Annual Report 1973-74

SCHOOL OF CHEMICAL SCIENCES

Biochemistry, Chemical Engineering, and Chemistry

August, 1974

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Preface

Although the requirement of an annual report as such was discontinued by President Corbally and the LAS College as of 1972-73, one was prepared and distributed internally for our School a year ago for 1972-73, using a modified format better suited to our own needs. The response by our staff to the report was sufficiently supportive that I believe it to be worth the effort to do the same thing for the 1973-74 year just ended.

Emphasis has been placed upon information and data with the widest internal interest or usefulness in planning and decision making during the coming year. Most of the data included and much of the actual textual material have been provided by the faculty and staff responsible for the various aspects of our operations. Personally, I believe that the gathering and organization of this material serves a very useful function in requiring a conscious analysis and evaluation of the year's work by those who do it.

This applies to me as well. I obtain a much better overview of the School's problems, successes and status in the course of compiling this report than would otherwise be the case. However, I do hope that the product will be informative to others as well. My intent is to continue the practice and therefore I would welcome suggestions at this time as to ways in which the report for 1974-75 might be made more useful and interesting.

H. S. Gutowsky
Director

Highlights

Faculty and Staff - Four new assistant professors are joining the faculty in 1974-75: Michael Glaser (biochem.) in August, Walter F. Mangel (biochem.) in January, David J. Shapiro (biochem.) in November, and John W. Birks (analytical) in August. The appointment of Dr. Mangel is to fill a new position in the School of Basic Medical Sciences; the others are replacements. Mr. Evan Melhado has been appointed, effective in August, as a Lecturer; the appointment is joint (50-50) between Chemistry and History to provide a person qualified to teach our History of Chemistry course.

Three persons are being appointed to the academic/professional staff to fill vacancies due to retirement or resignation: Georgean Arsons as Placement Director, Stephen E. Ulrich as Spectroscopist in charge of the Molecular Spectroscopy Lab, and Frank Palmer as Staff Assistant in Biochemistry.

Awards and special recognition of our faculty during 1973-74 included the following. In biochemistry, I. C. Gunsalus served as President, American Society of Biological Chemists and Ana Jonas was awarded a 5-year Established Investigatorship of the American Heart Association. In chemical engineering, H. G. Drickamer received the Langmuir Award in Chemical Physics of the ACS; C. A. Eckert, the A. P. Colburn Award of AIChE; and J. W. Westwater, the Vincent Bendix Award of the American Society for Engineering Education; while T. J. Hanratty and J. W. Westwater were elected to the National Academy of Engineering. In chemistry, David Chandler and D. F. S. Natusch were appointed as Associate Member and Fellow, respectively, in the Center for Advanced Study; J. A. Katzenellenbogen and P. G. Schmidt shared a special U. of I. award for an outstanding undergraduate instructional development project; W. H. Flygare was elected a member of the National Academy of Sciences and of the American Academy of Arts and Sciences; H. S. Gutowsky received the Midwest Award of the St. Louis ACS Section and the Award of the International Society of Magnetic Resonance; and J. A. Katezenellenbogen was awarded an Alfred P. Sloan Fellowship.

Undergraduate Programs - Overall enrollments and degrees granted seem to have leveled off, but with a continued shift from the chemistry S&L major (or area of concentration to use the new terminology) to the biochemistry S&L programs. Grade inflation does not seem to be serious at any level of the School; however, a systematic effort is being initiated to inform the instructor in each course, each semester, of previous grade distributions in that course.

A PLATO "lab," with 25 terminals, has been set up on the 3rd floor of Chem. Annex, under the care of Stan Smith. It will be employed extensively during the coming year in testing on a larger scale than hitherto possible, lessons developed for general chemistry and beginning organic.

Graduate Programs - Incoming students and total enrollments have continued to recover from their 1971-72 minimum, as have the Ph.D.s granted. Postdoctorates increased by 11 to a total of 86 in 1973-74, a new high attributable to increased federal research support.

In biochemistry, a major rearrangement was made of the introductory courses to provide a "two track" system; one a terminal pair of lecture and lab courses (Biochem. 350, 355) for students in preprofessional programs and not planning intensive study of biochemistry; the other, a two-semester lecture course (Biochem. 352-3) with lab (Biochem. 355) required of majors and available to those desiring in-depth training.

Several of our graduate students received special awards: Barbara J. Slatt (analytical) shared the 1973 Certificate of Merit from the Environmental Division of the ACS, with D. F. S. Natusch, for the best paper presented before the Division in 1973; Brian W. Renoe and Terry O. Woodruff (analytical) received 2 of the 7 one-year $5,000 fellowship awards of the ACS Division of Analytical Chemistry; and Graham C. Walker (organic) took first prize in the annual Sigma Xi student paper competition of the local chapter.

Instructional Program - Enrollments increased by nearly another 10% this year compared to last, giving a 20% total increase in instructional units since 1971-72. Some of this is due to overall increases in student population but most is attributable to major shifts in the enrollment patterns, associated largely with increased student interest in preprofessional curricula.

The chief problem in dealing with these additional 2,000 course registrations has been funds. Funds have not been provided for additional faculty nor for the operating expenses of the lab courses which most of the added students require. The relief provided has been an ad hoc increase in TA funds sufficient to increase the FTE by 10% over the two years, half of the student increase. As a consequence TA loads have been increased by an average of 10%.

The problems in handling the added students have become increasingly acute. Unless adequate resources are provided to us we will have to cut back on the enrollments.

The School has developed a set of questionnaires for student evaluation of courses and instructors. They were tried and modified during the year and their full-scale systematic use and analysis is planned for 1974-75.

Placement - Recruiting activity in the Placement Office continued to be rather light, but the employment picture was visibly better. Increased industrial interest was particularly noticeable at all degree levels of chemical engineering and at the Ph.D. level in chemistry. For the fourth year, the Office carried out an active and useful service in helping alumni wishing to relocate. Student interest in scheduling interviews with recruiters remained intense.

Financial Support - Budgetary problems due to the squeeze in state funds, increased enrollments and inflation have become acute. What little "slack" there was in the system has been used up. Our survival this year was made possible by a continued increase in non-state funding, the total of which was up 15% compared to the year before. Operations in 1974-75 will require either an increase in state funds or a cut in enrollments.

Alumni - Our main contact with alumni continues to be the annual newsletter. Also, we have a luncheon at the fall ACS meeting and a social hour at the spring meeting. In April, the social hour at Los Angeles was the most successful we've had so far.

The alumni, like our faculty, continue to have their talents recognized. Herbert E. Carter (Ph.D., 1934) now at the University of Arizona was awarded an honorary Sc.D. from the University of Illinois and had a ridge in Antarctica named after him; Chris Enke (Ph.D., 1959), of Michigan State received the ACS Award in Chemical Instrumentation; David R. Kearns (B.S., 1956), of the University of California at Riverside, the Gold Medal Award of the California Section of the ACS; Robert W. Holley (B.A., 1942) and Robert E. Sievers (Ph.D., 1960) received alumni achievement awards from the University of Illinois and of Texas, respectively; and Robert L. Pigford (Ph.D, 1942), the Founders Award of the AIChE.

I. Academic Appointments and Activities

A. Changes

1. During 1973-74, one of our emeritus professors died. This is Professor Duane T. English who was a member of the faculty in analytical chemistry from 1916 until his retirement in 1959. Mary Jane Snyder, the wife of Professor Harold Snyder, in organic chemistry, died in April 1974.

Although there were no retirements effective in 1973-74, one was announced in the latter part of the year which will be effective October 1, 1974. This is the early retirement of Professor Herbert A. Laitinen in analytical chemistry who will leave for a part-time appointment at the University of Florida. He has been a member of our faculty since 1940.

Another retirement, from our non-academic staff, of particular interest to students and faculty is that of Margaret Durham who has been in charge of our Placement Office for 16 years. Her retirement is effective October 1, 1974.

Other losses in our faculty and academic/professional staff effective on or about the beginning of the 1974-75 year include the following:

Biochemistry

Karl M. Dus, Assistant Professor, to the St. Louis University Medical School.

Bruce E. Marshall, Staff Assistant, to the School of Basic Medical Sciences on this campus.

John M. Wood, Professor, to be Director of an Institute at the University of Minnesota.

Chemical Engineering

John L. Hudson, Associate Professor, to be Director of the Air Pollution Division of the Illinois State EPA. Jack has taken a leave of absence without pay for a year to accept this position headquartered at Springfield; however, he will continue his graduate research program in our department and his family will remain here.

A. A. Kozinski, Assistant Professor, has returned to industry, in a position at Quaker Oats.

Chemistry

James G. Wetmur, Assistant Professor, to be Associate Professor of Microbiology at the Mt. Sinai Hospital of CUNY.

School

Robert L. Thrift, Spectroscopist in charge of the Molecular Spectroscopy Laboratory, to a similar position at the University of Minnesota.

2. Staff additions have consisted of replacements for earlier losses, with the exception of two of the assistant professors who are joining our biochemistry faculty. One of these, Walter Mangel, is being appointed to fill a new position in the School of Basic Medical Sciences; the other appointment (Michael Glaser or David Shapiro) was made possible by the award to Ana Jonas of a five-year Established Investigatorship Award of the American Heart Association; the Award pays most of her salary as an Assistant Professor, thereby releasing state funds in the Biochemistry budget to provide the additional appointment. Synopses of the background of the new appointees are listed below:

Biochemistry

Michael Glaser, Assistant Professor

Married, one child
Degrees: B.S., University of California, Los Angeles, 1966
Ph.D., University of California, San Diego, 1971
In September, 1971, Dr. Glaser joined the research group of Dr. Roy Vagelos in the Biological Chemistry Department at Washington University of Medicine in St. Louis where he has spent three years doing research in the area of membrane structure, function and biogenesis.

Walter F. Mangel, Assistant Professor, in School of Basic Medical Sciences (second semester 1974-75)

Married
Degrees: B.A., University of Illinois (Philosophy), 1963
Ph.D., University of Illinois (Biophysics), 1970
After completing his Ph.D. he was a postdoctoral fellow in the laboratory of Dr. Michael Chamberlin at the University of California, Berkeley, working in the areas of enzymology and nucleic acid biochemistry. In January, 1974, Dr. Mangel embarked on a year of study at the Imperial Cancer Research Institute in London, England.

David J. Shapiro, Assistant Professor (November, 1974)

Single
Degrees: B.S., Brooklyn College (Chemistry)
Ph.D., Purdue University (Biochemistry), 1972
From 1972 to the present time, Dr. Shapiro was a Helen Hay Whitney postdoctoral fellow in the laboratory of Dr. Robert Shimke in the Department of Biological Sciences and Pharmacology at Stanford University, Stanford, California. Dr. Shapiro's research interests are in the areas of cellular regulation and control of gene expression in eukaryotes.

Frank Palmer, Staff Assistant*

Married, 3 children
Degrees: Bradley University, 1955-58
B.S. in Microbiology, University of Illinois (1962)
Mr. Palmer has served as Field Engineer for Beckman Instruments since 1963, dealing mainly with installation and maintenance of research instruments such as centrifuges and analyzers.

*The appointment of Mr. Palmer to this position was recommended on September 17, 1974, but approval had not been received by the time this was prepared.

Chemistry

John W. Birks, Assistant Professor (analytical)

Married, one child
Degrees: B.S., University of Arkansas, Fayetteville, 1968
M.S., University of California, Berkeley, 1970
Ph.D., Expects to receive Ph.D. in December, 1974
Mr. Birks did graduate research with Professor Harold Johnston at the University of California, Berkeley, on chemical kinetics including the effect of SST airplanes and nuclear explosions on the stratospheric ozone shield. He plans to continue his research on stratospheric chemistry and extend it to include the effects of chlorine compounds used in aerosol spray cans.

Evan M. Melhado, Lecturer (joint, 50-50, with Department of History)

Married
Degrees: B.S. in Chemistry, Carnegie-Mellon University, 1967
M.A. in History, Princeton University, 1970
Mr. Melhado is interested in the history of science, and is completing his Ph.D. thesis on the development of 19th-century organic chemistry, with Professor Thomas S. Kuhn of Princeton University. He has taught as an Instructor at Washington University (St. Louis) during 1971-74.

School

Georgean E. Arsons, Placement Director

Married, one child
Degrees: B.S. in Sec. Education, Ohio State University, 1965
Mrs. Arsons has served as Admissions Officer I and II at the University of Illinois from 1968 until taking this position, which has been reclassified as academic/professional.

Stephen E. Ulrich, Spectroscopist in charge of Molecular Spectroscopy Lab

Married, one child
Degrees: B.S., Pennsylvania State University, 1965
Ph.D., Cornell University, 1971
From October, 1970 Dr. Ulrich served as a postdoctoral fellow with Professor B. A. Dunell in the Department of Chemistry, University of British Columbia, engaged primarily in nmr research.

3. The following have been promoted to the rank indicated beginning with the 1974-75 academic year:

Chemistry

Iain C. Paul	to Professor
David F. S. Natusch	to Associate Professor of Environmental Chemistry in the Institute for Environmental Studies

B. Visiting Appointees for 1974-75

A comparison of the new appointees with the losses indicates that the net change going into 1974-75 is negative; indeed there has been a decrease in our regular staff, especially in chemical engineering and chemistry. However, the difference has been very largely made up by increasing the number of temporary, i.e., visiting faculty appointments. A brief synopsis, by department, of the visiting appointments is given below for 1974-75. Appointments are for both Semester I and II and limited to that period unless otherwise indicated.

Biochemistry

*Ford, Sharon, Visiting Assistant Professor, Semester I, from Visiting Assistant Professor, Biochemistry Dept., Univ. of Ill.

Chemical Engineering

Fell, Christopher J. D., Visiting Professor, Semester II, from Senior Lecturer, University of New South Wales, Australia.

*Nicolaides, George L., Visiting Instructor, two-thirds time, Semester I, from graduate student, University of Illinois.

*Plichta, Roman T., Visiting Instructor, two-thirds time, Semester I, from graduate student, University of Illinois.

*Soloman, Robert L., Visiting Assistant Professor, Semester I, from Assistant Res. Eng. IES, University of Illinois.

Chemistry

*Bodner, George M., Visiting Assistant Professor (general), from Indiana University (Ph.D. 1972), third year of a three-year appointment.

*Guss, Cyrus O., Visiting Professor, half-time (organic), retired Head of Chemistry Department, University of Nevada.

Hadjiioannou, Themistocles, Visiting Professor, half-time (analytical) from Professor, Analytical Chemistry, University of Athens.

*Hopke, Philip K., Visiting Assistant Professor (physical) from Assistant Professor, State University College Fredonia, N. Y.

*Livant, Peter D., Visiting Assistant Professor, full time (organic) from graduate student, Brown University (Ph.D., 1974).

*Loeffler, Paul A., Visiting Assistant Professor (general) from Rice University (Ph.D., 1973), second year of a two-year appointment.

Tanner, Stephen P., Visiting Associate Professor, two-thirds time (general) from Associate Professor, University of West Florida.

*Wood, Anne T., Visiting Assistant Professor (general) from Research Associate, Biochemistry Department, University of Illinois.

*Zumdahl, Steven S., Visiting Assistant Professor (general) from Assistant Professor, University of Colorado. This appointment may be renewed for a second and third year.

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

C. Leaves and Special Appointments for 1974-75

Chemical Engineering

Hudson, J. L., Semesters I and II, Leave of absence without pay; see Sec. I.A.

Chemistry

Haight, G. P., Jr., Semesters I and II, Sabbatical Leave

Hendrickson, D. N., Semester II, Center for Advanced Study

Leonard, N. J., Semester I, Sabbatical Leave

Martin, J. C., Semester II, Sabbatical Leave

D. Awards and Similar Recognition During 1973-74

Biochemistry

Gunsalus, I. C.	President, American Society of Biological Chemists
Jonas, Ana	Established Investigatorship of American Heart Association (1974-79)

Chemical Engineering

Drickamer, H. G.	Langmuir Award in Chemical Physics of ACS
Eckert, C. A.	A. P. Colburn Award of AIChE
Hanratty, T. J.	Elected Member National Academy of Engineering
Westwater, J. W.	Elected Member National Academy of Engineering; Vincent Bendix Award of American Society for Engineering Education

Chemistry

Bailar, J. C., Jr.	Elected Honorary Fellow of the Indian Chemical Society
Brown, T. L.	Chairman, Inorganic Division, ACS
Chandler, David	Associate Member, Center for Advanced Study, Semester II
Drago, R. S.	Distinguished Scientist Lectureship, Ithaca College
Flygare, W. H.	Elected Member National Academy of Sciences and of American Academy of Arts and Sciences
Gutowsky, H. S.	Midwest Award, St. Louis Section, ACS; Award of International Society of Magnetic Resonance; Appointed Member State Board of Natural Resources and Conservation
Halght, G. P., Jr.	Visiting Scientist Award of Western Connecticut Section, ACS
Katzenellenbogen, J. A.	Awarded Alfred P. Sloan Research Fellowship; U. of I. Award for an Outstanding Undergraduate Instructional Development Project
Laitinen, H. A.	Elected Foreign Member of Finnish Academy of Science and Letters
Leonard, N. J.	FMC Lecturer, Princeton University
Malmstadt, H. V.	Reilly Lectureship, University of Notre Dame
Natusch, D. F. S.	Fellow, Center for Advanced Study, Semester I; Award from ACS Environmental Division for best paper on environmental chemistry at ACS meetings during 1973.
Schmidt, P. G.	U. of I. Award for an Outstanding Undergraduate Instructional Development Project

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.	5	-
Conrad, H. E.	-	2
Dus, Karl M.	3,1	2,2
Gumport, R. I.	-	2
Gunsalus, I. C.	12,3	10,2
Hager, L. P.	6,2	3,1
Jonas, Ana	2	2,1
†McClure, W. O.	14[a]	6
Nystrom, R. F.	-	2
Ordal, G. W.	1	1
Robinson, J. L.	-	2
Storm, D. R.	-	-
Switzer, R. L.	1	2
Uhlenbeck, Olke	3	1
Weber, Gregorio	n.a.	n.a.
Wood, John M.	14,1	4,1

CHEMICAL ENGINEERING

Name	Lect.	Attend.
Alkire, R. C.	2	4
Drickamer, H. G.	8,5	1,1
Eckert, C. A.	5	1
†Hanratty, T. J.	-	4
Hudson, J. L.	2	3
Kozinski, A. A.	2	2
Sani, R. L.	-	3
†Schmitz, R. A.	5	1
Westwater, J. W.	2	3

CHEMISTRY

Name	Lect.	Attend.
Applequist, D. E.	-	1
Bailar, J. C., Jr.	[b]12,1	1,1
Barefield, E. K.	2	2
Beak, Peter	2	-
Belford, R. L.	3	1
Brown, T. L.	9	2
Chandler, David	4	2
†Coates, R. M.	8,1	1,1
Curtin, D. Y.	1	-
Drago, R. S.	6,8	-
†Faulkner, L. R.	2	3
Flygare, W. H.	7	2
Ford, W. T.	1	5
Gennis, R. B.	1	2
Gutowsky, H. S.	1	4,1
Haight, G. P., Jr.	8,2	5,2
Hendrickson, D. N.	1	1
Hummel, J. P.	-	2
Jonas, Jiri	5,1	4,1
Katzenellenbogen, J.	8	5
Laitinen, H. A.	5	2
Leonard, N. J.	9,1	5,1
†Malmstadt, H. V.	4	4
Marcus, R. A.	7,3	5
†Martin, J. C.	4,1	2
McDonald, J. D.	1	1
Natusch, D.	12,3	4,1
Paul, I. C.	3	1
Pirkle, W. H.	1	0
Rinehart, K. L.	8,2	4
Schmidt, P. G.	2	2
Secrest, D. H.	1	1
Shapley, J. R.	-	2
Smith, S. G.	6	-
Snyder, H. R.	-	1
Stucky, G. D.	4	1
Yankwich, P. E.	1	1
Yardley, J. T.	6	2

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

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

[b]Ten of these were on two ACS lecture tours.

n.a. means the information is not available.

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.	-	1
Gunsalus, I. C.	3	8
Nystrom, R. F.	1	-
Wood, J. M.	-	4

CHEMICAL ENGINEERING

Name	Ed. Bd.	Pan. & Com.
Alkire, R. C.	1	2
Drickamer, H. G.	3	3
Eckert, C. A.	1	1
Hanratty, T. J.	1	2
Hudson, J. L.	-	2
Schmitz, R. A.	-	3
Westwater, J. W.	3	5

CHEMISTRY

Name	Ed. Bd.	Pan. & Com.
Applequist, D. E.	1	-
Bailar, J. C., Jr.	7	1
Belford, R. L.	1	1
†Brown, T. L.	4	-
Coates, R. M.	1	-
Curtin, D. Y.	3	-
Drago, R. S.	-	1
Flygare, W. H.	3	2
Gutowsky, H. S.	1	9
Haight, G. P., Jr.	1	5
*Laitinen, H. A.	1	3
Leonard, N. J.	2	1
Malmstadt, H. V.	-	1
Marcus, R. A.	1	4
Martin, J. C.	1	3
Natusch, D. F. S.	-	1
Paul, I. C.	1	-
Rinehart, K. L.	3	4
Schmidt, P. G.	1	-
Snyder, H. R.	2	-
Stucky, G. D.	1	-
Yankwich, P. E.	-	1

†Associate Editor, Inorganic Chemistry

*Editor, Analytical Chemistry

II. Undergraduate Programs

A. Registration During 1973-74

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. The totals and their distribution by class are very similar to those for last year, except for a continued shift from the chemistry major (14-07) to the two biochemistry programs, of about 30 students.

	Fr.	So.	Jr.	Sr.	Total
Biochemistry					
32-14-06 (majors)	19	12	20	24	75
32-16-06 (premeds)	15	16	12	18	61
Totals	34	28	32	42	136
Chemical Engineering					
32-06 (curriculum)	37	43	34	41	155
Chemistry					
32-06 (curriculum)	41	29	36	56	162
32-14-07 (majors)	18	17	20	18	73
32-15-07 (prejourn)	--	--	--	1	1
32-16-07 (premeds)	39	37	28	19	123
32-18-07 (prelaw)	--	1	1	--	2
32-71 (teaching)	--	1	3	2	6
Totals	98	85	88	96	367

B. Five-Year Enrollment Trends

Comparisons of total registrations by semester in the several major types of undergraduate programs are given below. There do not appear to be any significant trends visible above the rather high "noise" level of year-to-year fluctuations. The main change is the 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.

Sem.	1969-70	1970-71	1971-72	1972-73	1973-74
		Biochemistry - S&L Majors			
I	(included under chem.)	-	72	100	134
II	(included under chem.)	37	81	104	137
		Chemical Engineering - Curriculum			
I	181	172	176	160	159
II	137	163	142	152	150

Sem.	1969-70	1970-71	1971-72	1972-73	1973-74
		Chemistry - Curriculum			
I	196	194	160	151	169
II	172	145	134	144	153
		Chemistry - S&L Majors			
I	287	313	248	292	221
II	261	286	214	246	173
		Totals - All Undergraduate Programs			
I	664	679	656	703	683
II	570	631	571	646	613

C. Degrees Granted over the Five-Year Period 1969-74

Degrees granted in the various 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 are at a high, while those in the S&L majors have dropped sharply.

Mo.	1969-70	1970-71	1971-72	1972-73	1973-74
		Biochemistry - BA and BS Degrees in the S&L Majors			
Aug.		0	2	2	2
Jan.		0	3	4	1
June		11	10	17	30
		11	15	23	33
		Chemical Engineering - BS Degrees in Curriculum			
Aug.	1	1	2	0	2
Jan.	15	7	10	5	5
June	14	23	17	30	28
	30	31	29	35	35
		Chemistry - BS Degrees in Curriculum			
Aug.	4	5	1	1	1
Jan.	5	6	3	4	4
June	23	20	12	21	36
	32	31	16	26	41

Mo.	1969-70	1970-71	1971-72	1972-73	1973-74
	Chemistry - BA and BS Degrees in All S&L Majors				
Aug.	8	3	2	10	2
Oct.	0	1	0	3	0
Jan.	8	4	17	10	8
June	29	47	45	45	28
	45	55	64	68	38
	Totals - All Undergraduate Programs				
Aug.	13	9	7	13	7
Oct.	0	1	0	3	0
Jan.	28	17	33	23	18
June	66	111	84	113	122
	107	128	124	152	147

D. Scholarships and Undergraduate Awards

For the 1974-75 academic year eleven $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 six in chemistry, five being funded from the income of the Roger Adams Fund, one from the Audrieth Fund, four by a grant from Monsanto and one by DuPont.

In addition, in chemical engineering undergraduate scholarship funds were provided for 1974-75 by the following companies:

Alcoa Foundation
Chevron Research Company
Chrysler Corporation
Marathon Oil Company
3M Company
Monsanto Company
Olin Corporation
University Oil Products Company

The Agnes Sloan Larson Awards, in the amount of $200 each, were presented by Mrs. Larson to the following five outstanding sophomore students, on January 22, 1974, before the Chemistry 108 class:

Charles F. Huber
Paul B. Johnson
Thomas O. Sidebottom
Mark A. Stanish
James L. Barbour

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

Reynold C. Fuson Award -	Dennis Houston
Kendall Award -	Dominic Meldi
Elliot Ritchie Alexander Award -	Thomas Ingolia
	Raymond Janevicius
	Donald Steiner
	Douglas Lauffenberger
	Thomas Sidebottom
	Priscilla Strange
Merck Award -	Dominic Meldi
	Cheung Leung
	Scott Field
Illinois Institute of Chemists Award -	Thomas Remec
	Brent Tennant
	Robert Jenik
W. H. Rodebush Award -	Michael C. Hovey
Alpha Chi Sigma Plaque -	Charles Huber
Honeywell Award -	Douglas Lauffenberger
Phi Lambda Upsilon Cup -	Paul B. Johnson
	Marjorie Mueller
	James Barbour
	Mark Stanish
Donald Eisele Memorial Award -	George Zieminski

An informal coffee, to which all SOCS faculty and undergraduate award winners were invited, was held in April, 1974 to recognize the academic accomplishments of these undergraduate students.

E. Curricular Matters

Undergraduate course and curriculum changes during the year were limited to relatively minor features. The Science and Letters majors and minors programs in chemistry and biochemistry have been converted to the "field of concentration" format, with no substantive changes. Also, the LAS College has sought to develop a consistent system of numbering undergraduate independent study, special topics and honors courses in order to establish a maximum of 18 semester hours in this category which can be counted towards the College's graduation requirements. Because of this the School's 290 courses, senior research, are being renumbered as 292.

In response to a Senate resolution on the problem of grade inflation, our Committee on Courses and Curricula studied the problem as it pertains to the School. No serious grade inflation was detectable in chemistry grades, but the Committee nevertheless recommended that a more systematic effort be made to inform the instructor in each course of previous grade distributions in that course, in order to minimize any tendency for the grading scale to drift or to be erratic. This recommendation is being implemented.

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 has remained virtually constant for several years although compensating changes are visible in some areas. However, three years ago there was a significant overall drop of 5%. The figures for the last two years (1972-74) have recovered from 408 to 421 because of increases in biochemistry (57 to 70) and in chemical engineering (47 to 52). The increase in biochemistry is due in large part to admission without financial support of Master's only candidates who plan to enter medical school after a year of graduate study. The other areas remained relatively constant with the notable exception of analytical chemistry which has experienced about a 50% increase due mainly to increasing interest in environmentally related analytical work.

Total Graduate Enrollments by Department and Area*

Dept.-Area	1969-70	1970-71	1971-72	1972-73	1973-74
Biochemistry	67	57	57	69	70
Chem. Engr.	60	55	47	52	52
Analyt.	32	35	38	36	50
Biophysical	*	*	5	6	4
Inorg.	79	70	52	58	60
Org.	106	108	104	101	96
Phys.	65	89	77	70	67
Ch. Phys.	10	10	16	15	12
Undecided	1	4	9	5	8
T. of Ch.	*	1	3	3	2
Chemistry	293	317	304	294	299
Semester I	420	429	408	415	421
Semester II	395	404	385	398	402

*In the earlier years chemical physics students are included with physical chemistry, and teaching of chemistry students with their area of major interest (if specified) while biophysical students were listed under physical, organic and biochemistry.

The numbers of advanced degrees granted by year in each of the three departments are summarized in the table below. 1969-70 was an all-time high for Ph.D.'s granted while in 1971-72 the M.S. total was an all-time high! For 1972-73, the numbers of M.S. and Ph.D. degrees were both back to more typical, lower levels; in fact the numbers of Ph.D.s granted during 1971-72 and 1972-73 (55 and 57) were the lowest since 1964-65, when 54 were granted. This low probably was due to the combined effects of the job market and the change in draft policies several years ago, which eliminated automatic deferments for graduate students. That some of these effects may be behind us is indicated by the increase of Ph.D.'s in 1973-74 to 71.

Summary by Department of Advanced Degrees Granted

	1969-70	1970-71	1971-72	1972-73	1973-74
Biochemistry					
MS	14	14	16	17	16
PhD	13	9	2	14	6
Chemical Engr.					
MS	11	13	13	16	14
PhD	18	14	9	6	7
Chemistry					
MS	40	37	53	34	29
*PhD	76	45	44	37	58
Total					
MS	65	64	82	67	59
PhD	107	68	55	57	71

*PhD degrees in chemical physics are included here.

B. Graduate Student Recruitment and Admissions

In chemistry, inquiries about graduate work were up slightly in numbers from those of the preceding year, being 518 U.S., 32 foreign encouraged, and 218 foreign discouraged. Nonetheless, the number of completed applications remained about the same (227 vs. 230 for last year). The number of offers for admission actually made decreased from 152 to 140. This was offset by a marked increased in the acceptance rate from 44% to 50% so that the number of new students expected has increased. This improvement is probably due to the increased subsidy levels offered, which fell behind a bit in 1971-72 compared with their number 1 or 2 national ranking in earlier years, but have been reinstated to more competitive levels during the past two years. Another point which may have helped is that we subsidized the visits of 14 F-1 applicants (the top fellowship group) this year. The acceptance rate for F-1's was 43% for those who visited and 18% for those who didn't. We obtained 8 F-1 acceptances this year versus 5 last year from the same number (25) of offers.

Students entering in June and August, 1974 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 4.54 GPA average of accepted offers compares favorably with GPAs in 1973-67 of 4.60, 4.61, 4.60, 4.54, 4.61, 4.42, respectively. In biochemistry only 2 of the 14 entering are Master's only candidates, without support, which is the main reason for the sharp drop in the admissions. The most striking changes in the distribution of acceptances are the increase in physical and the decreases in biochemistry and organic.

Graduate Student Acceptance of Admission Offers*

Dept.-Area	1970-71	1971-72	1972-73	1973-74	1974-75
Biochemistry	21	15	20	27	14
Chemical Engr.	12	12	17	15	22
Analyt.	8	10	7	14	12
Inorg.	16	10	12	12	13
Org.	27	24	22	21	16
Phys.	27	16	14	12	21
Ch. Phys.	5	7	-	2	4
Undecided	-	3	6	11	6
T. of Chem.	2	2	-	-	1
Chemistry	85	72	61	72	73
Total	118	99	98	114	111

*The 1970-74 figures are actual enrollments, including students entering in February. The 1974-75 data do not include January admissions of which there were 9 this past year. Biophysical students are listed under physical, organic and biochemistry. Current projections are that the total number of graduate students in the School will be at about the 425 level this fall.

The specific recruiting of black graduate students was continued with emphasis on visits to predominately black colleges in the southeast. The effort becomes more competitive each year, but we were still able to recruit three new blacks for next year (1 each in inorganic, organic, and physical). Seven schools (Morgan State, Choppin State, Jackson State, Morehouse, Atlanta Univ., N. Carolina A & T, Florida A & M) were visited by one of our faculty (Barefield, Flygare, Katzenellenbogen or Stucky) and eighteen others were written to. A particular effort will be made in 1974-75 to visit those schools which gave a positive response to the letter of contact but which, for one reason or another, we did not visit this year.

On the other hand, a continued, conscious effort is being made to reduce the numbers of foreign students admitted; this is because the employment opportunities for foreign students remain scarce. Only 4/111 of our admissions for 1974-75 are foreign nationals, compared with 18% for the country as a whole in 1972-73.

C. Fellowship and Traineeship Support

1. Fellowship and Traineeship Support - These nonassistantship appointments were held by 133 graduate students this year. As shown by the data below, this represents a stabilization of fellowship type support for our most outstanding students, after a high of 197 in 1967-68, the drop being largely due to elimination of NSF and NDEA traineeship and NIH fellowship programs, and to the NSF fellowship program being cut in half. The changes so far have had their main impact upon chemistry and chemical engineering. Unfortunately, it has been announced several times in an on-again, off-again way that the NIH traineeship programs will be phased out during the next few years which, if fully implemented, will eliminate about 35 traineeships in biochemistry and 15 in biophysical chemistry.

For the third 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 funding over the past five years is given in the table below.

Type of Appointment	1969-70	1970-71	1971-72	1972-73	1973-74
NASA Fellowship	1	0	0	0	0
NDEA Traineeship	3	1	4	3	2
Natl. Science Foundation					
National Fellow	19	22	13	10	8
Trainee	15	17	11	7	4
U.S. Public Health Serv.					
National Fellow	15	11	3	1	0
Trainee	50	41	43	53	52
	103	92	74	74	66
Institutional Fellowships					
University	26	23	24	19	24
Industrial - Dept.	22	25	37	38	39
Industrial - Univ.	0	0	0	0	1
ACS PRF	2	0	0	0	0
Other	5	4	3	5	3
	158	144	138	136	133

2. Industrial Support - A synopsis is given below, by department, of the industrial donors who have made grants during 1973-74, 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 $50,000 for chemical engineering and $101,000 for chemistry, both down about 10% from last year. Most of these funds are being used for graduate fellowships.

Biochemistry

None

Chemical Engineering

*American Cyanamid
*American Oil
*Atlantic Richfield
*Dow
DuPont (G in A)
*Exxon Educational Foundation
*General Electric
3M
*Shell
*Union Carbide Corporation

Chemistry

*Allied Chemical
American Cyanamid
Dow
DuPont (G in A)
Eastman Kodak
*Eli Lilly & Co.
Exxon Educational Foundation
*Hercules
*Johnson & Johnson
*Lubrizol
3M
*Mobil Oil
Monsanto (undergrad)
*Phillips Petroleum
*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. However, there has been a continued general increase in numbers during the past four years reflecting the poor job market, plus increases in outside support.

Department	1969-70	1970-71	1971-72	1972-73	1973-74
Biochemistry	26	29	26	20	26
Chem. Engr.	1	-	1	1	2
Chemistry	36	42	49	54	58
Total	63	71	76	75	86

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 second lecturer in this series was Professor Richard H. Holm, MIT, who presented two lectures entitled "The Synthetic Analog Approach to Elucidation of the Active Sites of Iron-Sulfur Proteins," the first, on 3 December 1973, dealing with "The Four- and Eight-Iron Cases" and the second, on 4 December, about "The Two-Iron Case."

2. Ada Doisy Lectures in Biochemistry - The third annual lectures were held on November 8 and 9, 1974. Dr. Saul Roseman, Director, McCollum-Pratt Institute and Chairman, Department of Biology, Johns Hopkins University spoke on "Sugar Transport in Bacteria" and Dr. Bruce Ames, Biochemistry Department, University of California at Berkeley, on "Carcinogens Are Mutagens: A Simple Detection System."

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 6 March 1974 by Dr. Philip Handler, President of the National Academy of Sciences, who received his Ph.D. from Illinois in biochemistry. He spoke on the role of the federal government in support of science.

Phi Lambda Upsilon sponsored another, special lecture this year, by Professor J. C. Bailar, Jr., on 29 November 1973, who spoke on "Anecdotes in the History of the School of Chemical Sciences."

4. Sherwin-Williams Seminars - This year is the second of a second three-year grant from the Sherwin-Williams Co. which sponsors our "Seminars in Chemistry" series. Three sets of seminars were given, one in the fall on "Advances in Organic Synthesis," a second on "Advances in Biophysical Chemistry" and the third in the early spring on Bioinorganic Chemistry. Dates, titles and speakers in the three series are as follows:

Advances in Organic Synthesis

Pierre Delongchamps, University of Sherbrooke (Quebec)

10 September 1973	"Synthetic Studies Toward Ryanodine"
11 September 1973	"The Importance of Conformation of the Tetrahedral Intermediates in Hydrolysis of Esters and Amides"

S. J. Danishefsky, University of Pittsburgh

1 November 1973	"Simplified Approaches to Steroid Synthesis"
1 November 1973	"Approaches to the Synthesis of Vernolepin"

W. S. Johnson, Stanford University

3 December 1973	"Non-Enzymic Biogenetic-Like Olefinic Cyclization"
4 December 1973	"Non-Enzymic Biogenetic-Like Olefinic Cyclization"

Advances in Biophysical Chemistry

H. M. McConnell, Stanford University

2 November 1973	"Molecular Motion in Membranes"

Alex Rich, Massachusetts Institute of Technology

10 December 1973	"Mechanism of Protein Synthesis"
10 December 1973	"3-Dimensional Structure of Phenylalanine tRNA from Yeast"

Bruno Zimm, University of California, San Diego

24 April 1974	"Giant DNA Molecules from Chromosomes"

Seminars in Bioinorganic Chemistry

W. E. Blumberg, Bell Laboratories

13 February 1974 "Structural Implications from EPR in Ferric Heme Systems"

H. Hagenkamp, State University of Iowa

25 February 1974 "Recent Studies of the Mechanism of B_{12} Coenzyme Activity"

J. P. Collman, Stanford University

25 March 1974 "Synthetic Models for Hemoproteins"

L. Mortenson, Purdue University

27 March 1974 "Nitrogenase from Clostridium Pasteurianum"

R. Bereman, SUNY at Buffalo

11 April 1974 "Stereoelectronic Properties of the Metalloenzyme Galactose Oxidase"

A. Mildvan, University of Pennsylvania

15 April 1974 "Divalent Metal Ion Replacement in Alcohol Dehydrogenase"

J. Katz, Argonne National Laboratory

18 April 1974 "Chlorophyll and Photosynthesis"

5. 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.

During the past year, there were nearly ninety such seminars by visiting speakers, sixteen from abroad, distributed among the areas as follows: Biochemistry (11,2); Chemical Engineering (9,0); and in Chemistry - Analytical (13,1), Inorganic (8,3), Organic (14,8), and Physical (16,2); where the first digit gives the number of talks by U.S. visitors and the second, by foreign visitors.

F. Curricular Matters

Several course proposals were acted upon. Chemical Engineering 384 has been extensively revised. Chemistry 496 on the synthesis and use of isotopically labeled compounds has been revised to eliminate biochemical experiments, and cross-listing as Biochemistry 496 has been discontinued.

In biochemistry, a major rearrangement was made of the introductory courses to provide a "two-track" system. One is a "terminal," survey course for students in preprofessional programs or wishing an elective exposure to the subject; the other, designed for and required of majors (concentrators) in biochemistry and available to those desiring in-depth training. This was accomplished by the following series of steps:

i) Introducing a new two-semester introductory lecture course, Biochem. 352 and 353, in general biochemistry for concentrators (required for those graduating after August 1975).

ii) Revising the old, one-semester introduction, Biochem. 350 and emphasizing its "service" course nature.

iii) Rewording prerequisites of the laboratory course, Biochem. 355, so that students with credit or registration in Biochem. 350, 352 or 353 can register in the course.

iv) Dropping Biochem. 354, 356 and 450, the first two being a lecture-laboratory pair for students in nutrition and veterinary medicine, the latter being a lecture follow-up to the old Biochem. 350. In other words, the Biochem. 354, 356 pair is replaced by the revised Biochem. 350, 355; and the Biochem. 350, 450 pair by Biochem. 352, 353.

The Cumulative Exam Committee which handles the written preliminary Ph.D. exam for chemistry and biochemistry made a 5-year synopsis and report of their activities. They found that the average number of exams taken by students before successfully completing the requirements was 9.7 exams during the past year. This means that on the average just a little over two semesters was needed to finish the cumulatives. This is down a bit from the four previous years for which the average was 11.6, 10.9, 10.4 and 10.6 exams. There is some variation by area, the range for 1973-74 being from 8.6 exams in physical to 10.5 in inorganic.

The average number of exams taken before failing the system has been quite constant with time and differs little by area, the range being 15.3 to 17 exams. During the five-year period, a total of 23 students failed the system, an average of 4.6 per year. During the same period, about 400 students passed the exams, so the failure rate was 6%.

G. Special Awards to Graduate Students

In addition to the various more usual forms of fellowship and traineeship support, summarized in Sec. III.C, several of our graduate students were selected for other types of competitive awards which appear to merit individual notice. Those which have come to my attention are the following:

Barbara J. Slatt (analytical)	Shared 1973 Certificate of Merit from the Environmental Division of ACS, with Dr. D. F. S. Natusch, for best paper presented before the Division in 1973.

Brian W. Renoe Terry A. Woodruff (analytical)	One-year $5,000 fellowship awards of the ACS Division of Analytical Chemistry (2 of 7 awarded)
Graham C. Walker (organic)	First prize in the annual Sigma Xi, University of Illinois-Urbana Chapter, student paper competition.

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 1969-74 period. The main point to note is that enrollments increased by nearly another 10% this year compared to last, giving totals 16% greater than the previous high in 1970-71 and 20% greater than the "local low" in the following year, 1971-72. This year's major increase was caused by two reinforcing factors.

Sem.	1969-70	1970-71	1971-72	1972-73	1973-74
	Total Instructional Units in All Courses*				
I	23,300	24,264	22,903	25,198	27,295
II	19,766	21,086	20,775	23,214	25,252
Total	43,066	45,350	43,678	48,412	52,547
	Instructional Units in General Chemistry				
I	9,428	9,320	10,112	11,103	11,974
II	8,170	8,616	9,154	10,531	11,420
Total	17,598	17,936	19,266	21,634	23,394

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

A minor contribution (2 to 3%) came from a small increase in the undergraduate student population of the campus as a whole, which included an upswing in engineering and ag students virtually all of whom take chemistry courses. The main reason (8 to 7%) for the increase, however, was a wholesale shift in enrollments of LAS students into the freshman and organic courses in chemistry, the latter an outcome of the increased freshman enrollments of last year.

B. Teaching Loads

In each of the past two years, the 10% increase in course registrations pointed out in Sec. IV.A was compensated partially by a 5% increase in TAs. However, the lack of funds has led to an overall increase of 10% during the past two years in the ratio of instructional units to FTE TAs, as shown by the five-year synopsis given below. This was adjusted to largely by an increase in the effective class size of our multi-section courses, especially in general chemistry.

Ratio of IUs to FTE TAs Employed

Sem.	1969-70	1970-71	1971-72	1972-73	1973-74
			Graduate Teaching Assistants Employed		
I	93.9	95.68	90.07	92.65	97.31
II	82.5	81.95	79.22	83.90	88.95
Average	88.2	88.80	84.64	88.27	93.13
			Ratio of Total Instructional Units to FTE Teaching Assistants		
I	249	254	254	272	281
II	239	258	262	277	283
Average	244	256	258	275	282

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 1974-75 suggest a modest increase (2%) in enrollments compared with the past year. Also, as a consequence of strenuous objections to the increased teaching loads we've been subjected to since 1969-70, we have been granted nonrecurring funds to increase our FTE TAs to 97.25 in 1974-75 compared with 93.13 in 1973-74. This should enable us to handle the increased enrollments and roll-back the teaching loads by a small amount (2%). The supply of graduate TAs is sufficient to meet this increase without major problems, using previous policies and procedures.

C. Teaching Evaluation

Beginning in late June 1973, an ad hoc Committee on Teaching Evaluation was appointed to consider the problem of student-based evaluations of instruction, as "suggested" by Vice Chancellor Weir. During the summer of 1973, the Committee developed a set of preliminary questionnaires which were discussed at a faculty meeting in the early fall, along with the general philosophy of evaluation. This effort reached its first output stage at the end of Semester I; five questionnaire forms were used rather widely in SOCS. Experience gained at that time and comments from both students and faculty were brought to bear on modification of the questionnaires for their second use, at the close of Semester II. The Committee has thus far considered student-based evaluation only; it has not yet considered peer evaluation.

V. Services and Facilities

A. Chemistry Library

The Chemistry Library continues to be open 107 hours a week for the use of faculty, staff, and students of the School of Chemical Sciences. Hours are 8 a.m. to midnight Monday through Saturday and 1 p.m. to midnight on Sunday.

During the first eleven months circulation increased 20%. Because the library is used primarily for research purposes, a large portion of the material, i.e., reserve books, reference books, and journals, is used in the library. Circulation statistics, therefore, do not show the complete use of the collection. The hourly seat count of users which has increased by approximately 6,000 is a more accurate indicator of use.

The collection of 38,359 volumes consists mainly of serial publications. A total of 725 serial titles are currently received, an increase of 23 titles over last year. The library is getting microfiche supplements which provide information supplementing the articles in the printed issues of some ACS journals. One-hundred and thirty-one microfiche are owned by the library.

The number of pages of library material photocopied on the library's Xerox copier has continued to rise. Approximately 127,500 pages were copied including both coin-operated copies and those charged to accounts. The strength and completeness of the collection are indicated by the number of requests from outside sources for photocopies of library materials. Requests on both domestic and international levels exceeded 4,500 pages.

An inventory of the entire collection was not made this year, however, fifty volumes have been reported missing during the last eleven months.

Lack of shelf space and staff work space continue to be a major problem. An additional 1,249 volumes of less-used journals and books were transferred to the Main Library stacks.

The combination of the tightening of the budget with the change in the calendar has led to some difficulty in adjusting library hours over vacation and holiday periods. With the experience with the new calendar gained this year a better assessment of the demand will be possible.

B. Placement Office

For the third consecutive year, recruiting activity in the Placement Office remained rather light. However, it was obvious that those in industries which did interview our students had actual positions to fill. Increased industrial interest was particularly noticeable at all degree levels of chemical engineering, and at the PhD level of chemistry. Fifteen BS chemists were still seeking employment when they left the campus at graduation time. Of this group, four had majored in the chemistry curriculum, two in the sciences and letters curriculum with a chemistry major, and nine in sciences and letters with a biochemistry major. The Placement Office will continue to assist these people in finding positions.

Two separate workshops were given during the year under the sponsorship of Phi Lambda Upsilon, one prior to fall recruiting and the other just before spring recruiting. Industrial representatives frequently commented that they felt the students to be much better prepared for interviewing as a result of this effort.

For the fourth year, the Placement Office mailed to industries a monthly bulletin containing summaries of the qualifications of alumni wishing to relocate. Approximately 300 companies and governmental organizations received this publication. From the interest expressed by the industries, and the reports of alumni who used the service, we learned that the bulletins have been very successful. (More than 50% of the alumni who were reemployed during the year reported that they received their contacts as a result of this publicity.)

Student interest in scheduling interview time with visiting representatives remained intense. In both the fall and the spring recruiting periods, the schedules were often filled early in the day the sign-up sheets for the week were released. In such cases, names were recorded of those unable to arrange interview time, and these people were later notified when cancellations developed in schedules of interest to them. When students were unable to get on schedules, resumes were given to the representatives for consideration. During the fall recruiting period (when student interviewing was at its height) an effort was made to alleviate the lines of students waiting outside the Placement Office door on mornings new schedules were released by pre-scheduling three interviews per student with the companies of greatest interest to them. This did not prohibit students from scheduling other interviews later, however, on a first-come-first-served basis.

Industrial vacancy notices received by mail and telephone increased from 1528 to 1638; and academic vacancy notices increased from 296 to 621. The vacancies were listed in bulletins which were published twice each month. Copies were distributed to members of the faculty, posted throughout the three buildings of the School for the benefit of its students, and mailed to alumni who had indicated that they wished to relocate.

A total of 194 alumni were registered during the year for assistance in relocating. About 50% of these people were employed on some sort of non-permanent basis, such as postdoctoral work which would terminate within a given time; in the military service and anticipating discharge; graduate work elsewhere; or wished to change employment or suspected that their employment might be terminated. The rest were unemployed. Sixty-four of these people have reported that they are now employed. One hundred five continue to receive vacancy notices, while a significant number failed to reply to our questionnarie and were dropped from the mailing list.

Surveys of the December, May, and August Bachelor's degree graduates reveal the following data relative to future plans:

Baccalaureate Graduates	Chem. Curric.	Sciences & Letters*	Chem. Engrg.
Employed	9	21	24
Graduate or Professional School	24	40	10
Undecided	2	2	0
No Information	5	5	0
Seeking Employment	4	11	0
Totals	44	79	34

*Includes biochemistry as well as chemistry.

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

PhD Graduates	Chemistry	Biochem.	Chem. Eng.
Industrial & Governmental Employment	23	0	8
Academic Employment	3	1	0
Postdoctoral Research	28	6	2
Military Obligation	1	1	0
Foreign, Returning Home	1	0	1
Totals	56	8	11

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

Salary Data	Salary Range	Salary Average
BS Graduates:		
Chemistry Curriculum	$ 850 - $1057	$ 947
Sciences & Letters Curriculum	750 - 945	861
Chemical Engineering	980 - 1100	1048
MS Graduates:		
Chemistry	975 - 1375	1099
Chemical Engineering	1100 - 1200	1156
PhD Graduates:		
Chemistry	1325 - 1567	1439
Chemical Engineering	1475 - 1575*	1520*

*Without previous applicable experience.

Only four PhD graduates (all chemists) accepted academic employment. Salaries ranged from $1089 to $1300 per month, the average being $1028. These academic figures are quoted on the basis of nine months of formal

work, i.e., the academic year salary is nine times the monthly figure cited. The majority, however, will receive additional compensation for all, or for part, of the summer months.

Plans of the 77 people who did postdoctoral work during the year 1973-1974 are as follows:

Plans of 1973-74 Postdoctorates

Dept.	No.	Indus. & Govt. Emplmt.	Academic Emplmt.	Post-Doc.*	No Info.	Not Def.	Looking	Stay UI
Biochem.	23	0	6	4	1	0	0	12
Chem. Eng.	3	1	0	0	0	1	0	1
Chem.	51	8	5	8	0	5	1	24
Totals	77	9	11	12	1	6	1	37

*A postdoctoral position elsewhere.

The salary average for the chemists who accepted industrial employment was $1446; and that of the one chemical engineer accepting industrial work was $1575 per month. Salary information for those chemists and biochemists who accepted academic employment was available in only two cases, the average being $1255 per month for nine months of formal work. In both instances, there will be an additional stipend for all, or for part of the summer months.

C. Shops and Service Laboratories

During this past year the proposal submitted by the School of Chemical Sciences to the National Science Foundation for research equipment was funded in the amount of $82,000. With additional funds obtained from the research board and other sources, we are in a position to add $140,000-$150,000 in major improvements to the nmr laboratory. These will take the form of converting the HR-220 instrument to Fourier transform mode. This particular operation should be completed in the next few months. In addition, it will be possible either to modify the HA-100 instrument to Fourier transform operation, providing Fourier transform operation on ^{31}P and other nuclei, or to add Fourier transform capability in the area of ^{13}C nmr. The latter course would enable us to employ the XL-100 at least part-time in Fourier transform spectroscopy of other nuclear spin systems than ^{13}C. The details of these modifications should be worked out soon, and the changes themselves completed during the winter of 1974.

In spite of the tight budget it has been possible to materially improve the equipment situation in some of the service facilities. For example, a large $20,000 lathe has been added to the machine shop during this past year. In addition, several less expensive items of equipment were purchased for other facilities.

D. PLATO

An air conditioned room has been set up in 301 Chem Annex by remodeling one corner of the lab. It is designed to accommodate 25 PLATO terminals for use primarily in our undergraduate courses. Several terminals are in operation there this summer and the total complement should be available for the fall semester; funding for the terminals was obtained by a grant from NSF for programs in Chemistry and in Physics.

E. Remodeling

Remodeling and non-recurring maintenance projects during the year totaled about $70,000, about the same as last year. The largest single project was to improve and expand research space for biophysical chemistry ($18,000).

VI. Administration

A. Affirmative Action Program

Although the focus of our efforts to insure that we do not discriminate for reasons of sex or of racial and ethnic background may change from year to year, the general question continues to be one of our major concerns.

Section III.B includes a report on our relatively successful efforts to recruit black graduate students as a result of which three blacks are entering our graduate program in chemistry for 1974-75. On the other hand, the number of women starting our graduate program has dropped a bit, the preliminary count for this fall being six. This may reflect greater competition for women applicants. In chemistry, for example, there were only five acceptances of 22 offers to women, an acceptance rate of 23% compared to an overall acceptance rate of 50%. The reason for this two-fold difference is not apparent. However, an effort should be made to determine the cause and correct for it in some way during the coming year.

Our nonacademic staff has reached pretty much of a steady state with 9 or 10 of the 100 employees in this category being black. Turnover in the stenographic-clerical area is high and we have to continue active recruiting and a training program in order not to fall behind. The distribution by sex is about 50-50, but the distribution by job classification is highly stratified. For example, we have no male stenographers or secretaries and no female machinists or storekeepers. Also, there are few women in administrative positions.

B. Financial Support

The financial aspects of our operations have continued pretty much as they have been during the preceding two years, namely a tight state budget with some relief because of continued increases in federal support. The state budget for a third year in a row did not provide any funds for equipment. So instead of the School's having about $100,000 in state funds, we were again allocated about $50,000 from CRR funds (indirect costs) for the purpose.

Another aspect, which is becoming of critical importance, is that our state operating budget, the funds provided for Wages and Expense (other than salaries), has remained static (~ $580,000) for the past four years in a row, and it is not scheduled to be increased in 1974-75. This means that because of inflation, we have already absorbed a cut of at least 30% and face another 15% in 1974-75. The problem is seriously aggravated by the increased enrollments in our laboratory courses which are costing us at least $35,000/year in increased operating expenses.

In the past few years, we've been able to absorb the equipment and operating expense squeeze by more careful planning and utilization of funds, largely on an informal basis, and to some degree by living off our inventory or postponing replacements. However, this "cushion" has been

exhausted and to survive 1974-75 we will have to explicitly change some of our charge procedures or cut back the graduate research programs. Also, if adequate operating funds are not provided for the increased enrollments and inflated costs, we will have to limit enrollments in some of our laboratory courses, probably mainly at the freshman and sophomore levels although a careful look should be given at our more costly advanced laboratories.

One change which has been helpful is a return to the old system of redistributing CRR (indirect cost) funds to departments on a formula basis, with a provision whereby some carry-over (20%) can be made from year to year. However, we lost 5% absolute, 5/30 relative, in the process. The old distribution formula was 40% "administration," 30% Graduate College, and 30% to the department generating the funds. The new procedure calls for 25% to the department and 5% to the college, in our case to LAS. The latter is sizeable, approaching $50,000/year; however, it has effectively been lost to us because we have not benefitted in any direct way from distribution of the funds by LAS. Within SOCS, we have returned to the earlier system of using our cut of the CRR funds; 50% of them are utilized at the option of the department generating them, while the other 50% are used for School functions and services as well as for non-recurring departmental needs.

SOURCES OF OUTSIDE RESEARCH SUPPORT-EXPENDITURES
SYNOPSIS SIX YEAR COMPARISON

	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74*
NIH Research Grants	808	937	1,079	1,162	1,372	1,768
NIH Training Grants	302	310	274	230	279	208
NIH Postdoctoral Allowances	2	9	3	6	4	4
Total NIH	1,112	1,256	1,356	1,398	1,655	1,898
Environmental Protection	--	--	--	--	80	52
National Science Foundation	682	873	819	1,019	1,126	1,303
Materials Research Lab - AEC	201	123	223	80	88	78
Materials Research Lab - NSF	181	228	219	288	179	129
Materials Research Lab - DAHC	--	--	--	--	--	119
Army Research Office	48	47	54	54	60	75
Office of Naval Research	56	15	45	29	31	27
Air Force OSR	--	--	--	1	15	28
Department of Agriculture	35	12	12	--	--	--
Department of Interior	24	24	23	35	10	--
Total U. S. Government	2,319	2,578	2,750	2,904	3,243	3,709
Grants from Provate Sources	134	121	168	204	219	214
Graduate Research Board	185	109	105	233	113	194
Grand Total	2,638	2,808	3,023	3,341	3,575	4,117

NOTES:

The data are given in thousands of dollars.

*Projections based on first 10 months' actual expenditures.

A synopsis is given of federal and other non-state funding over the six-year period of 1968-74. The total went up by 15% this year, which is about an 8% increase in available "constant" dollars. (Most of the funds are spent on salaries, which increased by only 5%; also, overhead charges are an appreciable fraction and they increased only in proportion to salaries.) Without this increase in funds, and a corresponding increase in our CRR allocation, we would have been in severe difficulties during the past year. The main increases are seen to be in NIH and NSF research grant funds and in Graduate Research Board grants.

It's clear that in the coming year we'll have to work even harder to obtain grant and state funds if we're to maintain our graduate programs at their current levels and to roll back some of the erosion and overenrollment at the undergraduate level.

VII. Alumni

A. Alumni Related Activities of the School

The chief work of the Alumni Affairs Committee is the editing, printing and distribution of the annual Alumni News Letter. This news letter serves at least three purposes:

i) It keeps our alumni abreast of what is going on in the School of Chemical Sciences on the Urbana campus.

ii) It serves as a recruiting device for new graduate students (and perhaps for undergraduates, too).

iii) It is accompanied by a sheet or flyer suggesting to the alumni that they may contribute to one or more of the funds administered by the School. The response to these "appeals" has been very good.

The news letter generally consists of an article about the general state of the University and/or the School of Chemical Sciences, a description of one of the Departments in the School, and the work that it is doing, mention of new faculty members, awards won by faculty and alumni, scholarship funds for undergraduates, and a list of new PhD's from the School, with thesis titles. It does not devote space to news items about marriages of alumni, promotions, changes of jobs, etc. Items of that sort appeal only to those who happened to be in school at the time that the person mentioned was enrolled. We have little inclination or space in the news letter to include such items. This coming year, however, we are including brief items about the deaths of one retired faculty member and the wife of a faculty member. We may also include a letter from one of our alumnae outlining her views on the place of women in the chemical profession, and her relationship to the University.

In view of the fact that a major purpose of the news letter is to attract good students, every effort is made in it to emphasize the excellence of the School in both teaching and research.

B. Awards and Honors to Our Alumni

The alumni of the School continue to excel in their professional lives, and to win major awards. Our list may not be complete, but eighteen have been so honored during the past school year. The following is a list of those which have come to our attention.

William J. Bailey (PhD, 1946), Professor of Chemistry at University of Maryland - Chosen President-Elect of the ACS.

Arnold O. Beckman (BS, 1922; MS, 1923), Chairman, Beckman Instruments - 1974 Award from the Scientific Apparatus Makers Association for his contributions to measurement technology and scientific instruments.

Roy H. Bible, Jr. (PhD, 1952), Research Chemist, G. D. Searle and Company - 1974 Honor Scroll Award, Chicago Chapter of the Illinois Institute of Chemists.

R. Byron Bird (BS, 1947), Professor of Chemical Engineering at University of Wisconsin - Chosen for the W. N. Lacey Lectureship in Chemical Engineering, California Institute of Technology.

Herbert E. Carter (PhD, 1934), Coordinator of Interdisciplinary Programs at University of Arizona - Honorary ScD, University of Illinois. Also, a ridge in Antarctica has been named for Dr. Carter.

Horace A. DeWald (PhD, 1950), Senior Research Chemist, Parke Davis and Company - Award for Excellence in Industrial Research, University of Michigan Section of the ACS.

Christie G. Enke (PhD, 1959), Professor of Chemistry at Michigan State - ACS Award in Chemical Instrumentation.

Bernard S. Friedman (BS, 1930; PhD, 1936), Research Associate, Sinclair Research Labs - Became President of the ACS.

Robert W. Holley (BA, 1942), Professor of Molecular Biology at Salk Institute - Alumni Achievement Award, University of Illinois.

David R. Kearns (BS, 1956), Professor of Chemistry, University of California at Riverside - Gold Medal Award of the California Section of the ACS.

Robert L. Pigford (PhD, 1942), Professor of Chemical Engineering at University of California at Berkeley - Founders Award of the American Institute of Chemical Engineering.

Robert E. Sievers (PhD, 1960), Senior Scientist, Aerospace Research Labs, Wright-Patterson AFB - Distinguished Alumni Award, University of Tulsa.

A. John Speziale (PhD, 1948), Director of Research for Agricultural Division, Monsanto Company - St. Louis Section Award of the ACS.

J. W. Westwater (BS, 1941), Professor and Head of the Department of Chemical Engineering, University of Illinois - Elected Member National Academy of Engineering; Vincent Bendix Award of American Society for Engineering Education.

Peter D. Zavitsanas (PhD, 1959), Senior Physical Chemist with General Electric - 1974 Honor Scroll of the Philadelphia Chapter of AIChE for his outstanding achievements in high temperature chemistry.

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E. J. Corey (U of I Faculty, 1951-59), Professor of Chemistry at Harvard - $10,000 Dickson Prize of the Carnegie-Mellon University.

C. C. Price (U of I Faculty, 1936-46), Professor of Chemistry, University of Pennsylvania - Charles Lathrop Parsons Award of the ACS, and ACS Award for Creative Invention.

Edward C. Taylor (U of I Faculty, 1951-54), Professor of Chemistry at Princeton - ACS Award in Synthetic Organic Chemistry.