extend far beyond the existing and projected space deficiency. Much of the space currently assigned to the School is outdated and is totally inappropriate for modern research and teaching.

The proposed solution to the space problem includes constructing a new Life Sciences Research Laboratory of 140,000 ASF. Planning funds (\$1.8 million) are being requested for FY 1988 to prepare for the construction of the first phase of the building in FY 1989. This initial phase would include 80,000 ASF and would cost approximately \$31.0 million. The second phase of the facility is tentatively scheduled for construction in FY 1995 for 60,000 ASF at an estimated cost (in current dollars) of \$19 million.

The Life Sciences Research Laboratory, Phase I will include the following types of space:

<u>Room Type</u>	<u>ASF in Proposed Building</u>
Office	20,500
Non-Class Laboratory	55,000
Animal Quarters	1,500
Lounge	1,000
Storage	<u>2,000</u>
TOTAL	80,000

Utility Infrastructure Upgrade - (\$3,689,000)

The completion of numerous remodeling projects, the recent addition of major new buildings on the campus, and the addition of new equipment with increased power requirements have combined to strain the limits of the existing electrical, chilled water, and steam distribution systems of the Urbana-Champaign campus. To support proposed facility and program growth, it is essential that the second phase of the campus infrastructure upgrading be completed as recommended by the consultants recently employed by the University.

The electrical portion of this request involves completion of the Illinois Power Company feeder from Windsor Road to the new Agriculture campus load center near the Plant Sciences Greenhouse complex now under construction. This represents the second phase of the two-phase project to increase the electrical capacity in the south campus area. This portion of the project includes a distribution/load center to provide electrical power for the Animal and Dairy Sciences Laboratory Addition and the federally funded Biotechnology Facility. In addition, it will provide the south campus with the electrical capacity to relieve existing overload problems at seven load centers by redistributing electrical loads. Completion of this electrical upgrading project will allow the Urbana-Champaign campus to redistribute loads throughout the campus electrical infrastructure, permitting the University to accommodate increasing electrical loads created by increased computer-oriented instructional usage, the remodeling of older campus facilities, and the addition of major pieces of equipment throughout the campus. This portion of the work is estimated to cost \$1,737,000. Funds in the amount of \$729,000 were approved in FY 1987 for the first phase of the south campus electrical improvement.

The steam distribution portion of this request involves the following components:

1. Extend a 12" utility pressure steam line from Harker Hall to the Engineering Research Laboratory to provide additional steam capacity for the north campus. This improvement will ensure that the Digital Computer Laboratory Addition, Beckman Center and the Microelectronics Center can be properly served. The estimated cost of this work is \$400,000.
2. The installation of a new 16" low pressure steam line and 4" condensate return line on the south portion of campus using the existing Peabody Drive tunnel from the Intramural-Physical

Education Building to the Stock Pavilion. When constructed, this project will provide the necessary steam and condensate capacity for all anticipated improvements and expansion to the Agriculture campus, including the proposed Animal Sciences Laboratory Addition and the federally funded Biotechnology facility. The construction portion of this work is estimated to be \$1,192,000. Planning funds in the amount of \$160,000 were approved for this project in FY 1987.

The completion of this steam distribution upgrading project will increase the capacity of the steam infrastructure, thereby preventing erratic steam pressure and temperature fluctuations in new buildings located in areas of the campus near the ends of the steam distribution system.

A third portion of this utility infrastructure request involves the construction of a cross-connection between two existing chilled water systems. The capacity of the Main Library air-conditioning center has been fully committed and it soon will be unable to meet the air-conditioning demands it could otherwise economically serve. In contrast, the Student Staff air-conditioning center currently has some unused capacity but its lines do not serve the areas of new load requirements. To gain maximum system flexibility and to allow for better load distribution, a cross-connection line of both supply and return piping along Matthews Avenue from Illinois Street south to Nevada Street is needed. Such an interconnect line would allow for shifting of loads when mechanical failures might occur, thus making both systems more reliable as well as more efficient and economical in picking up additional air-conditioning loads. This proposed interconnection line is estimated to cost \$360,000, with the necessary design fees being provided in FY 1987 by the University's Auxiliary Services fund. This funding distribution is appropriate, as various auxiliary units currently utilize approximately 10% of these two systems' capacities.

In summary, this request is a critical part of the needed upgrading of the utility infrastructure of the Urbana-Champaign campus. If the University of Illinois at Urbana-Champaign is to retain and to expand its national leadership role in high technology and biotechnology research, this investment in utility service is necessary. The proposed improvements will clearly have a long-term beneficial effect upon the expansion of the

technical programs of the Colleges of Engineering and Agriculture which will benefit the economy of the area and the State of Illinois.

Campus Land Acquisition - (\$1,500,000)

The campus has initiated an update of its long range land use and needs plan. The original plan was last revised in the early 1970's, and preliminary review of the current update has confirmed that many premises of the 1970's plan remain accurate and important. Certain issues, such as research parks, athletic facilities, and agricultural needs have changed somewhat, but the general overall acquisition boundaries of the earlier plan are still meaningful. It is apparent, however, that few actual land acquisitions for satisfying that plan have been accomplished. As a result, a large number of privately owned properties which ultimately will be needed by the Urbana-Champaign campus have not yet been acquired.

It is extremely important that a multi-year Land Acquisition Plan be immediately implemented for the Urbana-Champaign campus. Building sites need to be acquired for projects now proposed for the College of Engineering (Beckman Institute), School of Life Sciences (Life Sciences Research Laboratory), College of Communications, and others. Although some land acquisition funds are included in the Beckman Institute project budget, these funds are only sufficient to acquire the land specifically needed for accommodating the Beckman Institute. Other land adjacent to the planned complex are still privately owned, thus eliminating or severely restricting future growth or the placement of support services for the Institute. The Sasaki Report, an Urbana-Champaign long range planning model, calls for considerable land acquisition east of the Beckman Institute to adequately accommodate the future growth of the Institute and the College of Engineering. Retaining a compact, cohesive campus is important for an overall economical campus operation to reduce wasted effort to faculty, staff, and students, as well as the physical plant operation.

A second reason for immediate action involves availability and acquisition costs of many locations. Of the properties included on the University's long-range needs list, few have been materially improved in the past fifteen years. This "status quo" condition is about to change, however, since the existing buildings on most of the locations in

consideration have outlived their current usefulness. Replacing existing structures with new student apartment complexes is becoming quite attractive to current owners and private investors. Upgrading a given location immediately increases the value of that location approximately ten-fold and can make the acquisition and clearing of a site for University use very costly in the long term.

The FY 1988 land acquisition request for \$1,500,000 involves the acquisition of 18 critical locations that appear to be prime targets for commercial/apartment development. If these properties are not acquired by the University and commercial improvements are allowed to proceed, the acquisition cost of these 18 properties will increase substantially, and the use of adjacent University-owned land will become quite limited. Most of the properties are located in areas of the existing campus where current College of Engineering or School of Life Science improvements are planned.

Environmental Sciences Building Remodeling - (\$4,250,000)

Since the completion of the new Veterinary Medicine Basic Sciences Building, the former veterinary education facility has remained largely unoccupied. After careful study, it has been determined that with appropriate remodeling, this building will make an excellent facility for the Department of Geology and the Institute for Environmental Studies. Both of these units are currently accommodated in substandard space, much of which is not suitable for modern research or instruction.

The old Veterinary Medicine Building (49,445 ASF) was constructed in 1952, and although it is structurally sound, the building has no central air-conditioning or ventilation systems. The building is equipped with only five fume hoods and currently does not meet building code requirements. The proposed occupants will require approximately sixteen fume hoods, and major heating, ventilation and air-conditioning improvements for the building will be necessitated.

An architectural firm has developed schematic plans for the remodeled building. The architect's plan includes joining the Veterinary Medicine Annex to the main structure, adding approximately 2,500 ASF to the building, and making the Annex a functionally usable part of the main structure. The Institute for Environmental Studies will occupy the third floor of the

building (15,460 ASF), and the remainder of the facility (36,730 ASF) will be devoted to the Department of Geology and the Geology Library.

The first phase of the project was approved in FY 1986 in the amount of \$3.5 million. The first phase renovation involves the installation and/or replacement of major mechanical systems in addition to finishing the third floor area for the Institute of Environmental Studies. This current request, the final phase of the project, involves completing the remaining three floors of the building for the Department of Geology. This phase is of vital significance because it will vacate approximately 30,000 ASF in the center of campus (Natural History Building) which could be used to help relieve the dry laboratory and office related space shortages experienced by the School of Chemical Sciences as well as solve an immediate need to provide an additional instructional computer laboratory.

This FY 1988 request also has a related movable equipment request for the Institute of Environmental Studies. The request involves the purchase of relatively expensive equipment items needed to fully utilize the remodeled space on the third floor of the Environmental Sciences building for the Institute of Environmental Studies. The equipment to be purchased will include items such as an ultra-centrifuge, plant growth chambers, laminar flow hoods, a multi-channel analyzer, a liquid scintillation system, and animal caging. This equipment supports the remodeling project approved in FY 1986.

Noyes Laboratory Remodeling Planning - (\$200,000)

Noyes Laboratory was built in two major phases which date back to 1902 and 1917 respectively. Since the building was constructed, the far-reaching advances in chemistry and the nature of the facilities required have rendered Noyes Laboratory functionally obsolete. There are major deficiencies in the building's utilities and ventilation systems which result in the inability to control temperature and humidity adequately. The sizes and shapes of the rooms and their furnishings do not relate to their functions, and there are too few fume hoods. These deficiencies not only make it very difficult to conduct a modern program of teaching and research in chemistry, but the environment is unattractive and the safety of the space is questionable. Although every program in Noyes Laboratory is

affected in some way, several specific examples follow to illustrate some of the limitations that are faced.

One of the current research programs in inorganic chemistry is heavily involved in fossil fuel desulfurization. (This program is relevant to issues such as coal beneficiation and, in the longer term, acid rain.) By necessity, much of this research involves work with the malodorous organosulfur compounds found in fossil fuels. Unfortunately, the hood, ventilation, and plumbing systems in Noyes Lab severely limit this work because sulfurous fumes vented in their hoods re-enter rooms located above, and dilute wastes flushed down the drain produce strong odors in neighboring laboratories. Progress is severely restricted because this work must be carried out at night when the area is largely unoccupied. Wholesale improvements in the hood, ventilation, and plumbing systems would be required in order to further this research.

Lasers are fast becoming an important tool in the study of molecular structure and dynamics. Several research groups in physical chemistry use lasers and the Department has established a central laser facility for general use. For lack of another location, the central lab was set up in Noyes Laboratory, but building deficiencies greatly impair its usefulness. Proper lay-out of experiments is hampered by the size and shape of the laboratory; building vibrations interfere with the alignment of the laser beams; poor temperature control causes changes in calibrations; and dust in the air scatters the laser light making it necessary to work with reduced laser power, thus lowering the sensitivities of the experiments. Individuals working with lasers in their own research labs in Noyes Laboratory have similar difficulties. Work goes on in these laboratories, but it is clearly very inefficient and relatively crude compared to what could be done in modern facilities.

The above two examples illustrate a broad range of problems that the conditions in Noyes Laboratory present. In these cases, the faculty and students involved try to work around the difficulties so that at least some research progress can be made. Similar problems plague the teaching laboratories in the building. Therefore, it has been necessary to reduce the number and type of experiments being conducted and to eliminate some experiments altogether. This, of course, negatively affects the educational experience of the students.

There are a number of important activities that cannot be conducted at all in Noyes Laboratory at this time. The inadequate hood and ventilation systems clearly make it risky to do any work involving highly toxic gases, especially if they are not easily detectable by their odor. The severe dust and general cleanliness problem makes it impossible to do certain work in the areas of tract analysis, surface studies, and radiopharmaceuticals. The absence of isolation facilities imposes significant restrictions on genetic engineering experiments that the biophysical chemists would like to pursue.

The School of Chemical Sciences at UIUC has long been one of the world's major sources of well-trained, highly-qualified chemistry graduates. That role is now jeopardized by the negative impact that Noyes Laboratory has on the Department's ability to attract the best faculty and students.

Because the School of Chemical Sciences currently has a space deficiency of 109,000 ASF, it is impossible to remodel large sections of its space at any one time, for the School has no surge space for those scientists whose space is being remodeled. This means that remodeling in Noyes Laboratory must be phased over a number of years.

Planning funds (\$200,000) are being requested for FY 1988 to solve two of the major building deficiencies; installation of adequate fume hoods and remodeling of Room 10 (5,500 ASF) into a chemical instrumentation laboratory. Planning will also be done for the development of modern chemistry laboratories (500 ASF) in Rooms 461 and 462. Funds for the construction of these projects will be included in UIUC's FY 1989 capital request.

English Building Remodeling - (\$3,360,000)

In 1975, an architect was hired and a masterplan was developed to convert the English Building to a modern and functional academic building. The plan called for the remodeling of the English Building in four phases at a total cost of \$9.3 million. When completed, the Department of English would have new facilities within the original exterior walls at a cost of 40-50% less than the cost of a new facility of the same size.

In total, 61,940 ASF (118,140 GSF) would undergo remodeling. The entire program involved the addition of a new heating and air-conditioning system for the building, the construction of a new fire-rated stair, the

enclosure of two existing stairs, the installation of an elevator, the construction of additional rest rooms and new plumbing, the installation of new structural flooring in the west half of the building and finally the typical partitioning, lighting, and ceiling improvements associated with newly remodeled office and classroom space. To date, only the first two phases of the remodeling have been completed.

The third phase of the work, which is currently being proposed, involves the renovation of the northwest and west center sections of the building on the first, second, and third floors. The remodeling will involve the installation of an elevator and the construction of new floors in the areas to be remodeled. A total of 22,500 ASF of space will be converted into office space and classrooms.

There will be an equipment request in FY 1989 to support this remodeling request.

WILL Radio-TV Building - Planning - (\$10,350,000)

The University's television and radio stations provide a valuable public service to the people of the State of Illinois, at a cost of less than a half-cent per listener-hour. For many people in Illinois, their only connection to the University is through these stations and their excellent educational programming.

The existing space occupied by the television station, a former bakery and rooming house, is badly deteriorated and requires continuing maintenance. One exterior wall of the bakery building was recently rebuilt to prevent water leakage on expensive equipment. The roof is under constant repair, but has deteriorated to the point that the repairs will last only temporarily. The dust level in the bakery building is unacceptably high but cannot be reduced without extensive repairs to plastered walls and the building's mechanical system. This dust penetrates expensive videotape machines and causes enormous damage and expense on a continuing basis. Videotape operation costs are approximately five times the industry average despite extensive air filtration and dust containment measures undertaken by the campus. Even existing office space at the Television Building is inadequate.

To address the problem of deteriorated space and to consolidate radio and television services in a single location, construction of a new

building is proposed. The building will be programmed to contain the following types and amounts of space:

<u>Room Type</u>	<u>ASF in Proposed Building</u>
Instructional Lab.	2,350
Office	15,300
Audiovisual, Radio TV	<u>14,700</u>
TOTAL	32,350

Upon completion of this building 10,600 NASF of space will be vacated and razed in the existing WILL Television complex of buildings. The location of that land will be valuable in the long-range development of the North Campus Master Plan. Additionally, 4,757 NASF in Gregory Hall and 3,517 NASF in the Studio Addition of the existing Television Building will become available for units requiring additional space.

Federal Research Facility Site Development - (\$1,275,000)

Planning funds for a biotechnology research center were appropriated to the U.S. Department of Agriculture for Federal FY 1986. Faculty from the departments of Animal Science, Agronomy, Plant Pathology, Horticulture, and Food Science, as well as the College of Veterinary Medicine and the School of Life Sciences, will comprise the research staff in the proposed biotechnology facility. The site location of the facility is extremely important because the staff must maintain a strong working relationship with their home departments as they pursue research initiatives in the Biotechnology Center.

The first phase of this project was approved in FY 1987 when funds were provided to relocate the Campus Car Pool. The FY 1988 request involves relocating Goodwin Avenue (\$800,000) and clearing the proposed site of existing structures (\$400,000) to make it ready to begin construction of the Federal Biotechnology Center.

The proposed location of the Biotechnology Center, and the construction of an addition to the Animal Sciences Laboratory, require discontinuing the use of Goodwin Avenue as a thoroughfare. Traffic will be redirected to Dorner Drive, an existing one-way, two-lane street, which

borders the east side of the Greenhouse Complex site. Dorner Drive will be expanded to four lanes and it will become the relocated Goodwin Avenue. In addition to improving vehicular traffic flow through the southeast section of the central campus, the project will enhance pedestrian safety for students walking from the Florida-Pennsylvania Avenue dormitory complex to classrooms in the Quadrangle. This request is essential in order to avoid creating a serious traffic and pedestrian safety problem during the construction of the Biotechnology Facility.

Also attached to this project is an equipment request of \$75,000 for modernizing the operation of the campus car pool. The equipment request involves the computerization of maintenance and gas usage records, additional electronic diagnostic equipment to maintain the electronically sophisticated vehicles the University is acquiring, and new office equipment to improve office functions and appearance.

New Commerce Building - Planning - (\$1,500,000)

This project will solve the need for additional space for the College of Commerce as well as provide space to house the Commerce Library. The additional, improved office space provided by this project will allow the College to hire additional permanent faculty to offset the excessive number of teaching assistants currently employed. The library space provided by this project will allow the Commerce Library to be centrally located to better serve the College's faculty, staff, and students.

This project has gained a greater urgency during the past few years as a result of the increase in the number of students in the area of Commerce, primarily students in Business Administration. In order to meet the teaching demand imposed by the increase in students, the College has relied heavily on teaching assistants for this task. In order to satisfy the various accrediting agencies, the College must now hire additional permanent faculty to restore the student/staff ratio to an acceptable level.

This project is programmed to contain the following types and amounts of space:

<u>Room Type</u>	<u>NASF in Proposed Building</u>
Classroom	14,500
Office	29,300
Class Laboratory	8,000
Non-Class Laboratory	6,500
Storage	1,000
Lounge	1,500
Stack	15,000
Reading	15,000
Service and Office	2,000
Office (Information Retrieval)	<u>2,000</u>
TOTAL	94,800

Upon completion of this project, approximately 33,500 NASF in David Kinley Hall (23,000 NASF vacated by the College of Commerce and 10,500 NASF of classroom space) will be used to consolidate the activities and the Library of the departments of Urban and Regional Planning and Landscape Architecture into one location. The vacated space in David Kinley Hall will also be used to provide new quarters for the Dean of the College of Fine and Applied Arts, a new location for the Graduate School of Library and Information Science's Library, and the Library Science publication unit presently located in the Armory. In addition to the space vacated in David Kinley Hall, the College of Commerce will vacate 5,180 NASF in the Armory which will be reassigned to solve the space requirements of other units. The library space provided by this project will vacate 9,583 NASF in the Main Library to provide general relief to the University Library's overall space shortage.

Furthermore, these moves into David Kinley Hall will trigger a number of other important space reassignments. The departments of Urban and Regional Planning and Landscape Architecture will vacate approximately 23,000 NASF in nine locations, of which approximately 7,000 NASF will be used to replace low quality space (which will be razed), and the remaining 16,000 NASF will be reassigned to solve the space requirements of other units. The relocation of the Graduate School of Library and Information Science's Library from the Main Library to David Kinley Hall will free 2,969 NASF in the Main Library to provide general relief for the University Library's overall space shortage. The relocation of the publications unit of the Graduate School of Library and Information Science from the Armory to David Kinley Hall will place the unit in space adjacent to the parent School's space and will free 793 NASF in the Armory for reassignment to

other units. The relocation of the Urban Planning and Landscape Architecture Library from Mumford Hall to David Kinley Hall will release 1,178 NASF in Mumford Hall for reassignment to the College of Agriculture (for the Agriculture Library). The relocation of the Dean of the College of Fine and Applied Arts from the Architecture Building to David Kinley Hall will vacate 2,183 NASF in the Architecture Building for reassignment to other units.

In summary, this project will allow a number of space realignments to occur which will correct existing space deficiencies and will consolidate several related units. The net impact is that the Urbana-Champaign campus will gain approximately 36,000 NASF in instructional space and 34,000 NASF in library space. The recently completed Library Sixth Stack Addition will not solve all of the library stack problems and it is not intended to meet library service or reading space problems. The relocation of the Commerce Library will provide space that can be used to expand library service and reading space in the Main Library.

The total planning cost, including the initial steps in construction document development, is estimated to be \$1,500,000. It is anticipated that funds for constructing this building will be included in the FY 1989 Capital Budget Request.

Veterinary Medicine Basic Sciences Building Remodeling Planning - (\$250,000)

This request for planning funds is to complete the final area of unfinished space in the Veterinary Medicine Basic Sciences Building. The animal rooms located on the first floor will be completed with funds received in FY 1984 and FY 1985. This request involves completing approximately 15,800 square feet on the second and third floors of the building to provide the required office and research space for the College of Veterinary Medicine.

The space on the second floor will be occupied by the Department of Veterinary Pathobiology. The Division of Pathology and the Division of Epidemiology must be provided additional offices and laboratories to accommodate existing faculty.

Additionally, the Department has recruited eight new faculty during the past four years. The Department's programs are expanding, and

additional pressure has been created for expansion of laboratory and office space to accommodate program growth. The Department has recently recruited a new parasitologist and two faculty members in the areas of molecular virology and bacteriology. These faculty are forced to share laboratories that are currently dedicated to other programs. One of these programs, in hematropic diseases of cattle and malaria in man, has been awarded a \$2 million grant from the U.S. Agency for International Development. The Department is also expanding its programs in biotechnology and wishes to recruit additional faculty in this area, but, must first complete the unfinished space to do so.

In summary, approximately one-half of the additional laboratory and office space will be used to support expansion of the biotechnology and molecular biology programs. One-fourth will be used to accommodate expansion of pathology and epidemiology programs, and one-fourth for molecular parasitology and the expansion of existing programs as the result of significant additions in extramural funds.

The third floor space will be occupied by the Department of Veterinary Biosciences. The Department has made a commitment to being the number one program in pharmacology/toxicology among veterinary colleges in North America. Although, it is now arguably in first place, it is imperative that the Department continue to build on its present success to maintain this recognition.

The Animal Poison Control Center has become a national resource and is recognized as such by the USDA. The anticipated favorable consideration of a new program proposal for Environmental Toxicology will result in two additional joint appointments between this department and the Institute of Environmental Studies. Therefore, it is expected that approximately one-third of the space will be devoted to laboratories and offices to accommodate the increase in toxicology research and graduate training. There will also be a need for work space for staff involved in the development and maintenance of the data base for the Animal Toxicology Hotline within the Animal Poison Control Center.

A second major consumer of space on the third floor will be faculty working in biotechnology, especially in research on culture and genetic manipulation of embryos. Because of these needs and increasing usage of various cell culture systems in other departmental programs, a modern

facility for tissue and embryo culture will be included. Other laboratories will be designed to accommodate faculty working in molecular biology as it relates to cellular or subcellular actions and mechanisms of hormones, drugs, and toxins. In this manner, strong basic research support will be provided to three program areas already nationally recognized; reproductive biology, pharmacology, and toxicology.

The third area for expansion is in bioengineering/morphology research activities. Interdisciplinary efforts are already in place for studies on bone growth, biomaterials, and biomechanics. These programs are now attracting graduate students as well as visiting scientists and post-doctoral trainees.

The total planning cost, including construction document development, is estimated to be \$250,000. It is anticipated that funds for completing the second and third floors will be requested in FY 1989.

Campus Landscape Improvements - (\$150,000)

This is a category of site improvements intended to improve the general appearance of the Urbana-Champaign campus. Specifically, the FY 1988 request is for landscape improvements for areas of the south campus and for planning improvements to the north campus in FY 1989.

The improvements planned for the south campus for FY 1988 involve the reforestation of Illini Grove to begin a gradual replacement of the trees. Although Illini Grove is still an attractive area, in ten years many species will have reached the end of their lives and a major replacement project will be required. By using a phased approach, the trees will be replaced gradually avoiding an unattractive transition period when Illini Grove would look like a nursery instead of the attractive recreation area that it has been for the past forty years. The estimated cost of the first phase of this work is \$50,000.

With the completion of the Beckman Institute, the Advanced Microelectronics Center, and the Digital Computer Laboratory Addition, it will be necessary to landscape the north campus area bounded by the Beckman Institute on the north, Wright Street on the west, Springfield Avenue on the south, and Mathews Avenue on the east. This project will develop the mall and the six block area around the Beckman Institute. After the utility installations and construction work, the existing Illinois Field

area will require substantial work. The FY 1989 request will include sidewalk construction, tree and shrub plantings, and additional improvements such as pedestrian gateways, entrance plazas, and grounds lighting for pedestrian safety. The FY 1989 request is intended to be a comprehensive project to complete the grounds surrounding the above three buildings in a manner in keeping with the quality of those buildings. The FY 1988 request is for \$100,000 to plan this project.

Sanitary Sewer System Upgrade - Planning - (\$90,000)

The sanitary sewer located under Mathews Avenue is reaching its maximum capacity. In FY 1985, the Urbana campus had to make changes to the Medical Sciences Building sewage system to avoid occasional sewage backup problems because of the overloading problem. With the construction of the Plant Sciences Greenhouses, Animal Sciences Laboratory, and the Federal Biotechnology Laboratory, it is becoming imperative that additional capacity be provided to the southeast campus buildings served by the Mathews Avenue sanitary sewer. An engineer must be employed to determine the best route for the proposed sewer and to determine which buildings should be connected to the new system. For FY 1988, a \$90,000 planning appropriation will permit the design of an estimated \$810,000 system to be constructed in FY 1989.

Art, Painting, and Pottery Laboratory - (\$662,000)

The School of Art and Design programs at UIUC are spread across eighteen separate buildings on the campus. The need for consolidation is evident and a site has been identified on Griffith Drive in Champaign for the construction of a related facility--the Art, Painting, and Pottery Laboratory.

The proposed facility location will permit easy access to students and faculty in the School and will accommodate 15 graduate painting students, 100 pottery students, and related resident faculty.

A metal building of 12,000 GSF that yields 10,000 ASF will have natural and artificial light, good ventilation, and will serve the sophisticated needs of the students and faculty in these programs. Planning funds will not be required because the basic structure will be pre-

engineered and the mechanical equipment will be simple enough that the building can be planned and bid in six months.

The importance of this project extends well beyond the School of Art and Design. The School will release 3,800 ASF in the Ceramic Engineering Kiln Lab to the College of Engineering which plans to use the space to accommodate new faculty and staff in its expanding Metallurgy, Ceramics, and Polymers Program. Educational and research programming planned for the future in this area of engineering includes research projects sponsored jointly by governmental and industrial affiliates. The rapidly growing areas of materials processing, electronic materials, and polymer/metal/ceramic composites are receiving national attention, and the rate of increase in the funding of research in these areas has exceeded the ability of the College of Engineering to provide laboratory space to accommodate the growth.

The total project cost is estimated at \$707,000 of which \$662,000 is requested for construction in FY 1988. A future equipment need of \$45,000 will be requested in the Capital Budget for FY 1989.

Nuclear Physics Laboratory Addition - (\$350,000)

The Nuclear Physics Laboratory requires a substantial expansion of its office, laboratory, and shop facilities. The need for this expansion has existed for some time and is beginning to reach critical proportions. The laboratory staff has grown, its activities have broadened, and the manner in which it must do research has changed. Its external funding has increased tenfold in the last ten years and is now approximately \$4.2 million per year. Its program received excellent reviews from a National Science Foundation panel, which visited the facility in April 1985. The same panel commented that the present physical plant was strained to the limit and more space was required. There is simply no place left for new initiatives in any of the activities of the laboratory. Projections of the activities of the laboratory through 1990 show that conversion of the main building to a three story structure would satisfy its principal needs.

The research of the laboratory is experimental nuclear physics. This discipline requires a particle accelerator that allows physicists to investigate various atomic nuclei by producing an electronic image of them. Nuclear physics requires an organization of highly trained and specialized

technicians, engineers, and physicists. As the research has advanced, the organization and its activities have grown. At one time, experimental data were recorded on photographic film; now, the laboratory uses numerous computers. At one time, the particle accelerator served a single experiment; the laboratory currently has five independent experimental areas. Formerly, a single experiment would occupy the laboratory for months; there are now more than ten independent projects. In the past, the accelerator required only normal maintenance. Now, development of an entirely new accelerator is taking place. Virtually every quantitative measure--staff size, capital equipment expenditure, operating budget--shows growth and increased activities by factors of 100% to 400%. Over the same period of time, permanent space has increased only 23%.

As the accelerator evolves from a local to a national facility, it is projected that approximately 15 researchers at any one time would be on site preparing, executing, and analyzing experiments. These researchers represent a 40% increase in the research staff and will require a corresponding increase in the operations and support staff. There is no clearer proof of a commitment to the national and international use of our facility than space specifically allocated to outside users. As a national facility, the laboratory would command an operating budget of twice the size (about \$5 million per annum) than could be justified by only a local facility. It is sound management to provide an adequate physical plant for this operation.

The addition is programmed to contain the following types and amounts of space:

<u>Room Type</u>	<u>ASF in Proposed Addition</u>
Office	6,500
Non-Class Laboratory	<u>8,500</u>
TOTAL	15,000

Mechanical Engineering Building Remodeling - (\$2,950,000)

In recent years the College of Engineering has been strengthening and expanding its Manufacturing Program--a program of great importance to Illinois industry. The Manufacturing Program has a high priority on the

agenda of a number of departments within the College: Mechanical and Industrial Engineering, Computer Science, Civil Engineering, Electrical and Computer Engineering, and General Engineering. Faculty members from these units are combining their efforts to work on research projects in the areas of robotics, manufacturing equipment design, materials processing, polymers and metal composites, production control, and computer-controlled manufacturing. The relevance of this work in today's manufacturing environment is evident.

The College of Engineering has been able to identify an area in the Mechanical Engineering Building, which in past years was used for a machine shop, a laboratory, and student shower and locker space, that can now be converted into laboratory and office space for the Manufacturing Program. The scope of the remodeling will be extensive because the areas are basically large spaces which need to be segmented into smaller office and laboratory areas.

The College is leaving behind the past emphasis on the use of the machine shop for teaching machine-tool design and application, and it is moving into a new era. In the future, students will be working with computers on design problems, and all aspects of manufacturing will be integrated in a new computer systems approach.

The graduates will be prepared to help convert outmoded assembly lines into flexible computerized systems that can be changed rapidly and adapted to new functions and products in a period of hours rather than weeks and months. Their exposure to robotics and artificial intelligence will stand them in good stead as they convert the plants and factories of the past into modern production facilities for the future.

Students who have completed the Manufacturing Program will also be invaluable in helping to establish new high-technology industry in Illinois. They will have the expertise required to establish and to maintain facilities that will be competitive with the best in the nation and the world.

Main Library (4th Floor) Remodeling Planning - (\$160,000)

This project involves planning for the east portion of the fourth floor area involving approximately 22,500 NASF. The actual remodeling must be accomplished while adjacent areas continue operations; consequently, the

architect must phase the work. It will be necessary to relocate staff and books around the construction area in order to keep the library areas available to staff and students.

The existing walls are constructed of cellulose wall board over wooden studs which do not meet current fire safety codes. Also, the structural steel columns supporting the roof need to be enclosed with a fire retardant material to meet existing building codes.

The Library believes this project will increase staff efficiency because both the second and fourth floors have inefficient layouts. The smaller libraries located on the fourth floor would be relocated to the second floor's larger rooms thus allowing staff to cover more than one library. The fourth floor would be developed into a landscaped office area giving some relief to the very crowded conditions existing in the acquisitions and cataloging areas currently located on the second floor.

The total planning cost including working drawings is estimated to be \$160,000. It is anticipated that construction funds will be requested in FY 1989.

Outdoor Instructional/Recreational Facilities - (\$85,000)

This request involves the construction of four additional tennis courts next to the four existing tennis courts west of the Illini Grove. This will provide a complex of eight tennis courts which will be ideal for use in tennis class instruction. Also, these courts will be in a good location for students living in the large dormitory complex located along Lincoln Avenue to use for instruction and recreation. This site will require some leveling, but there will be no drains required because surface drainage will be adequate for these asphalt base recreational courts. This improvement is part of an overall program to improve the quality of outdoor instructional/recreational facilities and provides a facility where the high demand for tennis instruction can be met.

Pilot Training Facility - (\$932,800)

This project has been developed to address the badly deteriorated condition of the present facility. The current facility was constructed in 1945 and, while the building has been upgraded, is rapidly deteriorating and requires replacement. The facility is poorly insulated, has inadequate

climate control capacity, and, until a recent temporary coating was applied to the roof, it leaked.

Deterioration due to aging and weather damage has occurred to the point where current educational functions have been jeopardized. Instructors and students were not being protected from leaking structures, and expensive electronic flight simulators were being damaged from moisture and furnace residues. There has existed the potential for severe electrical shock resulting from the operating of equipment in areas where water has collected. While the resurfacing of the roof has corrected the situation for the short term, these leakage problems are expected to recur two to three years from now. The current space is also extremely energy inefficient and this must be corrected to conserve energy and utilities funds.

In order to clear the site for this project, the existing Pilot Training Facility, containing 3,760 GSF, must be razed. The structure planned to replace the current facility will be of low-cost construction (concrete block or pre-engineered metal structure with concrete foundation and concrete floor) and will provide approximately 8,500 NASF of replacement space.

Additionally, funding is required to finance the cost of normal utilities service required in the new building. The water, storm sewer, and sanitary sewer are either on or near the site. The electric service will have to be extended from Hangar One to this new building. The facility will need to have its own heating and air-conditioning plant since the Airport has no central plant. Most of the utility cost of this building will be for the electric service and for the storm and sanitary sewer connections.

The total project cost is estimated at \$1,087,800 of which \$852,800 is requested for construction and \$80,000 is requested for utilities improvements in FY 1988. An additional request of \$155,000 will be made in FY 1989 to finance moveable equipment.

Campus Police Building - (\$90,000)

The Campus Police Building will create new facilities for the Police Department. The building which the Police Department is currently using for its headquarters is an Army barracks type building constructed in 1945. The building is expensive to maintain and is grossly inadequate for police

operation, both in the quality and the configuration of the space. The effectiveness of the campus security force is greatly hampered by the lack of adequate space. In order to help alleviate the crowded space conditions, the Police Department was assigned space in the nearby Engineering Research Laboratory and a frame house at 1207 W. Springfield. The Engineering Research Laboratory space is primarily basement space which floods, experiences extreme temperature fluctuations, and is poorly arranged. The space at 1207 W. Springfield is used for investigative staff and evidence storage, and it is not secure.

The new facility will replace the inadequate facilities currently used by the Police Department, make way for the imminent razing of the old structure, and will eliminate the present efficiency and coordination problems caused by dispersed and inadequate quarters. Additionally, the relocation of the Police Department is becoming even more vital because the new "North Campus Master Plan" indicates that the existing Campus Police Station is on a portion of the site where the proposed Engineering Library is to be located.

The Campus Police Building is programmed to contain the following types and amounts of space:

<u>Room Type</u>	<u>NASF in Proposed Building</u>
Office	3,905
Lounge	1,030
Locker	1,050
Storage	280
Other Supporting Facilities	<u>310</u>
TOTAL	6,575

Upon completion of this project, the existing Campus Police Station (2,027 NASF) and 1207 W. Springfield (1,213 NASF) will be vacated by Campus Security and razed. Additionally, Campus Security will vacate its presently assigned space in the Engineering Research Laboratory (1,720 NASF), and that space will be reassigned for a more appropriate use. The FY 1988 request is for planning funds. If approved, the construction funds will be requested in FY 1989.

FY 1988 BUILD ILLINOIS PROJECTS
CHICAGO CAMPUS

Chemistry Laboratory Remodeling-Phase 3 - (\$300,000)

The Department of Chemistry maintains outstanding research faculty with expertise throughout the field of Chemistry. The Department recently completed a review of its programs, and an acute shortage of research space emerged as its dominant finding. Numerous examples illustrate the Chemistry Department's acute research space shortage. For example, space in the Science and Engineering South Building (SES) is so scarce that one professor has been forced to house his research work in a former departmental work room. The Chemistry Department's capital remodeling request for FY 1988 represents phase 3 of a three-phase remodeling program. Phase 1 of the program included the remodeling of several rooms in the Science and Engineering Laboratories Building (SEL), including an organic chemistry laboratory and a chemistry laser laboratory. Phase 2 of the program included the partitioning and remodeling of several rooms in SES.

The currently proposed phase 3 of the program will entail a variety of remodeling tasks that will benefit all occupants of SES. These tasks include the repair and remodeling of the elevator floors in SES which presently suffer from holes in the surface, the painting of badly dilapidated seminar rooms, and the removal of unsightly graffiti.

This third phase of the plan will remodel excessive building circulation space into productive office and research space and will convert a student staff machine shop to a productive research laboratory. These conversions will require partitioning HVAC, electrical power and lighting, laboratory utility services, and equipment. Approximately 2,200 square feet of space is included in these conversions.

Remodeling for AAUP Computer Facility - (\$100,000)

The design condition of the Architecture and Art Building has been an obstacle to the growth and development of teaching and research programs. Its partial completion, open-plan, and staggered floor elevation render the facility awkward and inefficient for typical classroom and laboratory activities. To meet long-deferred basic building improvements, the College

has developed a comprehensive plan for upgrading lighting, power, ventilation, acoustic, and spatial utility of the building.

The first priority project of this renovation plan is the creation of two computer rooms to implement the computer aided design (CAD) programs required in the review conducted by the Architecture Accrediting Board. In this plan, one room will accommodate two computer terminals linked to a compatible Physical Plant system. The second room will house personal computer hardware and CAD programs. Development of these rooms requires partitioning of space in existing open studio areas with related ventilation, electric power, lighting, and equipment upgrades.

Upgrade Electrical Power and Cooling in the Academic Computer Room - (\$175,000)

More than two years ago, the Academic Computer Center computers, disk drives, communications equipment, related support equipment, and personnel were relocated from the Science and Engineering Laboratory Building to the Benjamin Goldberg Research Center (BGRC). The modern facilities of the BGRC building permitted growth and development of the academic computer systems and services. This Center also serves as the Chicago campus control center to the supercomputers located in Urbana. To accommodate recent expansion and projected program needs, the computer room requires upgrading of the electric power and cooling capacity. The proposed remodeling will enlarge the uninterruptible power supply (UPS) in the Goldberg Research Center. The UPS in the Goldberg building has been poorly maintained and presently is unable to meet current equipment power demands. In addition, the power distribution system, for both UPS power and power from normal sources, is barely adequate for existing equipment. The proposed remodeling will increase the electrical supply to the computer room and increase the power supply to the building.

The proposed remodeling project will provide additional operational and reserve cooling capacity for the Goldberg Research Center Building Machine Room to correct the following serious deficiencies: (1) all three of the Center's cooling units must be operated simultaneously, thereby eliminating a spare unit in case of breakdown; (2) there is insufficient reserve capacity to accommodate peaks and extreme variations in outside

ambient temperatures; and (3) there is insufficient reserve cooling capacity for future expansions of computer hardware.

Roof Replacement-SEO - (\$100,000)

The proposed remodeling will remove and replace the roof of the Science and Engineering Office Building (SEO). The existing roof structure is 20 years old and has never been replaced. Moreover, leaks in the existing structure have caused interior damage to the 13th floor and to the elevator equipment room. The proposed remodeling will repair the leaks and eliminate the threat of interior damage to the 13th floor and elevator equipment room.

Code Corrections-Alumni Hall - (\$438,000)

The proposed remodeling will complete the following building code corrections initiated during FY 1987: (1) electrical conversion and distribution modifications; (2) replacement of the southwest stairway; (3) sprinkler modifications; (4) central stair modifications; (5) building fire detection system; and (6) the northwest stair modifications. The code corrections are required in order to comply with the Chicago Building and Life Safety Codes.

Remodel Physics High Bay-Phase II - (\$350,000)

The Physics Department's success in attracting outside funding, its quality research, and its demonstrated commitment to quality teaching have earned the backing of a number of noteworthy supporters. Indeed, support from diverse sectors such as private industry, the Federal government, and academic research agencies reveals widespread recognition of the value of physics research at the University of Illinois at Chicago.

The Physics Department's success results from a recognition of its applied research potential. For example, laser microchips, semiconductors, and data-based computer applications provide enormous opportunities for collaborative scientific projects between the University and numerous government and private sector agencies. The remodeled first floor structure would be capable of housing a laser physics laboratory and a device physics laboratory. This close proximity would enhance collaboration between those doing research in device physics and those involved with

short pulse work in laser physics. A technical support area will be situated nearby.

In addition, a moderately large shop assembly area would be needed on the first floor. A portion of the area would extend for two floors in height with an overhead crane to aid in the construction and dismantling of tall apparatus. This is expected to be vital for future construction in high energy physics, as well as some servicing in solid state physics. The assembly area is near an existing machine shop and provides an ideal area for construction projects for adjacent laboratories. This project will result in the remodeling of a total of 3,068 NASF.

Expand Greenhouse - (\$150,000)

A major component of the biotechnology initiatives at UIC has been the Laboratory for Cell, Molecular, and Developmental Biology (LCMDB). Presently in its third year of development, the interdisciplinary LCMDB has received a total of \$263,000 in State support during FY 1985 and FY 1986. The LCMDB brings together faculty and students in the most promising areas of research in microbiology, physiology, ecology, entomology, plant sciences, vertebrate biology, mammalian tissue culture, and evolutionary and population genetics. Currently, two-thirds of the core faculty are primarily engaged in recombinant DNA research, with the remaining one-third engaged in RNA metabolism and protein synthesis. The ability to manipulate DNA has been pivotal to the development of modern biotechnology science. However, the continued support for the research activities of the Laboratory will require additional research laboratory space.

The department has developed a multiphased comprehensive plan for converting underutilized teaching laboratories, common areas, and storage rooms to productive research space. The scope of the plan contains 16 remodeling components valued at about \$1.5 million. The remodeling plan was initiated in FY 1985 under the Biotechnology Initiative. Additional remodeling was accomplished with FY 1986 locally-held funds, and a third increment will be undertaken with FY 1987 Build Illinois funds.

This phase of the plan will expand the Greenhouse located east of Halsted Street to approximately double the current capacity to 2,800 square feet. This expansion will consolidate plants growing in four separate

rooms in the SEL and SES buildings and will consequently allow the release of these rooms to be used for additional research laboratory development.

Biomedical Research and Teaching Lab Facilities Development - (\$354,000)

The Basic Medical Sciences (Physiology and Biophysics, Biochemistry, Pharmacology, Anatomy, Microbiology, and Genetics) are at the center of the study and practice of Medicine. The need of medical students to be familiar with physiological and biomedical processes and interactions within the human body is of first importance in their total exposure to medicine. The study of the effects of medicines and drugs on the human body, the testing of new ideas and new chemical compounds, and the biologic manifestations of physical disorders are the appropriate and necessary subjects of Basic Medical Sciences teaching and research. This project will provide modern, efficient, properly-appointed research and teaching facilities in which College of Medicine researchers may carry on their work. It also will put the presently poorly-utilized space into productive use. The proposed project will remodel 3,000 net square feet of antiquated teaching laboratories on the 6th floor of the Wolcott wing in the CMW building. The project will create two 60-station modern teaching laboratories, two moderate-sized research laboratories, one prep room, one storage room, and two small offices. The project will involve the construction of partition walls, the purchase and installation of laboratory benches and teaching stations, the redistribution of on-site laboratory services, the reorganization of lighting, the provision of air-conditioning by use of fan coil units, window replacement, installation of a suspended ceiling, cleaning, patching, and painting.

Roof Repairs and Renovation MSSB - (\$115,000)

The proposed remodeling will involve the removal and replacement of the flat composition roof on the third floor and the removal and relaying of the clay tile pitched roofs serving the Medical Sciences South Building (MSSB). The building roofs were last repaired in 1968 and are showing signs of cracking and dry rot. Also, there is evidence of slipping and falling tiles. The proposed remodeling will correct these deficiencies and restore the stability of the existing roof structure.

Remodel Periodontal Center Laboratory - (\$122,000)

The Periodontal Center is a key component of the Campus Biotechnology Program whose staff have demonstrated a unique ability to bring together interdisciplinary groups for scientific research. Continued growth of the Periodontal Center requires more laboratory and research office space. Funds are required to remodel underutilized teaching laboratory and office space to enable the Center to conduct experiments efficiently and effectively and to store necessary supplies and equipment. The remodeling will entail constructing a cold room, installing air-conditioning, and installing distilled water lines.

Mass Spectroscopy Laboratory MSA Phase I - (\$236,000)

The Research Resources Center of the Medical Science Addition (MSA) is a centralized unit for supporting research and advanced teaching activities of faculty and students at the Health Sciences Center. Expensive scientific equipment and instrumentation is maintained and operated by the Center. The current sites for the Research Resources Center's spectrometers are not dust-free, lack appropriate air handling units or exhaust systems, and are unable to accommodate more than one investigator per instrument at one time. A new \$400,000 mass spectrometer is to be acquired which will be used by campus-wide faculty and graduate students for the characterization, identification, and quantification of material compounds. To accommodate the research equipment, the Center plans to remodel the contiguous rooms: E25A, E25B, E25C, and E26 in the Medical Science Addition. The remodeled space will house equipment valued at over \$600,000.

The remodeling will include (1) the installation of four 100 amp circuits, (2) new exhaust and air handling systems, (3) a false ceiling for dust isolation, (4) new floor tiles, and (5) interior painting. When completed, the area will be able to accommodate four mass spectrometers, one atomic absorption spectrometer, and two resident spectroscopists.

Install Fire Alarm Control Station - (\$610,000)

The existing fire alarm system at the Chicago campus consists of two reporting stations, one at the University Center and the other at the Health Sciences Center. Some of the buildings' fire alarm systems are

hardwired to the respective reporting station, others are connected by telephone lines through automatic dialers. These methods of reporting are outdated and do not meet with the current standards of national, state, and local codes; nor are they expandable as the needs increase.

This project represents the first phase of a multiphased program to provide an up-to-date fire alarm system for the Chicago campus. It consists of a central monitoring station installation at the University Center. The proposed location of the new central monitoring station is in the Services Building (Police & Watch Station), and it will have the capacity to receive reports from all buildings at the Chicago campus.

Window Replacement AHPB - (\$234,900)

The windows in rooms F1, F2, and F3 in the Associated Health Professions Building (AHPB) are in very poor condition and provide inadequate isolation during periods of severe weather. The replacement of 326 window units at the basement, second and third floor levels of the building will provide needed isolation and will promote greater energy conservation. The required window replacements will remove existing single-glazed windows and replace them with energy efficient, aluminum-clad, wood, double-glazed windows.

FY 1988 BUILD ILLINOIS PROJECTS
URBANA-CHAMPAIGN CAMPUS

Bevier Hall - Animal Rooms, Planning - (\$50,000)

This project provides planning funds to remodel a portion of the basement of Bevier Hall to construct new animal facilities to replace those currently on the fourth floor. The development of facilities in the basement will allow room for necessary expansion, permit easier access, allow the release of space for critically needed laboratory space on the fourth floor, and provide facilities that meet National Institute of Health (NIH) standards.

The area to be remodeled is currently used to store computer paper and supplies. It is an excellent area for development and will be isolated from other areas of the building. The area can be remodeled and made operational without taking the current animal facilities out of use, a very critical consideration for the research projects in progress.

The area to be remodeled consists of four rooms (28, 28A, 30, and 30A) and amounts to 5,091 NASF. It is expected that this remodeling will yield 2,500 NASF of animal room facilities. This project will involve the construction of new exit stairs from the basement at the south end of the building, creation of a corridor network, and development of animal rooms with necessary support areas including space for a cage washer and feed preparation. New heating, cooling, and ventilation systems will be required. Floor drains, water supply, and electrical systems will be extended into the area.

The total planning cost of this project is estimated to be \$50,000. It is anticipated that a request for remodeling funds will be made in FY 1989.

Bevier Hall - Chilled Water A/C System - (\$400,000)

This project will provide Bevier Hall with central air-conditioning from the new chilled water line recently installed at the east side of the building. The building has an air circulation system that can be converted to a cooling system by adding condensation coils. The conversion will reduce cooling and maintenance costs, and will also reduce the electrical

load on the now overloaded electrical system by replacing costly window units.

The third floor library requires air-conditioning to be usable as a year-round facility. The entire building has undergone a transformation from a predominantly non-laboratory to a laboratory facility, and air-conditioning has become essential for many activities.

This project will extend the chilled water line into the building and install the necessary pumps, coils, and other equipment to provide central air-conditioning to all rooms on the fan system. Window air-conditioner units will be removed to reduce winter energy loss and window sashes will be replaced as necessary to match the original design.

Mechanical Engineering Building - Develop Manufacturing Labs. - (\$459,100)

This project provides for the remodeling of 5,777 NASF on the second floor of the Mechanical Engineering Building (Rooms 213A, B, C, and 217). This project involves the development of six laboratories and supporting office space to be used for research and teaching in the areas of manufacturing and materials processing. In addition, the project will develop an integrated engineering-psychology laboratory for research and teaching in the area of human factors.

The manufacturing and materials processing portion of this project involves the creation of six laboratories and the construction of an upper level over portions of the laboratory space to provide office space and computer/instrument rooms. This portion of the project will require electrical utilities for operating machines and computer instrumentation, raceways for computer communications between laboratories and offices, environmental control (temperature, humidity, and particulate) of the individual areas, and a compressed air supply. At least two of the laboratories will require access doors for the movement of large equipment from the main aisleway to the laboratories.

The engineering-psychology portion of the project involves the creation of test booths for subjects, a laboratory area for computer-controlled simulators, a central computer room, and small computer/instrument rooms. This portion of the project requires electrical utilities for instruments, computers, and machines; environmental controls (temperature and humidity); sound control in the subject booths; and raceways for the interconnection

of these laboratories with the above-described manufacturing/materials processing laboratories.

Talbot Laboratory - Remodeling for Composite Center - (\$200,000)

This project is the second phase of a multiphased project to create a Composite Center as a part of a proposal to the U.S. Department of Defense. The proposed Composite Center that will be located in Talbot Laboratory is a multi-disciplinary unit created by and under the direction of the Department of Theoretical and Applied Mechanics. Also, this Center will be engaged in the study of polymers and their relationships to other materials.

This project involves relocating the print shop, a research laboratory, and several offices from the southeast corner of the second floor to another location in Talbot Laboratory. The vacated space to be remodeled (Rooms 206, 206A, 206B, 207, 207B, 208, and 209) contains 1,978 NASF. The remodeling will involve the upgrading of lighting; the addition of electrical outlets (both 110v and 208v single phase and three phase); changes to partition walls; the installation of a new floor covering, a drop ceiling, a fume hood, several laboratory benches, air-conditioning and the necessary utilities; and painting of interior surfaces.

Mechanical Engineering Laboratory - Thermal Fluids, Planning - (\$40,000)

This project involves planning to remodel a portion of Rooms 114 and 115 in the Mechanical Engineering Laboratory to develop laboratories for education and research in heat transfer, fluid mechanics, combustion, and related areas of thermal-fluids. Approximately 4,500 NASF of the large, open laboratory area is to be subdivided into several smaller laboratory rooms of various sizes. These laboratories will require electrical utilities for computers, instruments, and other larger power systems; environmental controls (temperature and humidity); other utilities such as water, gas, air, vacuum, drain, etc.; and raceways for data and instrumentation lines.

The total planning cost of this project is estimated to be \$40,000. It is anticipated that a request for remodeling funds will be made in FY 1989.

Davenport Hall - Chemistry and Life Sciences - (\$500,000)

The School of Chemical Sciences is in desperate need of additional research laboratory space to satisfy current space shortages totaling 26,400 square feet for Biochemistry, 35,500 square feet for Chemistry, and 11,500 square feet for Chemical Engineering. The long range solution to this tremendous space shortage will be the request for funding, in FY 1991, of \$34,500,000 towards the construction of a new facility to house the School of Chemical Sciences. As an interim solution, the east center component of Davenport Hall will be remodeled to provide approximately 10,000 GSF of area with approximately 2,500 GSF to be used by the School of Life Sciences (SOLS) and 7,500 GSF to be used by the School of Chemical Sciences (SOCS).

The proposed 2,500 GSF area for the SOLS (Phase III) will house eight laboratories, ranging in size from 100 square feet to 416 square feet with an average size of approximately 165 square feet, and three office/ laboratory complexes of approximately 200 square feet in size. It is anticipated that a combination of 12-15 graduate students and post-doctorates will be located in this area and that an allocation for clerical staff of 300 square feet will be provided. Upon moving to the remodeled space in Davenport Hall, the SOLS would vacate 1,500 square feet of laboratory space in Noyes Lab for reassignment within the college.

The proposed 7,500 GSF area for the SOCS would be used primarily as research laboratories with office space representing approximately 25% of the total available floor area. The area will house a combination of 15 to 20 graduate students and post-doctorates with the principal research investigators being housed in other campus Chemistry facilities.

The remodeling in the east wing of Davenport Hall represents the third phase of this multiphase project. In the first phase, (FY 1986 funding) extensive demolition work will be completed and a new stairtower, elevator, and a complete second floor deck and structural system will be installed. Phase II (FY 1987 funding) involves remodeling 2,500 NASF in order to accommodate a distinguished professor in Bio-Physics. This Phase III request, involving approximately 3,000 GSF, will provide quality research laboratory and office space for the School of Chemical Sciences. It is anticipated that the final Phase IV request will be made in FY 1989.

Psychology Lab. - Expansion of Library, Planning - (\$50,000)

This project involves planning to remodel the north and west porticoes and the center atrium of the Psychology Laboratory to provide a library for Psychological Sciences. This project will greatly improve library services for the faculty and students of the Department and provide additional study area for students. This in turn, will free space in the Education and Social Science Library in the Main Library building which will help meet the increasing space needs of those collections.

This project involves enclosing the north portico of the Psychology Laboratory and expanding the current enclosure of the west portico. The existing "garden" in the center atrium will be preserved by remodeling the atrium with the addition of a mezzanine on the east and south walls, and arranging for proper entryways and pathways that will allow the combining of the atrium with the two enclosed porticoes into a library facility. Some minor remodeling will also be necessary on the eighth floor to convert the existing library into office space after the Psychology Library is completed. A feasibility study has been completed by the building's architects, and they have concluded that the building can structurally support the proposed modifications.

The total planning cost of this project is estimated to be \$50,000. It is anticipated that a request for remodeling funds will be made in FY 1989.

Veterinary Teaching Hospital - Animal Rooms - (\$450,000)

This project will upgrade approximately 7,400 NASF of animal room facilities in the Veterinary Medicine Teaching Hospital. Current facilities for housing dogs of the size required by ongoing investigations, are inadequate and do not meet minimum standards required by the U.S. Department of Agriculture. Additional regulations, now being considered by the USDA, if adopted, will prohibit the use of these areas for animal housing if modifications are not made. Specifically, this project is required to ensure compliance with the National Institute of Health guidelines and the U.S. Department of Agriculture's Animal Care and Welfare Regulations, and to correct a major deficiency in qualifying the College of Veterinary Medicine Animal Care Program for accreditation by the American Association for Accreditation of Laboratory Animal Care.

This project involves converting 4,222 NASF of existing floor space from a two-tier wall-mounted dog caging system to a dog run/pen type system and upgrading 3,200 NASF of existing dog run area. Work includes 1) minor demolition, 2) installation of associated plumbing, partitions, and suspended ceilings, 3) minor lighting conversion, 4) modification of the existing ventilation system, 5) minor modifications in the existing heating and cooling system, and 6) minor modification of the existing electrical service.

Elevator Replacement - Lincoln Hall - (\$200,000)

This project would replace an elevator installed in 1927 in Lincoln Hall with reliable, maintainable, and code conforming access to all floors of Lincoln Hall for students, staff, faculty, and handicapped persons. A modern elevator car will be installed with selective-collective controls, an automatic leveling system, and power door controls for ease of operation by paraplegics. The improvement will allow easy access to all five floors and the 33 classrooms in the building, including 14 classrooms on the second and third floors. Planning funds have been requested in FY 1987 to determine the best location for the elevator to provide access to the Museum on the top floor. This request is part of an overall program to replace obsolete elevators which are inadequate and difficult to maintain.

Steam and Condensate Repairs - (\$250,000)

This project includes the replacement of condensate return and vacuum heating pumps that are out of date and that require major maintenance. Since the present campus steam system is a closed cycle system, all steam condensate must be returned to the Abbott Power Plant by individual building pumps. There are in excess of 325 pumps on campus with an average expected life of 20 years. Over half of the pumps are older than 20 years and are in dire need of repair or replacement.

Waste Pipe System Repairs - (\$240,000)

This project includes the replacement of waste piping in research labs, runouts, and risers. Waste piping, consisting generally of hubbed cast iron, has a very short life exposed to today's organic chemicals. The waste piping in research laboratories in Burrill Hall, Turner Hall, and

Noyes Laboratory will be replaced with fused joint polypropylene plastic piping.

Electric Air Conditioning Repairs - Law Building - (\$200,000)

This project includes the replacement of freon compressors on each fan system of the Law Building. Individual freon compressors and coils will be replaced with a looped chilled water system and electric chillers. Parts for the 31 year old compressors are no longer available and the present systems are deteriorating quite rapidly.

Roof Repairs - (\$355,000)

This project will provide for the replacement of all or part of the roofs on the following buildings:

The Hydrosystems Laboratory was constructed in 1970, and has leaked almost since the day the building was completed. Repairs and temporary patches have been completed on many sections of the roof. The project entails removing the existing roof membrane and saturated insulation and installing new insulation and membrane of a higher quality.

The Digital Computer Laboratory was constructed in three phases, in 1958, 1963, and 1966. The coal tar pitch and gravel roof on all three phases is badly deteriorated, and chronic leakage is observed over offices in the earlier phases of construction. The leakage that occurs in several other areas is quite worrisome in this facility, due to the many millions of dollars of computer hardware that is located in the building. This project entails removal to the concrete deck of all old materials, and replacement with new roofing and insulation on the entire roof (22,000 square feet).

This request is part of an overall program developed to repair many of the Urbana-Champaign campus buildings requiring new roofs. There will be similar requests in future years to install new roofs in other major buildings.

HVAC Improvements - Psychology Laboratory - (\$370,000)

This project is designed to improve building ventilation problems, prevent street odors from entering the building, and reduce air infiltra-

tion and exfiltration which impacts on the heating and air-conditioning systems. Some of the work to be included is listed as follows:

- A. Replace all half-brick exhaust grilles with louvers, remove air restriction, and replace dampers and operators.
- B. Install purafil filters to serve both offices and laboratories on the ground and second floors.
- C. Recaulk the exterior building surfaces.

Masonry Repairs - (\$280,000)

This project will provide for masonry repairs to be completed on the following buildings:

David Kinley Hall was constructed in 1928. Water infiltration is causing paint to peel off the interior walls. Mortar in brick joints is loose and deteriorating rapidly. Moisture entering these open joints will soon cause structural damage, particularly in the areas of the chimneys. The project entails cutting out all loose mortar in joints and tuck-pointing these joints and cracks.

Davenport Hall was constructed in 1900. Water infiltration is causing paint to peel off the interior walls, causing damage to building interior surfaces and woodwork. Extensive areas of the building interior are scheduled to be remodeled with Build Illinois Funds. This work must be protected from future damage from water infiltration. The major work to be completed is tuck-pointing and caulking the exterior masonry. Also, the high terra-cotta facade in the south courtyard area, as well as the masonry on some chimneys, is in need of extensive repairs.

HVAC Improvements - Armory Building - (\$330,000)

This project is designed to improve ventilation and cooling to 25 interior class rooms on both the east and west ends of the Armory Building. Improvements will include removing room fan units, enlarging ducts to chases in each room, and installing large supply fans on the mezzanine to provide adequate air movement to these interior rooms. Also included is the upgrading of temperature controls throughout the whole building. The existing system is so noisy, that in many cases, the room fans must be shut off during class sessions for the students to be able to hear the instructor.

Planning Funds for FY 1989 Projects - (\$175,000)

These funds are requested to plan future R & R projects including the replacement of the elevator in the Architecture Building, the additional repair of steam and condensate lines, waste piping replacement projects in various research laboratory buildings, and future air-conditioning replacement projects on the Urbana-Champaign campus.

Completion of Animal and Dairy Science - (\$1,998,100)

As submitted in the FY 1987 budget request, the Animal and Dairy Science project required total funding of \$16,385,900. Subsequently, \$14,500,000 was appropriated for the project. To complete the project as originally designed, \$1,998,100 is being requested in FY 1988. That amount represents the balance of \$1,845,000 plus one year of cost escalation.

The original project was to build an addition that would provide an additional 20,000 NASF to the existing 1952 structure and then upgrade and remodel deficient areas within the present 46,000 NASF space. Based on the FY 1987 \$14,500,000 funding level, the building addition can be fully constructed, but only 49% of the original upgrade and remodeling portion planned can be realized. With this additional request, the entire project can be completed.