Annual Report 1974-75

SCHOOL OF CHEMICAL SCIENCES

Biochemistry, Chemical Engineering, and Chemistry

August, 1975

Table of Contents

Preface

The format for this year's report is virtually the same as that for 1973-74. A new part, on the undergraduate advising in chemistry, has been added to Section II on Undergraduate Programs; another, on Storerooms, has been added to Section V on Services and Facilities. Also, this year's report on PLATO describes our instructional uses of it, while the year before we reported the installation of the facility in Chem Annex.

As before, in editing the report I have emphasized information and data with the widest internal interest or usefulness in planning and decision making during the coming year. Most of the data and much of the text were provided by the faculty and staff responsible for the operations described. In gathering the material this year, I called more heavily upon the chairmen of the various School and Departmental committees for reports of their activities, most of which have been incorporated. The origin of this material is usually apparent, so I haven't identified it.

Again, I will welcome comments on the report and especially suggestions for ways to improve the next one.

H. S. Gutowsky
Director

Highlights

Faculty and Staff - Five new assistant professors are joining the regular faculty in 1975-76: Thomas O. Baldwin (biochem.), Kenneth J. Kaufmann (physical, in January 1976), Timothy A. Nieman (analytical), Gary B. Schuster (organic), and Eric Oldfield (physical). All of these are replacements. In addition, Dr. Charles A. Evans, Senior Research Chemist in MRL since 1970, has accepted a joint appointment with us as Associate Professor (analytical).

Two persons are being appointed to the academic/professional staff as Spectroscopist in the Molecular Spectroscopy Lab: Bruce J. Williams and James A. Wehmer. One is a replacement, the other fills a new position.

Awards and special recognition of our faculty during 1974-75 included the following: In biochemistry, I. C. Gunsalus became President-elect, Federation of American Societies for Experimental Biology; R. L. Switzer was awarded a Guggenheim Fellowship; and Gregorio Weber was elected a member of the National Academy of Sciences. In chemical engineering, R. A. Schmitz received an award for excellence in Undergraduate Teaching at the University of Illinois. In chemistry, R. B. Gennis was the recipient of a USPHS 5-year Career Development Award; H. S. Gutowsky received the Peter Debye Award in Physical Chemistry of the ACS; G. P. Haight, Jr. became Chairman-elect of the Chemical Education Division of the ACS; D. N. Hendrickson and J. R. Shapley were appointed as Associate Member and Summer Fellow, respectively in the Center for Advanced Study; J. A. Katzenellenbogen received a Dreyfuss Teacher Scholar Award; N. J. Leonard was the Edgar Fahs Smith Awardee and Memorial Lecturer of the Philadelphia Section of the ACS and the University of Pennsylvania; and I. C. Paul received a U. of I. Special Award for an outstanding undergraduate instructional development project in the summer of 1974.

Students - This spring the ACS announced that in 1973-74, our School again led the nation in total number of chemistry and chemical engineering degrees conferred (243) and in total doctorates (71). We also led in chemistry bachelor's (79) and masters' (46) degrees.

Undergraduate enrollments (majors) in the biochemistry programs continued to increase (now 165) and those in chemical engineering experienced a phenominal increase, from 160 to 230. Those in chemistry remained about the same (350). Graduate enrollments continued virtually unchanged, and admissions for the fall are within the fluctuations of recent years except, perhaps, for chemical engineering which is exceptionally low (9) after a banner season the year before (24).

The placement of our graduates continues to be generally good compared with many other disciplines, especially for the better students. The job picture is brightest for chemical engineers, where most graduates at all levels have had little difficulty in obtaining positions. Industrial recruiting was on the up-swing last fall, but declined markedly in the spring when economic conditions led to cancellation of a quarter of the scheduled recruiting visits.

The undergraduate advising office for chemistry was moved last fall from the General Chemistry office in the Annex to the School Placement Office in Noyes Lab where more space is available to provide them with an organized and accessible display of career-related materials.

Charles L. Turnbough, a graduate student in biochemistry took second prize in the annual Sigma Xi student paper competition of the local chapter.

Instructional Programs - The principal change in the undergraduate offerings, to be effective this fall, is the separation of the laboratory portions of Chem. 101 and 102 from the lecture-discussion. In the graduate programs, the foreign language reading requirement has been dropped for Ph.D. candidates in physical chemistry, biophysical chemistry and chemical physics.

Overall course registrations and teaching loads, which went up sharply for two years in a row during 1972-74, dropped off a bit (5%) this year. Student demand for courses in the coming year will be about what it was this year, perhaps slightly (1 to 2%) less.

Twenty-nine PLATO IV terminals were put in use in our Chem Annex facility during the year. PLATO lesson material was a required part of Chem. 100, 103, 131, 136, 338 and 431. General chemistry students used the system for over 4,600 hours while organic students, for whom more material is available, used it over 16,000 hours.

This spring graduate students reactivated the popular lecture series, "Wednesday Night at the Lab." Two lectures were given and it is planned to continue the program in the fall, with support from a duPont Co. grant. The Zeta Chapter of Alpha Chi Sigma started an annual lecture series, funded from a bequest of Louis G. Kruz (B.S. Chem. Engr., 1917), a former member of the house. The first lecture, "Lucky Accidents, Great Discoveries and the Prepared Mind," was given by Professor Hubert N. Alyea of Princeton University.

Budgetary Problems - The combined adverse effects of inflation, austere state appropriations, and enrollment pressures were a continuing problem during the year. Operating expenses exceeded the funds budgeted by $120,000. The difference was provided from several non-recurring sources, and the situation next year will be even more acute. Spring semester enrollments were cut back by about 200 students in the freshman and beginning organic courses for budgetary reasons, and a similar curtailment seems likely for this fall.

Alumni - Four alumni received major ACS awards during the year: Fred Basolo (Ph.D., 1943) of Northwestern, the Award for Distinguished Service in the Advancement of Inorganic Chemistry; James P. Collman (Ph.D., 1958) of Stanford, the Award in Inorganic Chemistry; Herbert O. House (Ph.D., 1953) of Georgia Tech, the Award for Creative Work in Synthetic Organic Chemistry; and John R. Huizenga (Ph.D., 1949) at the University of

Rochester, the Award for Nuclear Applications in Chemistry. This gives a total of 5 out of the 24 major annual, national awards made by the ACS during the year which went to alumni and/or faculty of the School.

Three alumni were elected to the National Academy of Engineering: Sheldon K. Friedlander (Ph.D., 1954) of Cal Tech, John H. Sinfelt (Ph.D., 1954) of Exxon Co., and Klaus D. Timmerhaus (B.S., 1948; Ph.D., 1952) at the University of Colorado. Friedlander also received the Alpha Chi Sigma Award in Chemical Engineering Research from the AIChE. The 80th birthday of C.S. Marvel (M.A., 1916; Ph.D., 1920; faculty 1920-61) was honored by a symposium at the University of Arizona.

R. Byron Bird (B.S., 1947) at the University of Wisconsin received the Bingham Medal of the Society of Rheology and the Warren K. Lewis Award of the AIChE; J. Franklin Hyde (Ph.D., 1928) of Dow Chemical Co., the Thomas Midgely Award of the ACS; Robert W. Vaughan (Ph.D., 1967) of Cal Tech, the Fresenius Award of Phi Lambda Upsilon; and William J. Ward (Ph.D., 1965) of General Electric Co., the A. P. Colburn Award of the AIChE.

I. Academic Appointments and Activities

A. Changes

1. Losses

The retirement of Professor H. A. Laitinen, in analytical chemistry, became effective October 1, 1974, at which time he moved to a part-time appointment at the University of Florida.

There were no other retirements from the academic staff; however, Richard R. Lytle is retiring this fall from his non-academic position as Chief Building Operating Engineer of RAL, where he has served students and staff for many years.

Other losses in our faculty and academic/professional staff effective on or about the beginning of the 1975-76 year include the following:

Biochemistry

William O. McClure, Assistant Professor, to the University of Southern California.

Chemical Engineering

John L. Hudson, Associate Professor, to become Head of the Department of Chemical Engineering at the University of Virginia.

Chemistry

Warren T. Ford, Assistant Professor, to the Rohm and Haas Co.

David F. S. Natusch, Associate Professor of Environmental Chemistry in the Institute for Environmental Studies to Professor of Chemistry, Colorado State University.

School

James E. Lohnes, Spectroscopist in the Molecular Spectroscopy Laboratory, to Varian Associates.

2. Additions

All of the non-visiting staff additions are replacements for earlier losses, except for one of the two Spectroscopists in the Molecular Spectroscopy Laboratory, who fills a new position, and for Charles A. Evans, Jr. who has accepted a part-time joint appointment in analytical chemistry. Unless otherwise noted, the appointments are effective on or about the beginning of 1975-76.

Biochemistry

Thomas O. Baldwin, Assistant Professor

Married, one child
Degrees: B.S. University of Texas, Austin, 1969
Ph.D. University of Texas, Austin, 1971
In 1972 Dr. Baldwin was awarded a Postdoctoral Research Fellowship at Harvard University, where he has spent three years doing research under the direction of Professor J. W. Hastings in the area of elucidation of the structural and functional parameters of the active center and the nature of the interactions between the subunits of bacterial luciferase.

Chemistry

Charles A. Evans, Jr., Associate Professor (analytical, 20% Y)

Married, one child
Degrees: B.A. Cornell University, 1964
Ph.D. Cornell University, 1968
After completing his Ph.D. Dr. Evans was employed for 2½ years at Ledgemont Laboratory of Kennecott Copper Corporation as an analytical chemist in mass spectroscopy. In October 1970, Dr. Evans joined the Material Research Laboratory of the University of Illinois as a Senior Research Chemist in charge of the MRL analytical facility. He will remain in that capacity in addition to the part-time (20%) joint appointment in our department.

Kenneth J. Kaufmann, Assistant Professor (physical, Sem II)

Single
Degrees: B.S. CCNY, 1968
Ph.D. MIT, 1973
In 1973 Dr. Kaufmann joined the research group of Professor G. Wilse Robinsen at the California Institute of Technology and for one year worked in the area of vibrational relaxation in hydrocarbons. In 1974 Dr. Kaufmann was awarded a Research Fellowship by Bell Laboratories where he is working with Dr. Peter M. Rentzepis in the area of ultrafast chemical processes using mode-locked lasers. Dr. Kaufmann will join us in January, 1976.

Timothy A. Nieman, Assistant Professor (analytical)

Married
Degrees: B.S. Purdue, 1971
Ph.D. Michigan State, 1975
Dr. Nieman's Ph.D. thesis was written under the direction of Professor C. G. Enke on the "Design and Application of a Computer-Interfaced Spectrophotometer Using a Silicon Vidicon Multichannel Detector."

Eric Oldfield, Assistant Professor (physical)

Single
Degrees: B.S. University of Bristol, England, 1969
Ph.D. University of Sheffield, England, 1972
In 1972 Dr. Oldfield was awarded a three-year Fellowship by the European Molecular Biology Organization and joined the research group of Dr. Adam Allerhand at Indiana University where he spent 2½ years doing research in the area of carbon-13 NMR of proteins in solution. In 1974 he moved to MIT where he spent six months with Dr. John S. Waugh doing research in the area of high-resolution NMR of solids and tumor immunology. He came here in July, 1975.

Gary B. Schuster, Assistant Professor (organic)

Married, two children
Degrees: B. S. Clarkson College of Technology, 1968
Ph. D. University of Rochester, 1971
From 1971-73 Dr. Schuster worked as a Physical Science Assistant with the Radiation and Biochemistry Division of the U.S. Army Environmental Hygiene Agency developing new procedures for enzyme assay and for the detection of potentially hazardous materials in the environment. In June, 1973, Dr. Schuster was awarded an NIH Postdoctoral Research Associateship with Professor Nicholas J. Turro at Columbia University to do research in the area of fundamental processes of electronically excited states, photochemical reactions and chemiluminescent systems. He arrived in July, 1975

School

Bruce J. Williams, Spectroscopist (Molec. Spectr.)

Married
Degrees: B.S. in El. Eng., University of Illinois, Urbana, 1971
M.S. in El. Eng., University of Illinois, Urbana, 1973
Mr. Williams has had four years of experience as an electronics technician in the Air Force and several summers and a year of trouble shooting and electronics design experience. He comes to us from two years as a research assistant with SBMS.

James A. Wehmer, Spectroscopist (Molec. Spectr.)

Single
Degrees: B. S. in Astronomy, University of Illinois, Urbana, 1975
Mr. Wehmer served as a part-time laboratory technician in 1969-75 and has an Associate Degree in Electronic Engineering Technology.

3. Promotions

All of the following have been promoted to the rank of Associate Professor beginning with the 1975-76 academic year:

Biochemistry

Olke Uhlenbeck

Chemical Engineering

Richard C. Alkire

Chemistry

David Chandler
Larry R. Faulkner
David N. Hendrickson
John A. Katzenellenbogen

B. Visiting Appointees

For 1975 Summer Session

Chemistry

Chadwick, D. J., Visiting Lecturer (organic) from Lecturer, Oxford University, Magdalin College, Oxford, England

*Glorvigen, B. W., Visiting Lecturer (general) from graduate student, University of Illinois

*Lamb, R. E., Visiting Lecturer (analytical) from graduate student, University of Illinois

Tanner, S. P., Visiting Lecturer (general) from Associate Professor, University of West Florida

For 1975-76 Academic Year

With the recruitment of four new regular faculty members in chemistry, the need for visiting faculty has diminished and the number in that department have decreased. However, the as yet unreplaced losses in consecutive years of Kosinski and Hudson in Chemical Engineering have required several temporary appointments.

Biochemistry

*Johnston, James B., Visiting Assistant Professor, Sem. I, from a similar visiting appointment in the Institute of Environmental Studies, University of Illinois

Chemical Engineering

Fell, Christopher J. D., Visiting Professor, Sem. I, from Senior Lecturer, University of New South Wales, Australia, a continuation of an appointment for Sem II of 1974-75.

*Lang, James J., Visiting Instructor, two-thirds time, Sem. I, from graduate student, University of Illinois

*Sheintuch, Moshe, Visiting Instructor, two-thirds time, Sem. I, from graduate student, University of Illinois

Chemistry

*Chabay, Ruth, Visiting Assistant Professor (general) from graduate student, University of Illinois, first year of a two-year appointment.

Cohn, Kim, Visiting Associate Professor (general) from California State College, Bakersfield

*Heisler, Suzanne, Visiting Lecturer, Sem. I, and Visiting Assistant Professor, Sem. II (analytical), from graduate student, University of Illinois

*Sarapu, Allen C., Visiting Assistant Professor (general) from post-doctoral fellow, University of Alberta

*Wood, Anne T., Visiting Assistant Professor (general), second year of a two-year appointment

*Zumdahl, Steven S., Visiting Assistant Professor (general), second year of a three-year appointment

*These are fixed term appointees not on leave from other positions.

C. Leaves and Special Appointments for 1975-76

Biochemistry

Switzer, Robert L., Semesters I and II, Sabbatical Leave

Weber, Gregorio, †October 20, 1974 - January 15, 1975, on leave of absence as Scientific Expert of the International Atomic Energy Commission to the Argentina AEC in Buenos Aires.

†Not included in 1973-74 report.

Chemical Engineering

Alkire, Richard C., Sem. I, Sabbatical Leave

Chemistry

Beak, Peter, Sem. II, Sabbatical Leave

Faulkner, Larry R., Sem. I, Fellow, Center for Advanced Study

Gennis, Robert D., Sem. I, Fellow, Center for Advanced Study

Marcus, Rudolph A., Sem. I & II, Sabbatical Leave

Yankwich, Peter E., In charge of administrator evaluation project

D. Awards and Similar Recognition During 1974-75

Biochemistry

Gunsalus, I. C.	Elected to Council, National Academy of Sciences; President-elect, Federation of American Societies for Experimental Biology
Switzer, R. L.	Awarded J. S. Guggenheim Fellowship
Weber, Gregorio	Elected Member of the National Academy of Sciences

Chemical Engineering

Drickamer, H. G.	Elected as Honorary Member, Phi Lambda Upsilon
Schmitz, R. A.	Award for Excellence in Undergraduate Teaching, University of Illinois

Chemistry

Bailar, J. C., Jr.	Visiting Professor, Kyushu University, Japan (Oct, Nov), and Washington State University (April-May)
Gennis, R. B.	USPHS Career Development Award, 1975-80
Gutowsky, H. S.	Peter Debye Award in Physical Chemistry of ACS; Appointed Chairman of Panel on Atmospheric Chemistry, NAS/NRC
Haight, G. P., Jr.	Chairman-Elect, Chemical Education Division, ACS
Hendrickson, D. N.	Associate Member, Center for Advanced Study, Sem. II
Katzenellenbogen, J. A.	Dreyfuss Teaching Scholar Award
Leonard, N. J.	Edgar Fahs Smith Award and Memorial Lecturer, Philadelphia Section of the ACS and the University of Pennsylvania; Frontiers in Chemistry Lecturer, Wayne State University; and Distinguished Visiting Lecturer, Department of Chemistry, University of California at Davis

Marcus, R. A.	University of Illinois Dr. E. H. Wakelund Recognition Award
Martin, J. C.	Arthur W. Ingersoll Memorial Lecturer, Vanderbilt University
Paul, I. C.	University of Illinois Award for an Outstanding Undergraduate Instructional Development Project, in the General Chemistry Program
Rinehart, K. L.	Arthur D. Little Visiting Professor, MIT
Shapley, J. R.	University of Illinois Faculty Summer Fellow
Yankwich, P. E.	University of Illinois Dr. E. H. Wakelund Recognition Award

E. Invited Lectures and Meetings Attended

In addition to the items listed above, a great deal of other professional recognition has been accorded to our faculty. An important component is the giving of invited lectures at seminars, symposia, and colloquia held at other institutions or in connection with meetings of professional societies or groups. The table given below summarizes the extent of such activities. The names of our regular faculty are listed according to department, along with the numbers of invited lectures (Lect.) and also of meetings of professional societies attended (Attend.). Lectures and meetings outside the U.S. or Canada are given as a second digit, where appropriate and where known.

Biochemistry

Name	Lect.	Attend.
Clark, J. M., Jr.	1	1
Conrad, H. E.	-	-
Glaser, M.	-	1
Gumport, R. I.	1	1
Gunsalus, I. C.	9,3	15,1
Hager, L. P.	4,3	3,2
Jonas, Ana	-	2
Mangel, W. F.	-	-
McClure, W. O.	11[a]	3,2
Nystrom, R. F.	-	-
Ordal, G. W.	1	1
Robinson, J. L.	1	2
Shapiro, D. J.	4	2
Storm, D. R.	4	1
Switzer, R. L.	5	2
Uhlenbeck, Olke	1	2
Weber, Gregorio	2,1	1

Chemical Engineering

Name	Lect.	Attend.
†Alkire, R. C.	7	8
Drickamer, H. G.	4,1	3,1
†Eckert, C. A.	7,3	1,1
*Fell, C.J.D.	1,2	1,4
Hanratty, T. J.	3	4
Hudson, J. L.	3	2
Sani, R. L.	3	3
Schmitz, R. A.	4	1
Westwater, J. W.	1,1	2,1

*Visiting Professor

Chemistry

Name	Lect.	Attend.	Name	Lect.	Attend.
Applequist, D. E.	-	1	Katzenellenbogen, J.	11	1,1
Bailar, J. C., Jr.	3,12	3,2	Leonard, N. J.	7,2	1,4
Barefield, E. K.	2	1,1	Malmstadt, H. V.	2,12	3,2
Beak, Peter	5	1	Marcus, R. A.	7,1	3,1
Belford, R. L.	1	1	Martin, J. C.	5,7	2,1
Birks, J. W.	1	1	McDonald, J. D.	2	1
†Brown, T. L.	9	3	Melhado, Evan	2	-
Chandler, David	7	4	Natusch, D.F.S.	8	4
+Coates, R. M.	4	3	Paul, I. C.	3,7	2,2
Curtin, D. Y.	8	1	Pirkle, W. H.	-	-
Drago, R. S.	5,1	2	Rinehart, K. L.	15,10	6,2
Faulkner, L. R.	3[b]	1	Rogers, E. P.	4	-
Flygare, W. H.	10	2	Schmidt, P. G.	3	2
Ford, W. T.	15	1	Secrest, D. H.	-,2	-
Gennis, R. B.	2	1	Shapley, J. R.	-	2
Gutowsky, H. S.	2	4	Smith, S. G.	7[c]	1
Haight, G. P., Jr.	12,11	3,1	Snyder, H. R.	-	-
†Hendrickson, D. N.	2	2	Stucky, G. D.	5	2
Hummel, J. P.	1	-	Yankwich, P. E.	-	1
Jonas, Jiri	4	3	†Yardley, J. T.	1	1

†These individuals also organized and chaired a symposium or similar event.

[a]Four of these were on an ACS lecture tour.

[b]One of these was a ten-lecture series at the University of Colorado.

[c]One of these was a six-lecture series at the University of California, Davis.

F. Other Professional Activities

Two other types of professional activities are summarized in the table given below. The first of these is service on the editorial boards of journals and other science-related periodicals. The second is membership on the wide variety of advisory panels, and committees for professional societies, federal and state agencies and for other institutions. The numbers of such activities are listed for each faculty member, insofar as they are known.

Biochemistry

Name	Ed. Bd.	Pan. & Com.
Conrad, H. E.	-	3
Gumport, R. I.	-	1
Gunsalus, I. C.	4	2
†Hager, J. P.	3	2
Jonas, Ana	-	1
McClure, W. O.	1	-
Nystrom, R. F.	1	-

Chemical Engineering

Name	Ed. Bd.	Pan. & Com.
Alkire, R. C.	1	3
Drickamer, H. G.	-	2
Eckert, C. A.	1	1
Hanratty, T. J.	1	1
Schmitz, R. A.	-	1
Westwater, J. W.	3	6

†Associate Editor, J. Biol. Chem.

Chemistry

Name	Ed. Bd.	Pan. & Com.	Name	Ed. Bd.	Pan. & Com.
Applequist, D. E.	1	-	Malmstadt, H. V.	-	2
Bailar, J. C., Jr.	6	-	Marcus, R. A.	-	6
Belford, R. L.	1	-	Martin, J. C.	1	2
†Brown, T. L.	3	2	Natusch, D. F. S.	-	1
Coates, R. M.	1	2	Paul, I. C.	1	1
Faulkner, L. R.	1	-	Rinehart, K. L.	3	4
Flygare, W. H.	3	3	Schmidt, P. G.	1	-
Gutowsky, H. S.	1	9	Snyder, H. R.	2	-
Haight, G. P., Jr.	1	4	Stucky, G. D.	1	-
Katzenellenbogen, J. A.	-	1	Yankwich, P. E.	-	3
Leonard, N. J.	2	3			

†Associate Editor, Inorganic Chemistry

II. Undergraduate Programs

A. Registration During 1974-75

Given in the table below is a summary, by class, of the number of undergraduate students enrolled in each of the two specialized curricula and in the several programs for S&L majors in the School. The numbers given are averages of the fall and spring enrollments.

	Fr.	So.	Jr.	Sr.	Total
Biochemistry					
32-14&44-06 (majors)	17	13	29	21	80
32-16&46-06 (premeds)	36	14	23	14	87
Totals	53	27	52	35	167
Chemical Engineering					
32-06 (curriculum)	81	50	51	46	228
Chemistry					
32-06 (curriculum)	33	36	30	40	139
32-14&44-07 (majors)	19	11	14	14	58
32-16&46-07 (premeds)	43	29	31	24	127
32-18-07 (prelaw)	1	--	1	--	2
32-71 (teaching)	--	1	3	4	8
Totals	96	77	79	82	334

B. Five-Year Enrollment Trends

Comparisons of total registrations by semester in the several major types of undergraduate programs are given below. There has been a continued shift to the S&L majors in biochemistry, starting with their inception in 1970-71, from the chemistry S&L majors which previously included biochemistry. In addition, there was a sharp increase in chemical engineering enrollments last fall, in all four classes, but especially for freshmen.

Sem.	1970-71	1971-72	1972-73	1973-74	1974-75
		Biochemistry - S&L Majors			
I	*	72	100	134	165
II	37	81	104	137	168
		Chemical Engineering - Curriculum			
I	172	176	160	159	233
II	163	142	152	150	223
		Chemistry - Curriculum			
I	194*	160	151	169	147
II	145	134	144	153	131

*Biochemistry included under chemistry

Sem.	1970-71	1971-72	1972-73	1973-74	1974-75
			Chemistry - S&L Majors		
I	313	248	292	221	210
II	286	214	246	173	186
			Totals - All Undergraduate Programs		
I	679	656	703	683	755
II	631	571	646	613	708

C. Degrees Granted over the Five-Year Period 1970-75

Degrees granted in the various types of undergraduate programs during the past five years are summarized below. The sharp increase from a total of a hundred degrees per year in 1969-70 and earlier, to 150 in 1972-73 appears to have leveled off at the latter figure. However, the steady increase in the numbers of biochemistry degrees, since their inception in 1970-71, has continued. B.S. degrees in the chemistry curriculum continue to fluctuate. Degrees in the S&L majors also fluctuate but to a smaller degree. The department, incidentally, led the nation in the total number (79) of chemistry baccalaureate degrees granted last year (1973-74).

Mo.	1970-71	1971-72	1972-73	1973-74	1974-75
			Biochemistry - BA and BS Degrees in the S&L Majors		
Aug.	0	2	2	2	2
Jan.	0	3	4	1	2
May	11	10	17	30	34
	11	15	23	33	38
			Chemical Engineering - BS Degrees in Curriculum		
Aug.	1	2	0	2	2
Oct.	0	0	0	0	1
Jan.	7	10	5	5	7
May	23	17	30	28	27
	31	29	35	35	37
			Chemistry - BS Degrees in Curriculum		
Aug.	5	1	1	1	4
Oct.	0	0	0	0	2
Jan.	6	3	4	4	2
May	20	12	21	36	20
	31	16	26	41	28

Mo.	1970-71	1971-72	1972-73	1973-74	1974-75
	Chemistry - BA and BS Degrees in All S&L Majors				
Aug.	3	2	10	2	7
Oct.	1	0	3	0	0
Jan.	4	17	10	8	7
May	47	45	45	28	32
	55	64	68	38	46
	Totals - All Undergraduate Programs				
Aug.	9	7	13	7	15
Oct.	1	0	3	0	3
Jan.	17	33	23	18	18
May	111	84	113	122	113
	128	124	152	147	149

D. Undergraduate Scholarships and Awards

For the 1975-76 academic year, ten $500 scholarships were awarded by the School to freshmen entering the University, and planning a professional career in one of the chemical sciences. Of these, four are in biochemistry, one in chemical engineering and five in chemistry with five being funded from the income of the Roger Adams Fund, one from the Lou Audrieth Fund, and four by a grant from Monsanto.

The following donors supplied scholarships in chemical engineering for undergraduate students:

Alcoa Foundation
Chrysler Corporation
Marathon Oil Company
Monsanto Company
Standard Oil of California (Chevron Research)
Universal Oil Products Foundation

The Agnes Sloan Larson Awards, in the amount of $200 each, were presented on February 4, 1975, before the Chemistry 108 class to the five sophomore students whose academic work during their freshman year was most outstanding:

Gary G. Trost
Douglas J. Krajnovich
James C. Hertenstein
Alan J. Conrad
Gregory A. Gregg

During the Spring Semester, a number of undergraduate awards based on academic excellence were announced. These are summarized below:

Reynold C. Fuson Award -	Robert A. Scott
Worth H. Rodebush Award -	Douglas A. Lauffenburger
Kendall Award -	William S. Karkow
Elliot Ritchie Alexander Award -	Alan L. Hinderliter Mark A. Stanish
Merck Award -	John D. Barnwell Jon A. Bernardi Winnie Wing-Yee Wong
Am. Inst. of Chemists Award -	Ira S. Abrams Thomas O. Sidebottom John W. Chapman
Alpha Chi Sigma Plaque -	Daniel C. Duan
Phi Lambda Upsilon Cup -	Donald Hennessy, Jr.
Donald Eisele Memorial Award -	Douglas A. Lauffenburger
AIChE Scholarship Award -	Mark A. Stanish
Freshmen CRC Handbook Award -	Joel Garbow Thomas Tulig
Honeywell Award -	James Barbour
Lisle Abbott Rose Award -	Douglas A. Lauffenburger

E. Curricular Matters

The principal change in the undergraduate offerings of the School was to separate the lecture and laboratory portions of Chem. 101 and 102. Beginning in August, 1975, there will be two three-hour lecture courses, Chem. 101 and 102, and associated one-hour laboratory courses, 105 and 106. A two-hour laboratory course, 104, equivalent to 105 plus 106, will also be offered for students who have completed Chem. 101 without laboratory. The new organization will offer greater scheduling flexibility to the student and will facilitate the coordinated but independent development of the two types of instruction.

The activities of the General Chemistry Committee this year were directed largely to reviewing and fire-fighting in areas of continuing concern: development of the X-format for Chem. 101 and 102, for which videotape production should be completed by the spring semester; general education credit for Chem. 100; evaluation of TA performance; textbook selection; and the repackaging of the didactic and laboratory portions of Chem. 101 and 102 just described. A number of cost/quality studies were made during the year. As one consequence, we will be tougher in steering students with reasonable high school chemistry backgrounds into the regular 101/102 sequence rather than allowing them to register in the "remedial" course, Chem. 100.

Another result is that plans have been made to convert as much of Chem. 100 as possible ($\gtrsim$ 80%) to PLATO lessons. This will require a two-year effort on the part of Ruth Chabay, who is being appointed as a Visiting Assistant Professor for this purpose, the salary funds being provided specially by the LAS College.

F. Undergraduate Advising in Chemistry

During the year, the undergraduate advising office was split off from the freshman chemistry office (107 Chem. Annex), which is small and overcrowded, and moved into the SOCS Placement Office (107 Noyes Lab), which has ample space for both placement and advising operations. We were most unfortunate in that the move caused the advising operation to lose the services of Mrs. Ruth Heicke, who had been doing an excellent job as the advising secretary and keeper of the undergraduate records; she remains with the freshman chemistry program.

However, in compensation, we were fortunate in that Mrs. Georgean Arsons, who had recently assumed responsibility for the Placement Office, has both considerable experience in the university admissions and advising apparatus and a strong interest in the advising function. She is assisted by Lois Siebold and Nita Erickson, who act as advising office receptionists and who are becoming accustomed to handling some of the routine student questions. With the space available in the Placement Office, we have begun to accumulate an organized and accessible display of material of interest to undergraduates--information on graduate and professional schools, catalogs from other undergraduate institutions in Illinois (primarily for use of students who wish to take summer courses elsewhere), and internal University of Illinois information on courses, curricula, and procedures.

Also, we have begun a program of bringing the student records up-to-date and keeping the progress of the students more closely (and, we hope, more accurately) monitored by means of computer-assisted student files with computer updates at least once each semester. We expect to be able to alert students to potential problems in a timely and systematic way. This program is just going into operation; another year should give us enough experience to assess its value and to determine just how much computerization of student records can accomplish for us.

III. Graduate Programs

A. Enrollment Trends and Degrees Granted

Graduate enrollment data for the fall semester of the past five years are summarized below according to the department and area of specialization. Spring semester totals are also given. Students registered in absentia are included, of whom there are now only two or three. It is seen that the total graduate enrollment continues to be virtually constant, although compensating changes are visible in some areas. In particular, over the past few years enrollments in biochemistry and chemical engineering have returned to earlier levels, while that in analytical has increased and that in organic has decreased.

Total Graduate Enrollments by Department and Area*

Dept.-Area	1970-71	1971-72	1972-73	1973-74	1974-75
Biochemistry	57	57	69	70	68
Chem. Engr.	55	47	52	52	59
Analyt.	35	38	36	50	53
Biophysical	*	5	6	4	4
Inorg.	70	52	58	60	65
Org.	108	104	101	96	83
Phys.	89	77	70	67	63
Ch. Phys.	10	16	15	12	13
Undecided	4	9	5	8	4
T. of Ch.	1	3	3	2	3
Chemistry	317	304	294	299	288
Semester I	429	408	415	421	415
Semester II	404	385	398	402	403

*In 1970-71 biophysical students were listed under physical, organic and biochemistry. It is estimated that the total number of graduate students in the School will be about 415 this fall.

The numbers of degrees granted this year are very similar to last year and probably reflect a new steady-state after the all-time high in total PhD's for 1969-70 (107) and the sharp drop in the succeeding year. In this connection, the ACS announced this spring that for last year (1973-74) our school again led the nation in total number of degrees granted; we also led in baccalaureates in chemistry, and in total doctorates.

Summary by Department of Advanced Degrees Granted

	1970-71	1971-72	1972-73	1973-74	1974-75
Biochemistry					
MS	14	16	17	16	14
PhD	9	2	14	6	8
Chemical Engr.					
MS	13	13	16	14	12
PhD	14	9	6	7	7
Chemistry					
MS	37	53	34	29	26
*PhD	45	44	37	58	59
Total					
MS	64	82	67	59	52
PhD	68	55	57	71	74

*PhD degrees in chemical physics are included here.

B. Graduate Student Recruitment and Admissions

Biochemistry - In the 1974-75 recruiting year 245 inquiries were received--essentially the same as last year, but the number of completed applications dropped from 73 in 1973-74 to 54 this year. However, as a group the overall quality of applications this year was better; consequently, the number of offers made this year, 38, compared favorably with the 37 offers made last year. Curiously, the number of applications from foreign students was quite low this year. Of the 38 students to whom we made offers this year, 24 have accepted and all plan to begin their graduate studies in August, 1975. A marked difference between the recruiting results for the last two years is seen in the percentage of students receiving offers who accepted them; 46% accepted last year, while 63% accepted this year. Perhaps the reason for this increased percentage lies in the fact that the total stipend offered this year was somewhat higher than a number of other biochemistry departments were offering. All of the entering students this year plan to work for the PhD degree. The average GPA of the entering class is 4.47 as compared to 4.55 for last year's class.

Chemistry - Virtually the same numbers of inquiries about graduate work were received this year as last: 515 U.S., 59 foreign (encouraged) and 192 foreign (discouraged). These numbers have been remarkably constant for the past four years, although the completed applications and acceptance rates vary substantially. The number of completed applications was up significantly, 267 vs 227 for last year, as was the number of persons admitted and offered appointments, 163 vs 139. However, this was more than offset by a decrease in acceptance rate, from 54 to 40%, giving a net decrease in number of new student expected this fall from 73 to 67. The decline may reflect an increase in multiple applications or, more likely, may result from deterioration in the competitiveness of our stipend levels, especially the F-2 category, the teaching fellowship.

Students entering in June and August, 1975, and the totals for each of the four years preceding are summarized in the table below. Overall, the quality of those applying and accepting seemed to be up to the high standards of the past several years. In chemistry the 4.58 GPA average of accepted offers compares favorably with GPAs in 1974-68 of 4.54, 4.60, 4.61, 4.60, 4.54, and 4.61, respectively.

Graduate Student Acceptance of Admission Offers*

Dept.-Area	1971-72	1972-73	1973-74	1974-75	1975-76*
Biochemistry	15	20	27	18	24
Chemical Engr.	12	17	15	24	9
Analyt.	10	7	14	13	8
Inorg.	10	12	12	13	7
Org.	24	22	21	16	22
Phys.	16	14	12	21	19
Ch. Phys.	7	-	2	4	2
Undecided	3	6	11	6	8
T. of Chem.	2	-	-	1	1
Chemistry	72	61	72	74	67
Total	99	98	114	116	100

*The 1971-75 figures are actual enrollments, including students entering in February. The 1975-76 data do not include January admissions of which there were 5 this past year. Biophysical students are listed under physical, organic and biochemistry.

The affirmative action aspects of our graduate recruiting are described in Sec. VI. A. In addition, a conscious effort is being continued to reduce the numbers of foreign students admitted; this is because the employment opportunities for foreign students remain scarce. Only 4/100 of our admissions for 1975-76 are foreign nationals, a level comparable with last year and a several-fold factor below the national average.

C. Fellowship and Traineeship Support

1. Fellowship and Traineeship Support - These nonassistantship appointments were held by 125 graduate students this year. As shown by the summary below, this represents a renewed drop in fellowship type support for our most outstanding students, from a high of 197 in 1967-68. Many of the earlier federal graduate student support programs (NDEA, NSF and NIH) have either been cut back sharply or eliminated. The drop this year reflects the ban on new awards of NIH traineeships, because of a phase out in the NIH training grant program. However, a new program has just been started; a main feature of which is a pay-back provision if the recipient doesn't subsequently serve in a "health-related" capacity for a two-year period. The new training programs also must be interdisciplinary in character. Several such grants have been made to the campus, effective July 1, 1975, overlapping the old programs by a year, with a temporary increase in the total numbers of trainees.

For the fourth year in a row unrestricted, industrial grant-in-aid funds were committed largely for student support to offset the impact of the reductions in federal funding. A synopsis of the numbers of students supported by the various programs is given in the table below for the past five years.

Type of Appointment	1970-71	1971-72	1972-73	1973-74	1974-75
NDEA Traineeship	1	4	3	2	0
Natl. Science Foundation					
National Fellow	22	13	10	8	11
Trainee	17	11	7	4	1
U.S. Publich Health Serv.					
National Fellow	11	3	1	0	0
Trainee	41	43	53	52	44
	92	74	74	66	56
Institutional Fellowships					
University	23	24	19	24	21
Industrial - Dept.	25	37	38	39	48
Other	4	3	5	4	0
Total	144	138	136	133	125

The distribution of these appointments among the three departments in 1974-75 is given in the next table.

Department	NSF	NIH	Univ.	Indust.	Total
Biochemistry	1	30	0	0	31
Chemical Engr.	5	0	4	9	18
Chemistry	6	14	17	39	76
	12	44	21	48	125

2. Industrial Support - A synopsis is given below, by department, of the industrial donors who have made grants during 1974-75, to support graduate fellowships and/or research. The list does not include several grants made to support directly the research of particular faculty members, or the smaller undergraduate scholarship grants listed in II. D. The amounts received total about $55,000 for chemical engineering and $115,000 for chemistry, both up about 15% from last year. Most of these funds are being used for graduate fellowships.

Biochemistry

None

Chemical Engineering

*Amoco Foundation
Atlantic Richfield Foundation
*Dow Chemical Company
DuPont Company
*Eastman Kodak Company
Exxon Educational Foundation
*General Electric Foundation
Granite City Steel Company
*Shell Companies Foundation
*Thailand Gulf Oil Company
*Union Carbide Corporation
3M Company

Chemistry

*Allied Chemical
American Cyanamid
*Dow
DuPont (G in A)
*Eli Lilly & Co.
Exxon Education Foundation
Granite City Steel
*Hercules
*Lubrizol
3M
*Mobil Oil
Monsanto (undergrad)
*Proctor & Gamble
Rohm & Haas
Sherwin Williams
*Standard Oil
Uniroyal

*These grants are made specifically for graduate fellowships.

D. Postdoctorates

Given below is a five-year synopsis of the numbers of postdoctorates in each department of the School. The numbers fluctuate appreciably during the year as individuals come and go almost at random, so the figures given are the total numbers appointed at some time during each year. The general increase in numbers during the 1970-74 period reflected the poor job market, plus increases in outside support.

Department	1970-71	1971-72	1972-73	1973-74	1974-75
Biochemistry	29	26	20	26	16
Chem. Engr.	-	1	1	2	2
Chemistry	42	49	54	58	52
Total	71	76	75	86	70

E. Special Lectures and Seminars

A number and variety of activities related to the graduate research programs of the School took place during the year. They are enumerated below, starting with the three name lectureships sponsored by the School, the John C. Bailar, Ada Doisy and W. A. Noyes lectures.

1. John C. Bailar, Jr., Lecture - The third lecturer in this series was Professor D. A. Buckingham of the Australian National University who presented two lectures entitled "Intermolecular Reactions" on March 13 and 14.

2. Ada Doisy Lectures in Biochemistry - The fourth annual lectures were held on April 1 and 23, 1975. Professor Arthur Kornberg, Stanford University School of Medicine, spoke on "Multienzyme Systems of DNA Replication" and Professor Osamu Hayaishi, Department of Medical Chemistry, Kyoto University, Japan, on "Properties and Functions of Indoleamine 2,3 - Dioxygenase."

3. W. A. Noyes Lecturer - This lectureship of many year's standing is sponsored by the local chapter of Phi Lambda Upsilon, the chemistry honor society, with financial assistance from the income of the Fuson Fund. The lecture, held traditionally in the early part of the spring was given on April 17, 1975, by Professor C. C. Price, University of Pennsylvania, who was a member of our organic faculty for 10 years, 1936-46. He spoke on "Evolution and Order."

4. Sherwin-Williams Seminars - This year is the third of a second three-year grant from the Sherwin-Williams Co. which sponsors our "Seminars in Chemistry" series. Three sets of seminars were given, as listed below. We are pleased that the Sherwin-Williams Co. has renewed their support for another three-year period.

Advances in Chemical Physics and Physical Chemistry

W. H. Miller, University of California, Berkeley
2 October 1974, "Transition State Theory Revisited"

J. C. Polanyi, University of Toronto
11 December 1974, "Infrared Chemiluminescence and the Dynamics of Some Simple Reactions"

Robert Zwanzig, California Institute of Technology
16 April 1975, "Stokes Law and Physical Chemistry"

Vistas in Organic Synthesis

Barry M. Trost, University of Wisconsin
31 October 1974, "Strain is the Name of the Game"
1 November 1974, "Sulfur is a Key Element in Synthesis"
2 November 1974, "New Approaches in C-C Bond Formation"

Advances in Organic Chemistry

Günther Wilke, Prof. Dr. at Max-Planck-Instituts für Kohlenforschung
27 May 1975, "Cyclooligomerisation of Olefins and Dienes"
28 May 1975, "π-Allyl Transition Metal Systems"
29 May 1975, "Catalytic Asymmetric Syntheses"

5. Alpha Chi Sigma Krug Lecture - Three years ago a former member of the Zeta chapter, Louis G. Krug (B.S., Chem. Engr., 1917) died and left a $10,000 bequest to the chapter, to be used as the chapter sees fit. The chapter has instituted an annual lecture to be funded by income from the bequest. The first lecture was given on April 3 by Prof. Hubert N. Olyea, of Princeton University, with the title "Lucky Accidents, Great Discoveries and the Prepared Mind."

6. Wednesday Night at the Lab - After a hiatus of several years, this series of popular lectures was reinstituted by a group of graduate students, with financial support from the School for travel expenses of speakers and honoraria. Two lectures were held this spring, with the help of funds from the grant-in-aid from DuPont Co. to the Department of Chemistry as follows:

Richard A. Goldsby, University of Maryland
12 March 1975, "The Biochemistry of Race"

Sidney Rosen, University of Illinois
30 April 1975, "Turning Gold into Oil: Alchemy"

7. Visiting Speakers in Seminars - In addition to the special events summarized above, we continued to have a large number and rich variety of visiting speakers in our several graduate seminar programs as well as several sponsored by one or another of the departments of the School and/or by the local section of the American Chemical Society. They come from a broad cross-section of educational, industrial, and governmental organizations in the U.S. and abroad; many are distinguished scientists who are international authorities in their areas. Others are current or recent PhD's being interviewed for faculty positions.

During the past year, there were over ninety such seminars by visiting speakers, eleven from abroad, distributed among the areas as follows: Biochemistry (29,0); Chemical Engineering (7,2); and in Chemistry - Analytical (7,0), Inorganic (11,5), Organic (13,3), and Physical (16,1); where the first digit gives the number of talks by U.S. visitors and the second, by foreign visitors.

F. Curricular Matters

The most noteworthy curricular change at the graduate level was the elimination of the foreign language reading examination for PhD candidates in physical chemistry, biophysical chemistry, and chemical physics. The reason for the change was the recognition that there are no longer many significant publications in these areas which are not in English or available in English translation.

There were three course revisions. Chemistry 424 was changed from a fixed-outline course in quantitative analysis to a special-topics course in analytical chemistry. Biochemistry 452 and 494 were both changed to variable credit courses which may be repeated by the student for a maximum of 1 1/2 and 2 units, respectively.

The uses of two courses in fulfillment of PhD requirements in Chemistry were revised. Chemistry 323 will now be accepted as a non-analytical course for most PhD candidates with analytical majors. Chemistry 395, History of Science with Particular Reference to Chemistry, will be accepted as a non-major course for PhD candidates in all areas of chemistry.

Performance of graduate students in biochemistry and chemistry upon the cumulative exams during the year was about the same as previous years. The average number of exams taken by students before successfully completing the requirement was 11.0 (about 2 1/2 years), which is in the same range as for 1974-70, 9.7, 11.6, 10.9, 10.4 and 10.6. There were four failures, three in physical and one in organic.

G. Special Awards to Graduate Students

In addition to the various more usual forms of fellowship and traineeship support, summarized in Sec. III. C., at least one of our graduate students was

selected for another type of competitive award which appears to merit individual notice. Charles L. Turnbough, Jr., who recently completed his PhD in biochemistry with Professor R. L. Switzer was awarded second prize in the annual Sigma Xi research paper competition at the University of Illinois, Urbana-Champaign.

IV. Instructional Program

A. Overall Registration

Comparisons of total instructional units, and, separately, of those in the General Chemistry Program are given below on a semester basis for the 1970-75 period. The main point to note is that enrollments have leveled off after two years of 10%/year increases. The leveling off is largely due to stabilization of total campus enrollments plus saturation of the student trend to pre-med programs.

Sem.	1970-71	1971-72	1972-73	1973-74	1974-75
			Total Instructional Units in All Courses*		
I	24,264	22,903	25,198	27,295	26,520
II	21,086	20,775	23,214	25,252	24,116
Total	45,350	43,678	48,412	52,547	50,636
			Instructional Units in General Chemistry		
I	9,320	10,112	11,103	11,974	12,174
II	8,616	9,154	10,531	11,420	11,249
Total	17,936	19,266	21,634	23,394	23,423

*An instructional unit is a student semester credit hour or equivalent (one graduate unit equals four semester hours).

B. Teaching Loads

In the preceding two years (1972-74) the 10%/year increase in course registration mentioned in Sec. IV. A. was compensated partially by a 5% increase in TAs. However, the lack of funds led to an overall increase of 10% during those two years in the teaching loads of our TAs, as shown by the five-year synopsis given below. This was handled mainly by increasing the effective class size of our multi-section courses, especially in general chemistry.

The situation was alleviated by the 2% drop in enrollments last fall and by a 4% increase in the TAs budgeted. However, the cumulative effects of inflation upon our operating budget led us to limit spring semester enrollments in organic (Chem. 131 & 134) and general (Chem. 100 & 101) chemistry by about 150 students and again increase teaching loads in order to transfer $15,000 from TA salaries to expenses. The separation of lab from the lecture-discussion part of Chem. 101-102, described in Sect. II. E., was made in good part because of these continued budgetary problems. It is hoped that in the future many students who take Chem. 101 will defer the lab (Chem. 105) to the semester in which they take Chem. 102. Attrition from and after Chem. 101 is considerable so this should result in much less "wasted" laboratory experience and instruction, and help reduce the demands upon our resources to a more tractable level.

Sem.	1970-71	1971-72	1972-73	1973-74	1974-75
	Graduate Teaching Assistants Employed				
I	95.68	90.07	92.65	97.31	101.75
II	81.95	79.22	83.90	88.95	88.17
Average	88.80	84.64	88.27	93.13	94.96
	Ratio of Total Instructional Units to FTE Teaching Assistants				
I	254	254	272	281	261
II	258	262	277	283	274
Average	256	258	275	282	267

The ratios of instructional units to FTE TAs given above do not allow explicitly for changes in faculty size; however, the latter have been small compared with registration changes and with changes in FTE TAs. Therefore, the ratios are a valid indicator of the amount of instruction delivered by faculty and also by TAs in the School, over the period.

The projections for 1975-76 suggest a slight decrease (1%) in TA needs, compared with this year. However, the funds budgeted are inadequate. Therefore, in order to maintain the quality of our teaching program, enrollments will be curtailed by about 200 students this fall in Chem. 100 and 101. This should give us an IU/FTE ratio about that of 1970-72.

C. Teaching Evaluation

Visiting quiz section TAs to improve and evaluate their teaching has always been a problem--too many TAs, too few visiting professors. Either it was too late to reap much benefit or the visit occurred too early to be a fair evaluation. This year in the General Chemistry Program, Paul Loeffler suggested using two highly qualified TAs, Joe Gleich and Brad Glorvigen, as non-evaluating visitors. Ed Curran and Steve Zumdahl added the dimension of offering each TA the opportunity to be TV taped in his own classroom. If the TA wished, no one but he would view the tape. All TAs elected to be taped and they felt it was of considerable help in their teaching. Finally, the professors visited all classes in the last third of the semester, to evaluate and further assist the TAs in self-improvement.

The Committee on Evaluation of Instruction served this year as the nucleus of the SOCS Committee to select faculty and TA nominees for the campus-wide excellence in teaching award. With the membership of the General Chemistry Committee it will screen nominees and make recommendations for the special Awards for Excellence in Teaching (this year limited to teaching assistants in the General Chemistry Program).

The principal activity of the Committee this year was supervision of the second (and final) year of trial use in the School of the five Evaluation of Instruction forms. (These forms are used in every section of every course to obtain student opinion of the performance of faculty and teaching assistants.) It is hoped that a synopsis of the experience of the two-year trial period can be presented to the faculty of SOCS early in the fall so that they will have information upon which to base decisions concerning the future scope and status of the program.

D. PLATO

During the summer of 1974, twenty-one additional PLATO IV terminals were installed in 301A Chemistry Annex, raising the total number of terminals in that classroom to twenty-nine. A microwave link to CERL was also installed as part of the communication system to the computer at CERL. These terminals were used to provide interactive self-paced instruction for students in Chem. 100, 102, 103, 108, 131, 136, 338 and 431. Lesson material on PLATO was a required part of Chem. 136, 338 and 431 in the fall and in Chem. 100, 103, 131 and 338 in the spring semester. General chemistry students used the PLATO system for over 4,600 hours while organic students, for whom more lesson material is currently available, used the system over 16,000 hours. Total use of chemistry lesson materials developed here by users of the PLATO network throughout the country was in excess of 31,000 hours this past year.

In general, student acceptance of the system has been good. For example, although Chem. 131 students spent an average of three hours per week on PLATO, only 9% of those responding to a survey felt there should be fewer required programs and 97% indicated that the use of PLATO helped them learn organic chemistry.

"Touch" panels have just been installed on the terminals in Chemistry Annex. This makes it possible for students to interact with lesson material by simply pointing at something on the screen. In many cases this greatly facilitates student-computer interaction.

V. Services and Facilities

A. Chemistry Library

Financial pressures have been increasing and have affected both the total hours the library has been open (especially during holiday periods) and, more seriously, the acquisition of books and continuation of journals. The senior staff has been polled with regard to its opinion as to which journals are indispensable and which should be discontinued. It is hoped that the situation is still not so critical that journals important to faculty cannot be provided either in the chemistry department library or in one of the departmental libraries nearby.

The Chemistry Library is open 106 hours per week for the use of faculty, staff and students of the School of Chemical Sciences. Staffing the library during vacations and interim periods with non-academic and student help continues to be a difficult problem which affects the service we are able to give our patrons during these times. Hours are 8 a.m. to midnight Monday through Friday, 9 a.m. to midnight on Saturday, and 1 p.m. to midnight on Sunday.

The collection of 40,140 volumes consists mainly of journals and other serial publications. A total of 760 titles are currently being received, an increase of 35 titles over last year. To meet the budget, the library serials department has asked the departmental libraries to decrease their periodical subscriptions by 25% and their continuations by 20%. We are making every effort to maintain the excellence of the collection in spite of this forced cut in the budget. The library is currently receiving microfiche which provides supplementary information to articles appearing in some ACS journals.

An inventory of the entire collection revealed that over the last year, 373 books and journals were found to be missing.

During the first eleven months of this year, the total circulation was 11,730, an increase of 5.9% over last year. Because the chemistry library is used primarily for research, most of the collection consists of journals, reference books and reserve books. Since these are used primarily in the library, the heavy use of these volumes is not reflected in the circulation statistics. The seat count which is taken hourly shows an increase again this year, thus causing overcrowding during times of peak use.

The number of pages of library material photocopied on the Xerox copier has also increased. A total of 136,175 copies, including both coin-operated copies and those charged to accounts, were made. This represents an increase of 6.8% over last year. Another indication of the strength and completeness of the collection is the number of requests from outside sources for photocopies of library materials. Requests from both domestic and foreign sources exceeded 7,286 copies.

B. Placement Office

The 1974-75 year was one of up's and down's for the recruiting activities scheduled through the Placement Office. Although our fall recruiting schedule was well filled, shortly following the close of recruiting in November, a number of employers who had visited the campus notified us that their number of positions to be filled had been sharply cut or their hiring was "frozen." This situation most seriously affected our PhD chemists. As a consequence of the worsening general economic situation, our spring recruiting period was lightly scheduled. In addition we experienced a 23% rate of cancellation of confirmed schedules which left us with 61 completed employer visits. Throughout the year the employment rate for chemical engineers continued to be excellent. In several instances during both recruiting periods schedules were cancelled by employers seeking BS chemical engineers because of insufficient student interest. The decrease in traditional jobs for chemical engineers in chemical companies has been overbalanced by the creation of new positions concerned with pollution control and energy sources.

Currently there are two BS biochemists, two BS chemical engineers and one BS chemist who worked through our office that have not accepted employment. In addition two PhD chemists, one PhD chemical engineer, and one MS chemist, one MS biochemist, and one MS chemical engineer, with geographic limitations, are seeking professional employment. We are continuing to assist these people in various ways to find permanent employment. (As of August, 1975.)

Once again the Placement Office and Phi Lambda Upsilon co-sponsored two pre-recruiting workshops to acquaint students with the interview process. We were privileged to have four guest participants from various industries share their experiences and advice for the benefit of our students. We have found that our workshops held prior to the fall and spring recruiting periods greatly assist our chemical science students in preparation for interviewing.

Other regular functions of the Placement Office this past year have included the semi-monthly mailing of our "Employment Opportunities Bulletin," which contains current position listings, to interested alumni and recent graduates who are still seeking employment. This past year the industrial and academic vacancies listed decreased from 1638 to 688 and from 621 to 334, respectively. This, again, reflects the tightening of the job market nationwide. Also, monthly, we continued to send our "Bulletin of Available Alumni" to over 300 employers located throughout the United States. This Bulletin lists mini-resumes of alumni who are available and wishing to relocate. Sixty-five out of 118 alumni who were registered with our office accepted new employment. Approximately 37% of these people indicated that our bulletins were responsible for providing the leads for their new positions.

This past spring, in an effort to build up our employer clientele, we sent letters and informative brochures to over 300 industrial firms that employ chemists and chemical engineers, inviting them to interview students through our office. We also indicated that we would be happy to publicize immediate openings and send resumes of students and alumni. We hope that our employer roster will continue to grow, especially in these depressed hiring conditions.

In general, student interest in interviewing with employers was high during both recruiting periods except for the abundance of employers from which the BS chemical engineers had to choose. On several Monday mornings when new schedule sheets were released, students would be lined up at the office door. In a number of instances, employers interviewing PhD chemists extended their schedules to accommodate more interviewees.

Our survey of the 1974-75 baccalaureate graduates indicates their future plans:

Baccalaureate Graduates	Chem. Curric.	Science & Letters*	Chem. Engrg.
Employed	6	14	23
Graduated/Professional School	16	46	11
Undecided	0	4	0
No Information	4	4	1
Seeking Employment	2	16	2
Totals	28	84	37

*Includes biochemistry and chemistry graduates.

Plans of chemists, biochemists, and chemical engineers completing the PhD degree requirements are as follows:

PhD Graduates	Chem.	Biochem.*	Chem. Engrg.
Industrial/Government Employment	30	1	6
Academic Employment	6	1	0
Postdoctoral Research	28	2	1
Military Obligation	1	0	0
Foreign, Returning Home or Still Looking	3	0	1
Totals	68	4	8

*Figures include those who worked through our office.

Information on monthly industrial salaries accepted by our graduates is listed below:

BS Graduates:	Salary Range	Salary Average
Chemistry Curriculum	$1100 - $975	$1027
Science & Letters Curriculum	$1100 - $700	$ 885
Chemical Engineering	$1450 - $917	$1179
MS Graduates:		
Chemistry	$1200 - $825	$ 967*
Chemical Engrg.	$1375 - $1200	$1299

*This figure is low because the majority of MS chemists accepted positions with government agencies.

PhD Graduates:	Salary Range	Salary Average
Chemistry	$1875 - $ 917	$1520
Chemical Engrg.	$1750 - $1550	$1668

Four PhD chemists accepted academic employment. Salaries ranged from $1389 to $1220 per month for nine months with the average being $1318.

Plans for the 59 postdoctoral people who had contact with this office are given below:

Plans of 1974-1975 Postdoctorates

Dept.	No.	Indus./ Gov't	Acad. Emplmt.	Post-doc	No Info.	Looking	Stay UI
Biochem.	14	1	0	0	4	1	8
Chem. Engrg.	2	2	0	0	0	0	0
Chemistry	43	14	5	3	2	3	16

The salary average for chemists who accepted industrial employment was $1538 and the salary for the one chemical engineer for whom we have salary information was $1875. The salary average for five chemists who accepted academic employment was $1482 per month for nine months.

C. Shops and Service Laboratories

During the past year, the annual proposal submitted by the Department of Chemistry to the National Science Foundation for research instruments was funded in the amount of $121,200. With additional funds obtained from the Research Board and other sources, we are in a position to add a $202,000 automated x-ray diffractometer facility to the School's services. The facility will include a sophisticated graphics system for display of x-ray structures and other uses in connection with research and teaching. The x-ray facility will be under the direction of Professor Iain Paul, who will use it for up to 50% of its operating time in his own research. The remaining time on the instrument will be devoted to structural work by and for other members of the faculty. It is anticipated that a postdoctoral research associate will be employed, using funds from various research grants, to help carry out the latter category of structural work.

This year also saw the addition of several improvements of the instrumentation in the nmr lab, largely via the NSF research instruments grant made in early spring of 1974. In particular, a new ^{13}C FT spectrometer recently became operational. Newly acquired equipment is on hand for modifying the XL-100 for ^{31}P FT operation.

D. Building and Space

Work is now underway in preparation for the installation of a new 3100 gal liquid nitrogen storage tank at RAL, just NE of the junction between the old and new parts of the building. This includes remodeling for a new liquid nitrogen dispensing area in room 64 RAL. This change should give us adequate storage capacity to survive a once-a-week delivery schedule (which the suppliers prefer) and erratic deliveries that we often experience during the summer. Our efficiency for supplying liquid nitrogen should also be greatly increased.

Remodeling and non-recurring maintenance projects financed from School funds during the year totaled about $56,000, which is down $14,000 from last year. More than 75 projects were accomplished.

As noted in I. A., Mr. Richard Lytle will be retiring from his position as Chief Building Engineer in RAL at the end of August. His dedicated service has been a dominant factor in keeping the facilities in RAL in top condition.

E. Storerooms

Two appreciable steps were taken during the year in our long range program of reviewing storeroom operations and restructuring them to improve effectiveness and reduce costs. Last summer we completed the consolidation of the analytical and chemical engineering storerooms in Adams Lab. Monthly issues from the analytical storeroom had been averaging only about $600/month. Therefore, after a detailed analysis of the items stocked and issued from the various storerooms, it became apparent that we should move the analytical storeroom out of 136-8 RAL into the chemical engineering storeroom in 104 and 204 RAL. Also, the latter space was remodeled to improve its utility. An important change was the installation of an internal staircase between the two levels which enables dispensing to be handled at the lower level, from 104 RAL. Another benefit is that the 600 sq. ft. released in the new addition by the move was readily reconverted to research lab usage, helping to accommodate some of the increased graduate student numbers in analytical.

The second change, made with the concurrence of the Executive Committee, is the establishment of a Storeroom Committee for the School. The new committee will operate in a manner similar to the long-established Service Facilities Committee. It will be responsible for recommending overall School storeroom policies, procedures and operating structure. This will include, but not be limited to, any additional storeroom consolidation or restructuring, the shifting of inventory between storerooms, eliminating duplicate items in storerooms, establishing storeroom operating budgets, and preparing personnel and nonrecurring requests for all storerooms within the School. This will permit greater coordination between the storerooms than at present and permit better School-wide control of the storeroom inventories. The committee will consist of the faculty members with overall responsibility for supervising a storeroom, with Larry Hess an ex officio member and J. M. Waters as a technical advisor.

In the past, the funding of a storeroom was part of the state operating budget for the area with which it was associated. This often led to close-out problems at the end of a fiscal year. Therefore, on a trial basis, it is planned to separate the funding of the storerooms from the area and departmental operating budgets. Each storeroom will have two types of accounts: 1) a state appropriation for operating supplies and expenses, overtime, and student labor and 2) a supply account in which all purchases and issues of stock will be made. There will also need to be provision within the system for replenishment of inventory losses, for handling obsolescence, for inventory expansion to accommodate new items, and for managing any unexpended funds or deficit at the end of a fiscal year.

The Chairman of the committee will be its spokesman and be responsible for carrying out its recommendations. In addition, he will have overall responsibility for storeroom personnel, inventory, and funding. Reassignments of personnel or personnel problems within the Stores system will be handled through the Chairman so that consideration of the overall effect on the School's stores operations can be made.

The individual storeroom supervisors will be responsible for carrying out the daily storeroom operations and supervising the personnel of their storeroom. They will be responsible for maintaining inventory levels as determined by the Committee and for seeing that the storeroom operates within the State funds appropriated for its annual operations. Stores stock purchases and issues will have to be balanced during the year in order to insure that the supply account balances out at the end of the fiscal year. The storeroom supervisor also will be responsible for approving vacation and sick leave of employees in the storeroom and, along with the Chairman, will make arrangements for necessary substitutes. The storeroom supervisors will notify the Chairman of any changes in operations affecting the overall policies and procedures established by the Committee.

The present structure of our storeroom system is summarized below:

Storeroom	Supervisor
256 Noyes Lab (Consolidated Storeroom)	J. P. Hummel
469 Noyes Lab, 371 RAL (Organic Storerooms)	J. A. Mullen (R. M. Coates)
4 CA, 204 CA, 304 CA (General Storerooms)	E. Curran (G. P. Hiaght, Jr.)
104 RAL, 204 RAL, 4a RAL (Consolidated Storerooms)	J. Jonas
308 RAL, 406 RAL, 211 NL (Biochemistry Storerooms)	Frank Palmer (H. E. Conrad)
125 NL, 33 RAL (Electronics, Electrical Storerooms)	L. R. Faulkner
114 NL (Glass Shop)	G. D. Stucky

VI. Administration

A. Affirmative Action Program

One of our major concerns continues to be the need to insure that we do not discriminate in any of our operations for reasons of sex or of racial and ethnic background. This applies to students as well as to staff, so a number of different aspects and groups are involved, reflecting the overall structure of the University.

Non-academic staff are employed via the Personnel Services Office, which is governed by the University Civil Service System of Illinois. We have a reasonable steady-state composition of our overall staff, but continued efforts will be necessary to reduce the stratification of the distribution by job classification.

Recruitment of the faculty and academic/professionals is governed by Campus, College and School Affirmative Action Plans. Turnover in these staff categories is slow; furthermore, relatively few women and even fewer minority group members are in the available labor pools. A good deal of care and effort has been spent in soliciting applications for these positions and, indeed, the compositions of the application pools for our openings demonstrate that the procedures employed are non-discriminatory on the basis of sex or race. However, changes in the composition of our academic staff will be slow because of the slow turnover rate and the very small fraction of women and minority group members among the applicants.

This brings one to the composition of the undergraduate and graduate students in our programs, where some substantial changes are visible. The number of women and minority group students in chemical engineering is clearly increasing. Five blacks are in our junior and senior classes. Two seniors are women. Fourteen freshmen are women. These figures represent a fantastic increase for chemical engineering. One present graduate student is a woman, and two more will enter in August 1975.

In our graduate student recruitment this year we contacted 42 predominantly black schools by letter, telephone and/or visit. We have three students coming from contacted schools (one in organic, two in analytical) and we made one offer to a black student that was not accepted. Seven schools were visited (Bennett College, Fayetteville State, North Carolina A & T, Morehouse-Atlanta University, Jackson State, Tuskegee). Visits were made by Mr. Covington, Mr. Williamson, Miss Rivers, and Drs. Beak, Katzenellenbogen, Smith and Stucky. Eleven other schools were contacted both by letter and by phone and did not wish to be visited. Dr. Prince Rivers of Fisk University visited our campus. It appears that the recruiting effort has been somewhat successful in establishing some fruitful contacts but that new directions should be considered. Reports to the undergraduate schools about how present students are doing or visits to Illinois by staff members from schools we particularly desire students could be helpful in the future.

As an experiment, a minority student was given a 1/6th time appointment as a tutor whose primary function was to help incoming students, particularly minority students, acclimate themselves to the graduate school environment and tutor in the introductory coursework taken during the first year. Discussions with the minority students suggested that it was not necessary to formalize such a position or to single out a particular individual, as mutual assistance was provided by minority students as a matter of course. Therefore, the experiment will be discontinued.

The recruitment of women graduate students was up this year. A year ago in chemistry there were only five acceptances from 22 offers; this year, it was 13/33 so last year's experience apparently was a statistical fluctuation. Averaged over the two years, about 10% of the graduate admissions in chemistry have been women, which is the national average.

B. Financial Support

In some ways the financial picture worsened during the year. The most troublesome aspect was our state operating budget. Wages and expenses funds have remained static at about $580,000 for four years in a row. Also, our state equipment budget was eliminated four years ago and half ($50,000) replaced with CRR funds, which also have remained static. Continued inflation plus undergraduate enrollment increases have made it increasingly difficult to operate without lowering the quality of our programs. This year we could no longer absorb the decrease in effective resources by economies, postponements, or transferral of further operating supply costs to research grants.

The funding gap was about $120,000 which we were able to bridge by the following non-recurring measures: Mort Weir provided $50,000 from campus reserves; Dean Rogers, $5,000 from LAS; we limited enrollments in the spring semester, as described in Sec. IV. B., and transferred $15,000 from TA salaries; and we squeezed $20,000 from leave monies and unfilled positions to use for equipment. Also, inventories dropped $20,000 and we had a $10,000 deficit.

The coming year promises to be even worse. The Governor's 6% summer cut in appropriations reduced the University's salary increases from the earlier agreed on average level of 9.5% to 7%. Moreover, in order to maintain a 7% level, reserves were used up along with the funds that would otherwise have provided increases in the expense and equipment categories. So we start out the new year with a $120,000 gap and at least another 10% of inflation (~$50,000) to contend with. Unless the University receives some sort of deficiency appropriation or squeezes out "reserve funds" by controlling replacement hiring, we will have to make some substantial changes to survive the new year.

Federal and other non-state funding was up a modest amount (6%) which is less than inflation for the year. This follows several years of net increases by a few percent per year in constant dollars, as may be seen in the synopsis for the six-year period, 1969-75. This year's grants included 43 NIH; 48 NSF; 1 EPA; 7 MRL (2 AEC/ERDA, 3 NSF, 2 DAHC); 6 ARO; 3 ONR; 1 AFOSR; 79 from private sources (industry and private foundations); and 15 from the Campus Research Board. Prospects for the coming year are that we'll probably just about keep up with inflation. If we're fortunate, there may be enough increase in federal

funding to compensate for the decrease in state funding, but it doesn't seem very likely. It's clear we'll have to struggle to remain solvent, without reducing the quality or extent of our programs.

SOURCES OF OUTSIDE RESEARCH SUPPORT EXPENDITURES

SIX YEAR SYNOPSIS**

	1969-70	1970-71	1971-72	1972-73	1973-74*	1974-75
NIH Research Grants	937	1,079	1,162	1,372	1,660	1,686
NIH Training Grants	310	274	230	279	208	272
NIH Postdoctoral Allowances	9	3	6	4	4	-
TOTAL NIH	1,256	1,356	1,398	1,655	1,872	1,958
Environmental Protection	-	-	-	80	52	65
National Science Foundation	873	819	1,019	1,126	1,303	1,364
Materials Research Lab (URDA)	123	223	80	88	78	77
Materials Research Lab (NSF)	228	219	288	179	129	175
Materials Research Lab (AF)	-	-	-	-	119	78
Army Research Office	47	54	54	60	75	57
Office of Naval Research	15	45	29	31	27	48
Air Force OSR	-	-	1	15	28	22
Department of Agriculture	12	12	-	-	-	-
Department of Interior	24	23	35	10	-	-
TOTAL U.S. GOVERNMENT	2,578	2,750	2,904	3,243	3,683	3,844
Grants from Private Sources	121	168	204	219	214	232
Graduate Research Board	109	105	233	113	194	193
GRAND TOTAL	2,808	3,023	3,341	3,575	4,091	4,269

NOTES:

The data are given in thousands of dollars.
* This column has been revised to correct errors in the report for 1973-74.
** Projections based on first 10 months' actual expenditures.

VII. Alumni

A. Alumni Related Activities of the School

The functions and activities of the Alumni Affairs Committee of the School were continued largely as in previous years. In addition, the Committee has embarked upon an important and ambitious expansion of our alumni program. They have begun the compilation of a permanent file of former staff members and postdoctoral research associates. This is a formidable task, for there are more than eight hundred of these people, and there is now no central record of their names, much less their current addresses. Once the file is complete, the Committee will try to keep in touch with these people through the Alumni News Letter and in other ways.

B. Awards and Honors to Our Alumni

Many alumni of the School have received honors since our last report. The list which is submitted here may not be complete, and almost certainly, other honors will be awarded before the beginning of the next school term. The list, as of now, includes:

William J. Bailey (Ph.D., 1946), Professor of Chemistry at the University of Maryland--became President of the American Chemical Society.

Fred Basolo (Ph.D., 1943), Professor of Chemistry at Northwestern University--the ACS Award for Distinguished Service in the Advancement of Inorganic Chemistry, sponsored by Mallinckrodt, Inc.

Arnold O. Beckman (B.S., 1922; M.S., 1923), Founder and Chairman of Beckman Instruments--the ACS Orange County Section's Service Through Chemistry Award, and the Award for Outstanding Business Achievement from the University of Southern California.

R. Byron Bird (B.S., 1947), Professor of Chemical Engineering at the University of Wisconsin--the Bingham Medal of the Society of Rheology and the Warren K. Lewis Award of the AIChE for contributions to chemical engineering education.

James P. Collman (Ph.D., 1958), Professor of Chemistry at Stanford University--ACS Award in Inorganic Chemistry, sponsored by Texas Instruments.

Sheldon K. Friedlander (Ph.D., 1954), Professor of Chemical Engineering and Environmental Health Engineering at Cal Tech--Alpha Chi Sigma Award in Chemical Engineering Research from the AIChE and Elected to membership in the National Academy of Engineering.

Sidney M. Hecht (Ph.D., 1970), Assistant Professor of Chemistry at MIT--Awarded Alfred P. Sloan Research Fellowships and USPHS Career Development Award.

Herbert O. House (Ph.D., 1953), Professor of Chemistry at Georgia Institute of Technology--the ACS Award for Creative Work in Synthetic Organic Chemistry, sponsored by the Synthetic Organic Chemicals Manufacturers Association.

John R. Huizenga (Ph.D., 1949), Professor of Chemistry at University of Rochester--the ACS Award for Nuclear Applications in Chemistry, sponsored by G. D. Searle and Company.

J. Franklin Hyde (Ph.D., 1928), Dow Chemical Co.--the Thomas Midgley Award of the American Chemical Society.

Carl C. Larson (B.S., 1918; M.S., 1921), of Springfield, Illinois--the Charles Emerson Medal of the Water Pollution Control Federation.

John H. Sinfelt (Ph.D., 1954), Exxon Co.--Elected Member of the National Academy of Engineering.

Klaus D. Timmerhaus (B.S., 1948; Ph.D., 1952), Professor of Chemical Engineering at the University of Colorado--Elected Member of the National Academy of Engineering and Vice President of the AIChE.

Robert W. Vaughan (Ph.D., 1967), California Institute of Technology--the Fresenius Award from Phi Lambda Upsilon for outstanding research by a chemical engineer under 35 years of age.

William J. Ward (Ph.D., 1965), General Electric Co.--Received the A. P. Colburn Award of the AIChE.

* * * * * * * * * * * * * * *

C. S. Marvel (M.A., 1916; Ph.D., 1920; U of I Faculty, 1920-61), Emeritus Professor of Chemistry at University of Illinois and Professor of Chemistry at the University of Arizona--His 80th birthday was honored by the C. S. Marvel Symposium. The Beta Tau Chapter of AXE and the Southern Arizona Section of the ACS will cosponsor a biennial Marvel Symposium beginning in 1977.

Max S. Peters (U of I Faculty, 1951-62), Dean of Engineering at the University of Colorado--Founders Award of the AIChE.

Sherlock Swann, Jr. (U of I Faculty, 1927-69), Emeritus Professor of Chemical Engineering at the University of Illinois--Elected an Honorary Member of The Electrochemical Society.