Annual Report 1976-77

SCHOOL OF CHEMICAL SCIENCES

Biochemistry, Chemical Engineering, and Chemistry

December, 1977

Table of Contents

*Sections taken largely from reports of committee chairmen (or equivalent).

Highlights of 1976-77

Faculty and Staff - Ruth Power, Chemistry Librarian for 27 years, retired in August, 1977. Her devoted service in establishing and maintaining a superior collection in our library has been an essential component in the School's research accomplishments. Lucille Wert has been appointed as Ruth's successor.

Professor Peter E. Yankwich has been co-opted full-time as Vice President of Academic Affairs of the University, effective August 21, 1977. He continues his association with the Chemistry Department on a zero-time appointment.

Four assistant professors are joining the faculty as replacements during 1977-78: Richard I. Masel (surface phenomena and catalysis) and Joseph A. Schaewitz (bio-engineering) in chemical engineering in January, 1978; and Anthony J. Arduengo, III (organic) and Clifford E. Dykstra (quantum chemistry) in chemistry in July, 1977.

Two persons have been appointed to academic/professional positions during the year: Abdulmajid Momin, Spectroscopist in the Molecular Spectroscopy Lab and Carl C. Reiner as an Electronics Research Engineer in the Electronics Shop.

Honors and awards to our members during 1976-77 include the following: In biochemistry, John M. Clark received a U. of I. Campus Award for Excellence in Undergraduate Teaching, I. C. Gunsalus was elected president of the Federation of American Scientists for Experimental Biology, W. C. Rose was honored on his 90th birthday by the Nutrition Foundation which established an annual, national lecture-ship in his name, and Gregorio Weber was European Molecular Biology Lecturer.

In chemical engineering, Harry Drickamer was the first recipient of the P. W. Bridgman Award of the International Association for the Advancement of High Pressure Science and Technology, C. A. Eckert received the ACS Ipatieff Prize for catalysis and high pressure research, and R. A. Schmitz, the George Westinghouse Award of the American Society for Engineering Education.

This year, two chemistry faculty received Alfred P. Sloan Fellowships: K. J. Kaufmann and G. B. Schuster. There was one Guggenheim Fellow, John A. Katzenellen-bogen. The Young Author's Award of the Electrochemical Society went to Larry R. Faulkner. Several faculty gave honorary lectures: T. L. Brown, Firth Visiting Professor at Sheffield; W. H. Flygare, Centenary Lecturer of The Chemical Society; H. S. Gutowsky, G. N. Lewis Memorial Lecturer at Berkeley; N. J. Leonard, B. R. Baker Memorial Lecturer at Santa Barbara and Ritter Memorial Lecturer at Miami; and R. A. Marcus, Distinguished Lecturer at Rochester.

Larry G. Hess, Manager of the School's Business Office was president of the Society of Research Administrators, a national organization with 1200 members.

Students - Although total undergraduate enrollments on campus have been stabilized at about 25,000 for several years, students majoring in biochemistry and chemical engineering continued to increase in 1976-77. Biochemistry has gone from 100 to 220 in five years and chemical engineering from 155 to 365. The increased enrollments in chemical engineering are placing an impossible demand upon the faculty

facilities, and resources available for them. By reallocation of funds within the School, the TAs have been doubled for them. Also, the LAS college has provided $15,000 towards a new faculty position in the department. However, sharply increased enrollments elsewhere in the School, largely in general and organic chemistry, have limited the amount of internal allocation that's feasible.

Graduate enrollments of majors in the School's programs were up to 440 in the fall of 1976, the largest ever. Those in chemistry and chemical engineering have been about 300 and 60, respectively, with modest fluctuations over the last decade. Biochemistry has experienced an increase from 60 to 85 over the past five years, due mainly to faculty expansion in connection with the School of Basic Medical Sciences. Graduate admissions in chemistry are down (58) from last year's banner yield (87), probably mainly because our stipend levels have lagged behind those of our competition. However, the total enrollments for 1977-78 will be at about the levels given above for 1976-77. Industrial funds for the recruitment and continued support of the top level applicants for graduate admission remain in short supply. Many of the applications we receive are encouraged by our alumni throughout the world; we need and are grateful for their help.

The degrees granted continued pretty much at the previous high levels, most changes being in the baccalaureate degrees. Over the past several years the BA and BS degrees for Science & Letters majors in chemistry are down from 60 to 40 while those in biochem are up from zero (no separate program) to about 35. In chemical engineering the increased enrollments are beginning to show in the degrees granted, 35, 37, 51 and 61 for the past four years.

Industrial opportunities for employment of our graduates continued to improve. A number of the companies sending recruiters expanded their schedules or extended their visits to talk to all the students who wished to be interviewed by them. As a result, this year there were 3200 interviews compared to 2760 in the preceding year. Improvement in the baccalaureate employment picture is shown by the decreased number (7/159) still seeking employment this fall compared with the number (15/165) a year ago. Also, of the PhDs, a smaller fraction (14/66) took postdoctoral positions than in 1975-76 (24/65). For the first time in five years or more, several companies made strong representations to us to encourage our best students to seek employment with them, and gave new fellowship grants as "earnest money."

This year the advising-and-placement office helped establish a cooperative education program for undergraduates in the chemistry curricula. Seven of them were placed with Dow, Eastman Kodak and Monsanto; they will spend alternate semesters working for the company and pursuing their academic studies at the University. Generally, such students will complete their baccalaureate degrees in five years. Several other companies have expressed an interest in the program. In the fall of '77 the office took over the administration of the existing program in chemical engineering (~10 students), handled previously by the Engineering College.

Instructional Programs - As mentioned above, the curriculum in chemical engineering has again become overcrowded and in order to provide an equitable way to restrain the increase, a 3.5 (C+) minimum grade-point average has been reinstated for juniors and seniors in the curriculum. Also, transfer students will need a 4.0 average for admission to it. Other curricular changes were small; the most significant was probably the rejection of a proposal that some civil engineering undergraduates be permitted to take general chemistry without the laboratory.

The general chemistry program continues to be an innovative leader in chemical education as well as an excellent training ground for visiting faculty who are interested in undergraduate teaching. In most such cases, we are able to place them in positions with responsibility for general chemistry programs at other institutions. National conferences and meetings on chemical education have featured presentations on our videotape program for lectures and labs in the main service track (Chem 101-2) and on our orientation and training program for new TAs. The development, testing and use of PLATO lessons in chemistry, largely by Professor Stan Smith in organic and general chemistry, has attracted international interest.

An important component of the graduate programs in biochemistry and chemistry is the cumulative written preliminary exam required in candidacy for the PhD. This year the chairman of the exam committee, J. P. Hummel, analyzed data describing operation of the "cums" for the past three years. The one-hour exams (9/yr) are on unannounced topics. Students start taking the exams when they arrive or when any deficiencies in their undergraduate background have been removed. In order to pass the cums a student must pass 6 out of 14 recorded exams (of the first 4 exams, only passes are recorded).

The system now in use has evolved through the years. At present, all of the exams in the different areas (bio, analytical, inorganic, organic and physical) are distributed to all students taking the exams. They are given 10 minutes to read them and select one. At least half of the exams passed are required to be in a student's major field. About 11 recorded exams (2½ semesters) are taken on the average to complete the requirement. There are some differences among the areas, the most variability being shown in the areas to which students "cross over" in selecting the exams to take.

The overall attrition rate on the cums is about 15%, but 3/4 of this is due to students withdrawing from the system and leaving the program with an MS degree. During the two-year period, 1975-77, there were 172 students who went through the system; of them, 151 passed, 15 withdrew, and 6 failed. For those who formally fail the system, a special review committee is appointed in about half the cases; and in half of those it is decided to retain the student in the PhD program.

Efforts to improve the quality of the instruction we offer are varied and continuing. They include a four-day orientation program for new TAs in the fall (with an added stipend of $150), a salary merit increase for 1/3 of the continuing TAs, a comprehensive Course Evaluation Questionnaire (CEQ) program, and School awards for teaching excellence (in addition to the campus awards). The CEQ program appears to be the most comprehensive on the campus, largely through the efforts of Professor P. E. Yankwich and his ad hoc committee, who have developed and operated it. At least there are no others in which careful attention has been paid from the outset to the varieties of instructional experience that students have.

This year for the first time the Office of Instructional Resources (OIR) made our forms available for use elsewhere on campus. It is gratifying that their use by others at the first opportunity exceeded the use of OIR's own CEQ on the campus! Cooperation by our faculty, TAs and students in the evaluations has generally been excellent, and the results have been useful, mainly as a guide to self-improvement by the instructors. School teaching awards ($500 ea), funded by Eastman Kodak Co.

and the duPont Co. were presented in August, 1977 to Professors Larry Faulkner and John Shapley and to TAs Daniel S. Foose, Nancy Gallick and Karl E. Wiegers. Campus awards ($1,000) were made in the spring to Professor John M. Clark of biochemistry and Daniel S. Foose, a TA in chemistry.

Administrative Matters - The School continues to be sorely troubled by increased enrollments that have increased our share of the LAS College load by 40% in nine years while our constant fraction of the College's state budget has lagged increasingly behind inflation. The Chemistry Library needs more space to function, chemical engineering needs more faculty and space in order to teach the 2.5x increase in undergraduate enrollments, obsolete and dangerous research labs in Noyes Lab need major remodeling to better serve inorganic and physical chemistry. More industrial grants are necessary if we are to continue to compete for the best graduate students in chemistry and chemical engineering.

On the positive side, federal support is up a bit including an NSF grant to set up a laser research facility for the School. Also, the biochemistry and chemical engineering departments passed with flying colors a self-evaluation sponsored by the Council on Program Evaluation of the campus. Chemical engineering was complimented on its "exceptional record of research productivity" and the need for added resources to handle the increased enrollments was validated. Chemistry is scheduled for the same sort of review in 1977-78.

Alumni - Three of our alumni and a former faculty member received major, annual national awards of the American Chemical Society: William J. Bailey (PhD, 1946) of the University of Maryland, the Award in Polymer Chemistry; Henry Gilman (faculty member, 1919-23) of Iowa State, the Priestly Medal; Glen E. Gordon (BS, 1956) of the University of Maryland, the Award for Nuclear Applications in Chemistry; and Robert W. Parry (PhD, 1946) of the University of Utah, the Award in Chemical Education.

Three alumni received local section or divisional awards of the ACS: Thomas T. Huang (PhD, 1968) of E. Tennessee State University, the Speaker of the Year Award of the N.E. Tennessee section; Robert G. Roeder (MS, 1965) of Washington University, the Eli Lilly Award in Biological Chemistry of that division; and Stanley Wawzonek of the University of Iowa, the Midwest Award of the St. Louis section.

Six other alumni received a variety of other awards, perhaps the most notable being award of The Dickson Prize ($10,000) by Carnegie-Mellon University to John H. Sinfelt (PhD, 1954) of Exxon Research and Engineering Co. and the election of Thomas Baron (PhD, 1948) of Shell Development Co. to the National Academy of Engineering.

H. S. Gutowsky
Director

December, 1977
Urbana, Illinois

I. Academic Appointments and Activities

A. Changes

1. Losses

Ruth Power, Head of the Chemistry Library, retired at the end of the 1976-77 year. Other losses in our regular (non-visiting) faculty and academic/professional staff during or at the end of the 1976-77 year include the following:

Chemistry

Birks, John W., Assistant Professor of Chemistry, to Assistant Professor, Department of Chemistry, University of Colorado, August 21, 1977.

Schmidt, Paul G., Assistant Professor of Chemistry, to Oklahoma Medical Research Foundation, Oklahoma City.

Yankwich, Peter E., Professor of Chemistry, has been appointed full-time as Vice-President of Academic Affairs, August 21, 1977, but retains a zero-time appointment as Professor of Chemistry.

Yardley, James T., III, Associate Professor of Chemistry, to Senior Chemical Physicist, Allied Chemical Corporation, Morristown, N. J., May 21, 1977.

School

Boenig, Beata, Spectroscopist in the Spectroscopy Lab left the community May 25, 1977.

Larsen, Robert, Electronics Research Engineer in the Electronics Shop, died November 21, 1976.

Silber, Steven K., Spectroscopist in the Spectroscopy Lab., to University of Houston, Houston, Texas, August 21, 1977.

2. Additions

All of the non-visiting staff additions given here are replacements for earlier losses. The list includes those recruited during 1976-77, even though several of the appointments do not start until later in 1977-78.

Chemical Engineering

Masel, Richard I., Assistant Professor (Sem II, 1977-78)

Married
Degrees: BS, Drexel University, 1972
PhD, University of California, Berkeley, 1977
Upon completing his PhD in April, 1977 with Professor R. P. Merrill, Dr. Masel became a NATO post-doctoral fellow at the Technische Universitat at Munich, Germany. His research is on the scattering characteristics and catalytic activity of single crystal planes.

Schaewitz, Joseph A., Assistant Professor (Sem II, 1977-78)

Single
Degrees: BS, University of Delaware, 1974
PhD, Carnegie-Mellon University, 1977
Mr. Schaewitz is presently completing this PhD thesis with Professor E. L. Cussler on rate processes in the dissolution of cholesterol gallstones.

Chemistry

Arduengo, Anthony J., III, Assistant Professor (organic) (July, 1977)

Single
Degrees: BS, Georgia Institute of Technology, 1974
PhD, Georgia Institute of Technology, 1976
Dr. Arduengo's PhD thesis was written under the direction of Professor E. M. Burgess on the synthesis of substituted stabilized thione methalylides ($R_2C{=}S{=}CR_2$). After completion of the degree he spent a year on the research staff of the Experiment Station at duPont Co.

Dykstra, Clifford E., Assistant Professor (physical) (July, 1977)

Single
Degrees: BS, University of Illinois (UC), 1973
PhD, University of California (Berkeley), 1976
His thesis work was with H. F. Schaefer, III on the method of self-consistent pairs in quantum-mechanical calculations of molecular properties. After he completed his PhD he stayed on at Berkeley for nearly a year as a postdoctoral.

School

Momin, Abdulmajid, Spectroscopist in Spectroscopy Lab (September, 1977)

Married
Degrees: BS, S.P. College, Poona, India, 1942
After coming to this country Mr. Momin was a Research Associate in the Physics Department at Purdue for 1972-74 and a consulting engineer during 1975-77 at Jaymin Research Corporation in Urbana.

Reiner, Carl C., Electronics Research Engineer in Electronics Shop (March, 1977)

Single
Degrees: BS, University of Illinois (UC), 1971
After a year of graduate work at the University of Illinois (1971-72), Mr. Reiner was an electronics research engineer at Deere and Company from 1972 to 1977.

3. Promotions

The following promotions were effective at the beginning of the 1977-78 academic year.

Biochemistry

Gumport, Richard I., Assistant Professor to Associate Professor (Joint appointment with SBMS)

Chemical Engineering

Alkire, Richard A., Associate Professor to Professor

B. Visiting Appointments

For the 1977 Summer Session

Biochemistry

Bodner, George A. Visiting Lecturer from Assistant Professor, Stephens College, Columbia, Missouri

Becvar, James E., Visiting Lecturer from Postdoctoral Fellowship at Harvard University

Chemistry

Marquart, John R., Visiting Lecturer from Professor, Mercer University, Macon, Georgia

Vestling, Martha M., Visiting Lecturer, from Associate Professor, State University of New York College at Brockport, Brockport, New York

For the 1977-78 Academic Year

Biochemistry

Sato, Ryo, George A. Miller Visiting Professor for October 1-November 20, 1977, from Professor, Institute for Protein Research, Osaka University, Japan

Chemical Engineering

*Chambers, Juanita, Visiting Instructor, two-thirds time, from graduate student, University of Illinois

Scully, Dewi E., Visiting Professor, from Principal Lecturer, The Polytechnic of Wales

Sunderland, Phillip, Visiting Professor, Sem II from University Lecturer, Leeds University

Chemistry

*Avery, James P., Visiting Lecturer (analytical), from graduate student, University of Illinois

*Gaul, Peggy, Visiting Lecturer, Sem I (general), from graduate student, University of Illinois

*Hadley, Fred J., Visiting Assistant Professor (general), from graduate student at Rice University, second year of a two-year appointment

*Hochberg, Edward, Visiting Assistant Professor (general), from Research Associate, University of Illinois

*Krottinger, David, Visiting Assistant Professor, Sem II (analytical), from graduate student, University of Illinois

*Melhado, L. Lee, Visiting Lecturer, Sem II (to teach experimental course in chemical writing and literature), from Research Associate, University of Illinois

*Pfeffer, George A., Visiting Assistant Professor (general), from graduate student, University of Illinois

*Rauchfuss, Thomas, Visiting Assistant Professor, Sem II (inorganic), from Research Fellow, Australian National University

*Reichgott, David W., Visiting Assistant Professor (inorganic) from graduate student, University of Washington, second year of a two-year appointment

*Robinson, Paul W., Visiting Assistant Professor (general), from Research Associate, University of Illinois, first year of a two-year appointment

*Wiegers, Karl E., Visiting Assistant Professor (organic), from graduate student, University of Illinois

*These are fixed term appointments, for the 1977-78 academic year, not on leave from other positions, unless otherwise indicated.

C. Leaves and Special Appointments

Biochemistry

Gunsalus, I. C., Sem I sabbatical leave; Sem II, leave from teaching duties (paid from trust funds)

Chemical Engineering

Schmitz, Roger, Sem I & II, Associate Member, Center for Advanced Study

Chemistry

Chandler, David, Sem I & II, on leave of absence at Columbia University

Katzenellenbogen, John A., Sem I & II, sabbatical leave at University of California, Berkeley

D. Awards and Similar Recognition During 1976-77

Biochemistry

Clark, John M.	U. of I. Campus Award for Excellence in Undergraduate Teaching; U. of I. Pre-Health Professions Society Teaching Award as the most outstanding teacher in courses selected by pre-professional students.

Gunsalus, I. C.	President, Federation of American Scientists for Experimental Biology
Rose, W. C.	On the occasion of his 90th birthday (April 4, 1977), the Nutrition Foundation established an annual, national lectureship to honor Professor W. C. Rose.
Weber, Gregorio	European Molecular Biology Lecturer (Oxford, Paris, Rome and Israel)

Chemical Engineering

Drickamer H. G.	P. W. Bridgman Award (first) of the International Association for the Advancement of High Pressure Science and Technology
Eckert, C. A.	Ipatieff Prize, for catalysis and high pressure research, of the American Chemical Society
Schmitz, R. A.	George Westinghouse Award of the American Society for Engineering Education

Chemistry

Brown, T. L.	Firth Visiting Professor, Sheffield University
Faulkner, L. R.	Young Author's Award of the Electrochemical Society
Flygare, W. H.	Centenary Lecturer, The Chemical Society, England
Gutowsky, H. S.	G. N. Lewis Memorial Lecturer, University of California, Berkeley
Katzenellenbogen, J. A.	Guggenheim Fellowship
Kaufmann, K. J.	Alfred P. Sloan Fellowship
Leonard, N. J.	B. R. Baker Memorial Lecturer, University of California, Santa Barbara; Ritter Memorial Lecturer, Miami University
Malmstadt, H. V.	Arthur Vernon Memorial Lecturer, Northeastern University
Marcus, R. A.	Distinguished Lecturer, University of Rochester
Schuster, G. B.	Alfred P. Sloan Fellowship

School

Hess, L. G.	President, Society of Research Administrators

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 lectures given and of meetings attended. Lectures and meetings outside the U.S. or Canada are given as a second digit, where appropriate and where known.

Biochemistry

Name	Lect.	Attend.
Baldwin, T. O.	3	2
Clark, J. M., Jr.	2	1
Conrad, H. E.	-	2
Glaser, M.	2	2
Gumport, R. I.	-	2
Gunsalus, I. C.	5,1	6,5
Hager, L. P.	4	4
Jonas, Ana	4	3
Mangel, W. F.	1	2
Nystrom, R. F.	-	-
Ordal, G. W.	6	1
†Shapiro, D. J.	4	3
Storm, D. R.	3	-
Switzer, R. L.	3	2,1
Uhlenbeck, Olke	8,1	3
Weber, Gregorio	1,6	1,2

Chemical Engineering

Name	Lect.	Attend.
Alkire, R. C.	8	6
Drickamer, H. G.	4,4	1,1
Eckert, C. A.	4	3
Hanratty, T. J.	3	6
Schmitz, R. A.	2	2
Stadtherr, M. A.	-	2
Westwater, J. W.	2	3

Chemistry

Name	Lect.	Attend.
Applequist, D. E.	-	-
Bailar, J. C., Jr.	5,3	1,1
Beak, Peter	5	3
Belford, R. L.	-,1	1,1
Birks, J. W.	6,1	2
Breiland, W. G.	2	-
Brown, T. L.	7,2	2
Chandler, David	4	2
Coates, R. M.	5	4
Curtin, D. Y.	1	-
Drago, R. S.	7	1
Evans, C. A., Jr.	7,5	1,2
Faulkner, L. R.	6	4
Flygare, W. H.	1,1	-
Gennis, R. B.	-	2
†Gutowsky, H. S.	9	4
†Haight, G. P., Jr.	11	4
Hendrickson, D. N.	3	4
Hummel, J. P.	-	1
Jonas, Jiri	4	3
Katzenellenbogen, J.	14,1	6
Kaufmann, K. J.	5	2
Leonard, N. J.	11,3	3,3
Malmstadt, H. V.	4	3
Marcus, R. A.	8,4	1
†Martin, J. C.	8	4
McDonald, J. D.	3	2
Melhado, Evan	-	-
Nieman, T. A.	-	2
Oldfield, Eric	2,2	4
Paul, I. C.	2	1
Pirkle, W. H.	3	-
Rinehart, K. L.	7,1	2,1
Rogers, E. P.	-	-
Schmidt, P. G.	3	1
Schuster, G. B.	3	3
Secrest, D. H.	-	-
Shapley, J. R.	7	5
Smith, S. G.	10,2	3,2
Stucky, G. D.	3,1	1,1
Yankwich, P. E.	2	2
Yardley, J. T.	-	-

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

F. Other Professional Activities

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

Biochemistry

Name	Ed. Bd.	Prof.
Conrad, H. E.	-	1
Glaser, Michael	-	2
Gunsalus, I. C.	5	10
Hager, J. P.	2	2
Jonas, Ana	-	1
Nystrom, R. F.	1	-
Switzer, R. L.	2	2
Weber, Gregorio	1	-

Chemical Engineering

Name	Ed. Bd.	Prof.
Alkire, R. C.	1	10
Drickamer H. G.	2	3
Eckert, C. A.	1	2
Hanratty, T. J.	1	5
Schmitz, R. A.	-	2
Stadtherr, M. A.	-	1
Westwater, J. W.	3	4

Chemistry

Name	Ed. Bd.	Prof.
Bailar, J. C., Jr.	6	1
Beak, Peter	-	1
Belford, R. L.	1	-
Brown, T. L.	3	4
Chandler, David	1	-
Coates, R. M.	1	1
Curtin, D. Y.	2	-
Drago, R. S.	2	-
Evans, C. A., Jr.	-	3
Faulkner, L. R.	1	1
Flygare, W. H.	5	4
Gutowsky, H. S.	1	11
Haight, J. P., Jr.	1	7
Jonas, Jiri	1	-
Leonard, N. J.	2	2
Marcus, R. A.	2	8
Martin, J. C.	1	4
Oldfield, Eric	-	1
Paul, I. C.	1	1
Rinehart, K. L.	3	4
Rogers, E. P.	-	1
Secrest, D. H.	1	-
Stucky, G. D.	1	2
Yankwich, P. E.	-	3
Yardley, J. T.	1	-

II. Undergraduate Programs

A. Registration During 1976-77

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					
32-14-06 (majors)	41	20	14	17	92
32-16-06 (premeds)	45	33	22	21	121
32-15-06 (prejournalism)	2	0	0	0	2
32-18-06 (prelaw)	2	0	0	0	2
Totals	90	53	36	38	217
Chemical Engineering					
32-06 (curriculum)	114	99	80	74	367
Chemistry					
32-07 (curriculum)	31	15	30	40	116
32-14-07 (majors)	48	12	14	14	88
32-16-07 (premeds)	50	28	21	22	121
32-18-07 (prelaw)	1	1	0	0	2
32-71 (teaching)	1	0	1	3	5
Totals	131	56	66	79	332

B. Five-Year Enrollment Trends

Comparisons of total registrations by semester in the several major types of undergraduate programs are given below for the past five years. The increase of S&L majors in biochemistry, starting with their inception in 1970-71, has continued. In addition, there was a sharp increase in chemical engineering enrollments for a third year in a row, again in all four classes. Their total enrollments have more than doubled in three years. The totals for the School are up accordingly.

Sem.	1972-73	1973-74	1974-75	1975-76	1976-77
		Biochemistry - S&L Majors			
I	100	134	165	196	237
II	104	137	168	168	196
		Chemical Engineering - Curriculum			
I	160	159	233	322	389
II	152	150	223	280	345
		Chemistry - Curriculum			
I	151	169	147	145	123
II	144	153	131	135	108
		Chemistry - S&L Majors			
I	292	221	210	207	227
II	246	173	186	174	191
		Totals - All Undergraduate Programs			
I	703	683	755	870	976
II	646	613	708	757	840

C. Degrees Granted over the Five-Year Period 1972-77

Degrees granted in the various types of undergraduate programs during the past five years are summarized below. After a sharp increase from a total of a hundred degrees per year in 1969-70 and earlier, to 150 in 1972-75 there now appears to be another upward turn due largely to an increase in the degrees in chemical engineering.

Mo.	1972-73	1973-74	1974-75	1975-76	1976-77
		Biochemistry - BA and BS Degrees in the S&L Majors			
Aug.	2	2	2	0	3
Oct.	0	0	0	0	1
Jan.	4	1	2	3	5
May	17	30	34	31	22
	23	33	38	34	31
		Chemical Engineering - BS Degrees in Curriculum			
Aug.	0	2	2	2	3
Oct.	0	0	1	0	0
Jan.	5	5	7	19	17
May	30	28	27	30	41
	35	35	37	51	61
		Chemistry - BS Degrees in Curriculum			
Aug.	1	1	4	2	4
Oct.	0	0	2	0	2
Jan.	4	4	2	4	6
May	21	36	20	28	16
	26	41	28	34	28
		Chemistry - BA and BS Degrees in All S&L Majors			
Aug.	10	2	7	6	5
Oct.	3	0	0	2	1
Jan.	10	8	7	5	4
May	45	28	32	33	29
	68	38	46	46	39
		Totals - All Undergraduate Programs			
Aug.	13	7	15	10	15
Oct.	3	0	3	2	4
Jan.	23	18	18	31	32
May	113	122	113	122	108
	152	147	149	165	159

D. Undergraduate Scholarships and Awards*

For the 1976-77 academic year, seven $500 scholarships were awarded by the Department of Chemistry to freshmen entering the University, and planning a professional career in one of the chemical sciences. Of these, two are in chemical engineering and five in chemistry with four being funded from the income of the Roger Adams Fund, one from the Lou Audrieth Fund, and two by a grant from Monsanto.

*Largely from the report of the Committee Chairman (R. L. Belford), prepared with with the aid of Georgean Arsons and the Placement-Advising Office.

The Agnes Sloan Larson Awards, in the amount of $200 each, were presented in December, 1976, before the Chemistry 107 class to the five sophomore students whose academic work during their freshman year was most outstanding:

Donald F. Rogers
Mitchell A. Newman
Randall A. De Ruiter
John D. Brofman
Ronald R. Lagnado

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

Chemical Industries Council Scholarship -	Stephen J. Elledge
Reynold C. Fuson Award -	Douglas J. Krajnovich
Worth H. Rodebush Award -	Louis L. Scinto
Kendall Award (Phi Lambda Upsilon) -	Jay W. Ellison
Merck Award -	Jay W. Ellison
	James L. Faltemier
	Patrick T. Horn
Illinois Institute of Chemists Award -	Patrick T. Horn
	Jay W. Ellison
	Thomas S. Wittrig
Alpha Chi Sigma Plaque -	No award
Donald E. Eisele Memorial Award - (Alpha Chi Sigma)	Philip A. DaPrato
AIChE Scholarship Award -	Henry A. Kroner
Lisle Abbott Rose Memorial Award - (Engineering College)	Thomas S. Wittrig
Freshmen CRC Handbook Award -	Kathryn L. Neville
Phi Lambda Upsilon Scholarship Cup -	Peter S. Dardi
	John J. Staudt
	Ronald R. Lagnado
	Randall A. De Ruiter
Elliott R. Alexander Award -	Stephen J. Elledge
	Donald F. Rogers
	Paul S. Hummel
	Mitchell A. Newman
	John D. Brofman
	Gary A. Peltz
ACS Analytical Chemistry Award -	Bruce H. Newcome
Special Citation -	Gregory T. Maine

The following donors supplied scholarships in Chemical Engineering for undergraduate students:

Air Products and Chemicals
Aloca Foundation
Chrysler Foundation
Marathon Oil Company
Monsanto Company
Universal Oil Products Foundation

E. Undergraduate Advising in Chemistry* and Coop Programs

The advising committee and the advising office assisted 331 new students to enroll during the summer of 1976 and 281 and 192 students to advance enroll in the first and second semesters respectively. Many inquiries (by letter, telephone and personal visit) by prospective students were handled and several tours of facilities and class visits were arranged for visitors. The advising office continues to maintain a file of catalogs and brochures for other Illinois institutions of higher education and for graduate programs in chemical sciences throughout the country.

This year the advising-and-placement office was successful in establishing a cooperative education program for the Department of Chemistry. Seven of our upperclass undergraduate chemists already have been placed with Dow Chemical, Eastman Kodak, and Monsanto. These students will spend alternating semesters working for the company and pursuing their academic studies at the University. Generally it will take a total of five years for such students to complete their baccalaureate degree requirements. Several other companies have expressed an interest in our new chemistry cooperative education program and we expect that it will continue to grow over the coming years.

Beginning in the fall of 1977, the advising-and-placement office will also be administering the chemical engineering cooperative education program previously handled by the Engineering College. No substantial change is expected in the current level of about 10 chemical engineering students who are participating in the cooperative program. The formal course mechanism for these cooperative programs has been established and approved (see new courses 201 and 202, 0 credit, each cross-listed as Chemistry and Chemical Engineering).

---

*Report of the committee chairman (R. L. Belford) prepared with the aid of Georgean Arsons in the Chemistry Advising Office.

III. Graduate Programs

A. Enrollment Trends and Degrees Granted

Graduate enrollment data for the fall semester of the past five years are summarized below. Spring semester totals are also given. Two or three students registered in absentia are included. It is seen that except for biochemistry the total graduate enrollment continues to be virtually constant, although appreciable fluctuations are visible in some areas. Biochemistry has experienced a 35% increase over the five-year period, due largely to faculty expansion in connection with the School of Basic Medical Sciences.

Total Graduate Enrollments by Department and Area*

Dept.-Area	1972-73	1973-74	1974-75	1975-76	1976-77
Biochemistry	69	70	68	75	84
Chem. Engr.	52	52	59	51	52
Analyt.	36	50	53	51	49
Biophysical	6	4	4	4	6
Inorg.	58	60	65	63	64
Org.	101	96	83	82	102
Phys.	70	67	63	67	59
Ch. Phys.	15	12	13	8	9
Undecided	5	8	4	9	12
T. of Ch.	3	2	3	1	2
Chemistry	294	299	288	285	303
Semester I	415	421	415	411	439
Semester II	398	402	403	393	389

*It is estimated that the total number of graduate students in the Schoool will be about 440 this fall.

The numbers of degrees granted this year are similar to previous years and probably reflect a steady-state total of 65±10 PhD's after the all-time high for 1969-70 (107) and the sharp drop in the succeeding year.

Summary by Department of Advanced Degrees Granted

	1972-73	1973-74	1974-75	1975-76	1976-77
Biochemistry					
MS	17	16	14	7	11
PhD	14	6	8	4	9
Chemical Engr.					
MS	16	14	12	15	10
PhD	6	7	7	9	7
Chemistry					
MS	34	29	26	29	31
*PhD	37	58	59	56	39
Total					
MS	67	59	52	51	52
PhD	57	71	74	69	55

*PhD degrees in chemical physics are included here.

B. Graduate Student Recruitment and Admissions

Biochemistry-- In the 1976-1977 recruiting year 290 inquiries were received--slightly more than the 265 received last year. The number of completed applications for the PhD program was 69--slightly more than the 60 received last year. Of the 69 completed applications for the PhD program, 39 were made offers and 20 (51%) accepted. This is up from the 35% acceptance rate of a year ago and about the same as the 63% acceptance rate of two years ago. The average GPA of the entering students is 4.56 and their average GRE scores are: Quantitative (697) and Advanced (698). The average GPA and GRE scores of the last two classes were 4.76 and 4.46 and 630/660 (Q); 630/630 (A). A total of 14 students accepted into the doctoral program visited the Department and of these, 9 accepted our offer. (Report prepared by D. J. Shapiro)

Chemical Engineering-- There were 19 acceptances for admission in 1977-78. This resulted from 218 U.S. and 429 foreign inquiries, 115 completed applications, and 47 offers made. Of the 19 acceptances (41%), 13 were U.S. and 6 were foreign applicants. The amount of support provided ranges from $5,100 to $6,300 (for 12 months).

Chemistry--After the exceptionally large number of applicants who accepted offers during the previous (1975-76) year (87) there was a sharp drop to 58 this year. The numbers of inquiries, applicants and offers was about the same as last year; however, the acceptance rate was down to 35% from the preceding year's 48%, although the average GPA is comparable with previous years (4.58 vs. a range of 4.54 to 4.60). The 35% rate is the lowest for several years, previous rates being 38, 45, 51, 40, and 48% starting in 1971-72. A number of factors probably contributed to the sharp drop, the most important may be the fact that our stipends were increased only slightly, while those of our competitors took larger jumps.

The chairman of the admissions and appointments committee (J. P. Hummel) has made a detailed analysis, including historical summaries, of recruitment activities in Chemistry, copies of which may be obtained from him if you wish further details. A strong effort will be made to increase our stipends to more competitive levels for 1978-79, and all of those involved in the recruiting operation are expecting to work harder at the job!

School-- Students entering in June and August, 1977, and the totals for each of the four years preceding are summarized in the table below for the School as a whole. Overall, the quality of those applying and accepting seemed to be at least up to the high standards of the past several years. In particular, the entering group in biochemistry seems to be exceptionally well qualified.

Graduate Student Acceptance of Admission Offers*

Dept.-Area	1973-74	1974-75	1975-76	1976-77	1977-78
Biochemistry	27	18	24	19	20
Chemical Engr.	15	24	9	20	17
Analyt.	14	13	9	11	2
Inorg.	12	13	7	16	8
Org.	21	16	22	38	21
Phys.	12	21	19	17	18
Ch. Phys.	2	4	2	3	-
Undecided	11	6	8	9	9
T. of Ch.	-	1	1	2	-
Chemistry	72	74	68	96	58
Total	114	116	101	135	95

*The 1973-77 figures are actual enrollments, including students entering in February. The 1977-78 data do not include January admissions of which there were 9 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. Of the 95 new students entering in 1977-78, 8 are foreign nationals, 1 in bio, 6 in chem engr and 1 in chem.

C. Fellowship and Traineeship Support

1. Fellowship and Traineeship Support - These nonassistantship appointments were held by 117 graduate students this year. As shown by the summary below, this represents a bottoming out in the large 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. In fact, there would have been another drop this year because of the decrease in NIH traineeships in chemistry except for the increases in University and industrial fellowships. For the sixth year in a row most unrestricted, industrial grant-in-aid funds were committed 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	1972-73	1973-74	1974-75	1975-76	1976-77
NDEA Traineeship	3	2	0	0	0
Natl. Science Foundation					
National Fellow	10	8	11	6	6
Trainee	7	4	1	3	10
U.S. Public Health Serv.					
National Fellow	1	0	0	0	0
Trainee	53	52	44	49	28
	74	66	56	58	44
Institutional Fellowships					
University	19	24	21	19	25
Industrial - Dept.	38	39	48	33	41
Other	5	4	0	4	7
Total	136	133	125	114	117

The distribution of these appointments among the three departments in 1976-77 is given in the next table. Chemistry and biochem are down; chem engr. is up.

Department	NSF	NIH	Univ.	Indust.	Total
Biochemistry	0	23	3	0	26
Chemical Engr.	9	0	4	13	26
Chemistry	7	5	18	28	58
	16	28	25	41	110

2. Industrial Support - A synopsis is given below, by department, of the industrial donors who have made grants during 1976-77, to support graduate fellowships and/or research. The list does not include the smaller undergraduate scholarship grants listed in II.D. The amounts received total about $50,000 for chemical engineering and $110,000 for chemistry, compared with $70,000 and $95,000 respectively for the preceding year. Most of these funds are being used for graduate fellowships.

Biochemistry

None

Chemical Engineering

American Association of University Women
Amoco Foundation
Atlantic Richfield Foundation
Consejo National de Cienca y Technologia
Diffenbach Trust Fund
Dow Chemical Company
†DuPont Company
Exxon Educational Foundation
†3M Company
†Mobil Foundation
Shell Companies Foundation
Standard Oil of California
Texaco, Inc.

Chemistry

†American Cyanamid
Dow
†DuPont
Eastman Kodak
Eli Lilly & Co.
†Exxon Education Foundation
General Electric Co.
Lubrizol
†3M Company
Mobil Oil
†Monsanto (undergrad)
Procter & Gamble
†Rohm & Haas
†Standard Oil of California
†Sherwin Williams (seminars)
Union Carbide
†Uniroyal

†These are departmental grants-in-aid that can be used for purposes other than graduate fellowships.

D. Postdoctorates

Given below is a five-year symposis 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 total appears to have bottomed out.

Department	1972-73	1973-74	1974-75	1975-76	1976-77
Biochemistry	20	26	16	16	16
Chemical Engr.	1	2	2	1	2
Chemistry	54	58	52	44	44
Total	75	86	70	61	62

E. Special Lectures and Seminars During 1976-77

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

George W. Parshall, DuPont Company, October 19 & 20, "Carbon-Hydrogen Bond Activation I. Aromatic Compounds, II. Aliphatic Compounds"

2. Ada Doisy Lecture in Biochemistry

Luis F. Leloir, Campomar Foundation, Buenos Aires, October 13, "The Role of Dolichol Phosphate in Protein Glycosylation"

3. W. A. Noyes Lecture

H. Gobind Khorana, MIT., February 18, "Total Synthesis of a Biologically Functional Gene"

4. Sherwin-Williams Seminars

Gabor A. Somorjai, University of California-Berkeley, October 27, "The Science of Heterogeneous Catalysis"

Ben Widom, Cornell University, April 6, "The Equilibrium of Three Liquid Phases"

Robin M. Hochstrasser, University of Pennsylvania, April 13, "Nonlinear Spectroscopy of Molecules and Molecular Crystals"

Al Meyers, Colorado State University, June 9 & 10 (3 talks), "New Methodology in Aromatic Substitution","Progress Toward the Total Synthesis of Maytansine", "Asymmetric Syntheses via Chiral Oxazolines"

5. Alpha Chi Sigma Krug Lecture

George B. Kistiakowsky, Harvard University, April 22, "On Policy for Science and Science for Policy"

6. Wednesday Night at the Lab (organized by Alpha Chi Sigma, supported by funds from duPont)

David S. Lieberman, University of Illinois, Department of Metallurgy, November 17, "Of Memories, Metals and Motors"

Richard S. Young, Exobiology Division-NASA, February 23, "The Viking Project: The Search for Life on Mars"

James Johnson, University of Illinois, Institute of Environmental Studies, March 9, "Pollution, Drugs, and Sex"

Ralph G. Smith, University of Michigan, April 13, "Women in Industry (Are they really safe?)"

7. Special Topics Course Taught by Visiting Faculty -

Dr. A. D. Buckingham (Visiting George A. Miller Professor), Cambridge University, August 26-October 1,"Optical, Electric, and Magnetic Properties of Molecules"

8. Local ACS Section Lectures -

There was an exceptionally active series of seminars sponsored by the local ACS section, most of whose members are associated with the School. Speakers included David Evans of Cal Tech., Barry Karger of Northeastern University, Joshita Kishi of Harvard, David Hercules of the University of Pittsburgh, Bernie Alder of Lawrence Livermore Lab, Alan Myers of the University of Pennsylvania, Bruce Berne of Columbia, our own J. C. Bailar, Jr., Richard Schrock of MIT, Daniel Koshland, Jr., of Berkeley, Sol Spiegelman of Columbia, and Walter Stockmayer of Dartmouth.

9. 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. 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.

   As in previous years there were about a hundred (116) of such seminars by visiting speakers, twenty-two presented by visitors from other countries, distributed among the areas as follows, where the first number gives the talks by U.S. visitors and the second, by foreign visitors: Biochemistry (26, 6),Chemical Engineering (11, 2), and in Chemistry--Analytical (10, 1), Inorganic (13, 1), Organic (14, 8), and Physical (20, 4).

F. Cumulative Exams

In biochemistry and chemistry, the preliminary PhD exam is a cumulative series of written, one-hour exams (9/yr) on unannounced topics. Graduate students are required to start taking the exams when they arrive or when any deficiencies in their college background have been removed. In order to pass the "cums", a student must pass 6 out of 14 recorded exams. Of the first four exams taken by a student, only passes are recorded.

The system now in use has evolved through the years. At present, all of the exams in the different areas (bio, analytical, inorganic, organic and physical) are distributed to all of the students taking the cums. They are given 10 minutes in which to read the exams and select the one each wishes to take. At least half of the exams passed are required to be in the student's major field.

This spring the chairman (J. P. Hummel) of the committee that administers the exams analyzed various data describing the operation of the cums system for the past three years. The results for 1976-77 are given on the next page. They do not differ significantly from the previous two years. The most variability is shown in the areas to which students "cross over" in selecting the exams to take. The average number of exams taken by students before successfully completing the requirements was 10.7 in 1976-77 and 10.9 and 11.0 in the preceding two years. This means that on the average about 2 1/2 semesters were needed to finish the cumulatives. Some differences are seen among the five areas, but nothing startling of a long-term nature.

The overall attrition rate on the cums is about 15%, but 3/4 of this is due to students withdrawing from the system and leaving the program with an MS degree. During the two-year period, 1975-77, there were 172 students who went through the system; of them, 151 passed, 15 withdrew, and 6 failed. For those who formally fail the system, a special review committee is appointed in about half the cases; and in half of those it is decided to retain the student in the PhD program.

Cumulative Exam Statistics

(1976-77 Academic Year)

	Area of Exam					
	Analyt.	Bio.	Inorg.	Org.	Phys.	All Exams
No. of Exams	127	239	169	312	216	1063
No. of Cross-overs into the Area of the Exam	20	23	12	3	18	76 (7.2%)
Origin of Cross-overs (i.e., their major areas)						
analyt.	--	3	--	--	5	8
bio.	3	--	--	2	1	6
inorg.	2	--	--	--	9	11
org.	10	19	7	--	3	39
phys.	5	1	5	1	--	12
Percent Receiving Pass Grades						
all students	50%	51%	51%	51%	51%	51%
own majors	50%	51%	54%	51%	51%	51%
cross-overs	50%	48%	17%	0%	61%	45%[1]
Ave. No. of exams taken before completing requirements						10.7[2]
Ave. no. of exams taken before failing						16.0[3]

[1] The percentage of passing grades by origin of the cross-over students was as follows: analytical--50%, bio--0%, inorganic--64%, organic--49%, physical--33%.

[2] For those completing the requirements during the past year; includes free exams. The average number of exams needed to finish for majors in the various areas was as follows: analytical--12.0, bio--11.7, inorganic--11.1, organic--9.4, physical--10.5.

[3] This includes free exams. Four students failed the cumulatives during the past year. These were distributed among the major areas in the following way: bio--1, organic--1, physical--2. The average number of exams taken before failing for majors in the various areas was: bio--15.0, organic--17.0, and physical--16.0.

IV. Instructional Program

A. Curricular Matters

1. Courses and Curricula Committee*

The Chemistry Department committee was asked to assess the impact of a 14-week calendar upon the course offerings in chemistry. The results were to be used by the Senate Committee on the Academic Calendar, which had been charged with consideration of a shortened calendar for the entire campus. Many of the faculty in Chemistry assisted in the survey, whose outcome with respect to individual courses varied from "no damage" to "considerable damage".

The Chemical Engineering Curriculum has again become overcrowded, and to provide an equitable way to limit the size, a 3.5 minimum grade-point average for juniors and seniors was approved by the SOCS Committee. Also, transfer students will need a 4.0 average to be admitted to the curriculum.

The Department Committee approved a revised course outline for Chemistry 406, approved special classification of Chemistry 433 in the fall of 1977 as a non-organic course for most organic PhD candidates, rejected a proposal that some civil engineers be allowed to take Chemistry 101-102 without laboratory, and made some editorial revisions in the catalog description of the Chemistry Curriculum.

2. General Chemistry Program†

Professional Activities - The 4th Biennial Conference on Chemical Education held in Madison, Wisconsin, drew on our program for (1) an address by G. P. Haight summarizing and closing the conference, (2) a poster session giving details of our videotape program presented by Kim Cohn and coauthored by Anne Wood. (Professor Smith's PLATO materials were also on display.) At the New Orleans ACS meeting we were requested to make another poster presentation of our TA training program in a symposium on how to train TAs (Curran, Welter).

Two staff members have engaged in activities of the Illinois Association of Chemistry Teachers, speaking at a meeting (Haight), serving on the Board (E. P. Rogers), and organizing annual articulation meetings with high school teachers coincident with the Engineering Open House in March (general chemistry staff).

Chemistry 100 - PLATO lessons and examinations have been written for all of Chemistry 100 during a two year project (R. Chabay) and will become an integral part of the study, testing and record keeping for that course. Work is beginning (Ms. Carolyn Moore with Prof. Smith) to develop PLATO simulations for the "dryer" portions of Chem. 100 laboratory. Considerable savings in teaching time are anticipated.

Chemistry 101-2. TV tape production for Chemistry 101 and 102B should complete its first round of full course materials during the summer of 1977. A program of continuous assessment, revision and development for these courses is planned in cooperation with the Office of Instructional Resources (OIR).

---

*Report by committee chairman (D. E. Applequist).

†Report by G. P. Haight, Jr.

Chemistry 102P was given for the first time by someone other than Prof. Yankwich, who created it. Professor Breiland will continue through 1977-8.

Chemistry 104,5,6, Laboratory courses to accompany Chem. 101-2. Chemistry 104 is a two credit course equivalent to both 105-6, given along with 102. By postponing lab work until the second semester and carrying on experiments twice a week, remarkable efficiencies in student work, teaching and administration are effected. Problems of time and facility for prelab instruction are more easily solved. 105 and 106 pose serious problems in time for students to learn and for TAs to evaluate. However, inflexibilities in student schedules prevent most students from taking the 104 approach. Professor Hadley has revised manuals and experimented with various teaching and testing devices. Some prelab TV tapes have been revised or new ones made.

Chemistry 107-108 continue to be taught in the traditional manner.

Chemistry 109-110 laboratories have been reorganized and revised by Professors Zumdahl, Henrickson and Haight who will publish a new laboratory manual in the fall.

Management - In the summer of '76 two TAs (Wayne Pearson and James Welter) were given full responsibility for teaching the laboratory courses 105-6. While the experiment was a success in terms of teaching and learning, it proved to involve too much time and responsibility for graduate students when extrapolated to large fall enrollments. Hadley managed 104-5-6 alone during the spring of '77. It probably is going to be necessary to have two visiting staff for this assignment if significant development of the courses is to accompany the teaching of these large multisectioned courses.

General Chemistry Committee - The committee has considered questions arising from royalties generated from course materials used in general chemistry. Modest funds will be available to provide RA support in summer for third or fourth year TAs who have depended solely on teaching for support and performed exceedingly well, and for introducing gifted undergraduates to research during the summer. Nominations for such awards are to be made by faculty and acted on by a committee (currently Katzenellenbogen and Haight).

The Committee responded to concern over the logistics of constant revision of course materials--manuals and syllabi--by voting to consider textbook adoptions next fall for up to three years in the future to try to reduce work loads by temporary stabilization of course materials. Objections from permanent senior staff, who participate in teaching, to having course materials pre-selected for them will have to be considered.

A library of multiple choice test questions is being assembled and preserved. Teachers can find questions together with data showing student responses on past occasions. OIR is supplying grading, item analysis and record keeping services for multiple choice tests which has improved the logistics for many of the examinations in multisectioned courses.

Placement of Temporary Staff - Personnel from the general chemistry program continue to find placement even though the academic market is very limited. Andrew Jorgensen has taken a tenure track position at Indiana State (Evansville). George Bodner obtained a tenure track position in Chemical Education at Purdue--the most sought after position in this field this year.

3. Chemistry 436, Experimental Organic Chemistry - This course has proved to be of interest to beginning research students from several areas. Its lectures/demonstrations/tours cover the practice of basic organic laboratory techniques and provide an introduction to the research facilities and services of the School. New post-docs and faculty could benefit from them as well. The course is offered in the spring (11 a.m. on Saturdays) and the schedule for this year is given here as a reminder of its availability and coverage for next spring.

1) Survey of services, storerooms, shops; laboratory safety - Coates
2) Literature searching; laboratory notebooks; reaction techniques; heating, cooling, agitation, temperature control - Beak
3) Distillation, solvent purification, gaseous reagents, hydrogenation high pressures - Pirkle
4) Vacuum systems and vacuum line techniques; inert atmospheres and dry box operation - Martin/Smith
5) Purification techniques; recrystallization, sublimation, extraction, zone refining - Beak
6) Semi-micro techniques - Katzenellenbogen
7) Adsorption chromatography - Coates
8) High pressure liquid chromatography - Katzenellenbogen/Pirkle
9) Gas chromatography - Schuster
10) Photochemical techniques; optical instruments: polarimeter, refractometer - Schuster
11) Mass spectrometry - Cook (meet at 9 a.m., in Mass Spec Center, 31 N.L.)
12) Spectroscopic services: infrared, ultraviolet, magnetic resonance - Ulrich
13) Programable calculator and analog computer - Smith

B. Overall Registration

Comparisons of total instructional units, and, separately, of those in General Chemistry are given below on a semester basis for the 1972-77 period. The main point to note is that enrollments have dropped and leveled off at about 50,000 IUs after two years of 10%/year increases in 1972-74. The levelling off is largely due to stabilization of total campus enrollments plus some reversal of the super-saturated student trend to pre-med programs.

Semester	1972-73	1973-74	1974-75	1975-76	1976-77
	Total Instructional Units in All Courses*				
I	25,198	27,295	26,520	24,955	25,638
II	23,214	25,252	24,116	24,631	24,407
Total	48,412	52,547	50,636	49,586	50,045
	Instructional Units in General Chemistry				
I	11,103	11,974	12,174	10,426	11,689
II	10,531	11,420	11,249	11,497	11,473
Total	21,634	23,394	23,423	21,923	23,162

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

C. Teaching Loads

The drop and levelling off in enrollments during 1974-77, after the sharp increases for 1972-74, has enabled some recovery from the excessive teaching loads for TAs in the two-year earlier period of increased enrollments. This may be seen in the following table which lists the FTE TAs we've used in each semester for the past five years, and gives the ratio of IUs to them. This ratio was about 250 in the late '60s and early '70s.

Semester	1972-73	1973-74	1974-75	1975-76	1976-77
	Graduate Teaching Assistants Employed				
I	92.65	97.31	101.75	92.10	97.45
II	83.90	88.95	88.17	94.19	93.61
Average	88.27	93.13	94.96	93.14	95.53
	Ratio of Total Instructional Units to FET Teaching Assistants				
I	272	281	261	271	263
II	277	283	274	262	261
Average	275	282	267	267	262

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

The projections for 1977-78 suggest a modest increase (4%) in TA needs, compared with this year. However, the funds budgeted are inadequate, and added funds will be sought; if funds are not available enrollments will be curtailed.

D. Teaching Evaluation and Awards*

Our Committee on Teaching Evaluation submits reports for each of the two semesters, based upon the Course Evaluation Questionnaires filled out by the students in the various courses and sections thereof. (Different types of questionnaires are used for different types of courses.) The committee also recommends persons for School and Campus awards for excellence in teaching, based in part on CEQs and in part on peer evaluation.

This year one of our faculty and one of our TAs received campus Awards for Excellence in Undergraduate Teaching ($1,000 each). The recipients were Professor John M. Clark of biochemistry and Daniel S. Foose, a TA in chemistry. The awards were presented at a banquet in May, 1977.

Also, late in the spring two faculty members and three TAs were selected for the second set of annual School awards ($500 ea) as a tangible expression of the high regard in which their teaching is held. Funds for the awards were from unrestricted grants by Eastman Kodak Co. and the duPont Co. The awards were presented at the introductory session of our orientation program for new TAs in August, 1977. The recipients were Professors Larry Faulkner and John R. Shapley, and TAs Daniel S. Foose, Nancy G. Gallick and Karl E. Wiegers.

---

*Taken in large part from reports submitted by P. E. Yankwich, Chairman of the ad hoc Committee.

3. Chemistry 436, Experimental Organic Chemistry - This course has proved to be of interest to beginning research students from several areas. Its lectures/demonstrations/tours cover the practice of basic organic laboratory techniques and provide an introduction to the research facilities and services of the School. New post-docs and faculty could benefit from them as well. The course is offered in the spring (11 a.m. on Saturdays) and the schedule for this year is given here as a reminder of its availability and coverage for next spring.

1) Survey of services, storerooms, shops; laboratory safety - Coates
2) Literature searching; laboratory notebooks; reaction techniques; heating, cooling, agitation, temperature control - Beak
3) Distillation, solvent purification, gaseous reagents, hydrogenation high pressures - Pirkle
4) Vacuum systems and vacuum line techniques; inert atmospheres and dry box operation - Martin/Smith
5) Purification techniques; recrystallization, sublimation, extraction, zone refining - Beak
6) Semi-micro techniques - Katzenellenbogen
7) Adsorption chromatography - Coates
8) High pressure liquid chromatography - Katzenellenbogen/Pirkle
9) Gas chromatography - Schuster
10) Photochemical techniques; optical instruments: polarimeter, refractometer - Schuster
11) Mass spectrometry - Cook (meet at 9 a.m., in Mass Spec Center, 31 N.L.)
12) Spectroscopic services: infrared, ultraviolet, magnetic resonance - Ulrich
13) Programable calculator and analog computer - Smith

B. Overall Registration

Comparisons of total instructional units, and, separately, of those in General Chemistry are given below on a semester basis for the 1972-77 period. The main point to note is that enrollments have dropped and leveled off at about 50,000 IUs after two years of 10%/year increases in 1972-74. The levelling off is largely due to stabilization of total campus enrollments plus some reversal of the super-saturated student trend to pre-med programs.

Semester	1972-73	1973-74	1974-75	1975-76	1976-77
	Total Instructional Units in All Courses*				
I	25,198	27,295	26,520	24,955	25,638
II	23,214	25,252	24,116	24,631	24,407
Total	48,412	52,547	50,636	49,586	50,045
	Instructional Units in General Chemistry				
I	11,103	11,974	12,174	10,426	11,689
II	10,531	11,420	11,249	11,497	11,473
Total	21,634	23,394	23,423	21,923	23,162

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

C. Teaching Loads

The drop and levelling off in enrollments during 1974-77, after the sharp increases for 1972-74, has enabled some recovery from the excessive teaching loads for TAs in the two-year earlier period of increased enrollments. This may be seen in the following table which lists the FTE TAs we've used in each semester for the past five years, and gives the ratio of IUs to them. This ratio was about 250 in the late '60s and early '70s.

Semester	1972-73	1973-74	1974-75	1975-76	1976-77
	Graduate Teaching Assistants Employed				
I	92.65	97.31	101.75	92.10	97.45
II	83.90	88.95	88.17	94.19	93.61
Average	88.27	93.13	94.96	93.14	95.53
	Ratio of Total Instructional Units to FET Teaching Assistants				
I	272	281	261	271	263
II	277	283	274	262	261
Average	275	282	267	267	262

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

The projections for 1977-78 suggest a modest increase (4%) in TA needs, compared with this year. However, the funds budgeted are inadequate, and added funds will be sought; if funds are not available enrollments will be curtailed.

D. Teaching Evaluation and Awards*

Our Committee on Teaching Evaluation submits reports for each of the two semesters, based upon the Course Evaluation Questionnaires filled out by the students in the various courses and sections thereof. (Different types of questionnaires are used for different types of courses.) The committee also recommends persons for School and Campus awards for excellence in teaching, based in part on CEQs and in part on peer evaluation.

This year one of our faculty and one of our TAs received campus Awards for Excellence in Undergraduate Teaching ($1,000 each). The recipients were Professor John M. Clark of biochemistry and Daniel S. Foose, a TA in chemistry. The awards were presented at a banquet in May, 1977.

Also, late in the spring two faculty members and three TAs were selected for the second set of annual School awards ($500 ea) as a tangible expression of the high regard in which their teaching is held. Funds for the awards were from unrestricted grants by Eastman Kodak Co. and the duPont Co. The awards were presented at the introductory session of our orientation program for new TAs in August, 1977. The recipients were Professors Larry Faulkner and John R. Shapley, and TAs Daniel S. Foose, Nancy G. Gallick and Karl E. Wiegers.

---

*Taken in large part from reports submitted by P. E. Yankwich, Chairman of the ad hoc Committee.

The SOCS evaluation program appears to be the most comprehensive one on the campus, and I (PEY) know of no other in which careful attention has been paid from the start to the varieties of instructional experience that students have. The Office of Instructional Resources (OIR) continues to improve its procedures for processing, and Nancy Way's willingness to do preparative work on the completed forms that OIR considers routine but we know to be sensitive, contributes to that result. We believe that TAs and faculty alike are beginning to treat the applications of the forms as a matter of routine - we no longer hear that their use kills half a class period (when in fact the longest questionnaire in the largest lecture section can be handled from broadcast to in-gathering in 16 minutes) - and the fact that the students also regard the matter as one of routine is most helpful in this regard.

The amount of work required of the Physical Chemistry area secretaries is now at its minimum - but that minimum is 13.5 person-days per semester, and is that low only because of accumulated experience. My own commitment of time to this activity has ranged from a "running minimum" of 5 days to a high of 12 (occasioned by an unusually large number of changes being made by OIR and an above average number of requests for analysis of faculty and TA instructional performance records). Frankly, I spend much more time each year attempting to put the SOCS nominations for campus teaching awards into the form the latest notions of the officers administering those programs require!

There is only one continuing problem in the processing of SOCS forms: the slow return of some forms because the instructors, most particularly the senior faculty, want to "have a look at them" before turning them in. Forms held back for such a quick look have a way of arriving at the collection point 3 to 6 weeks after the close of the semester. Since we have no evidence that instructors are "skimming" the returns of unfavorable responses, we are <u>not</u> anxious to follow the campus-wide practice of asking a student in each class to be responsible for immediate delivery of the collected forms to the collection point; the fact that we operate in what are, essentially, four different buildings, would undoubtedly lead to confusion and to loss of returns. We will continue to exhort faculty and teaching assistants to return the forms quickly.

OIR generated all rating forms by computer in Sem. I for the first time, which made possible the use of SOCS Forms by other departments on the campus. Our orders aggregated 13,307 (which included approximately 2 percent overage for spoilage at the time of use), but OIR distributed 35,746 copies of our forms to other users! Forms FL and TQ are apparently quite suitable for use elsewhere. It is gratifying to the Committee that the use of SOCS Forms by others at the first opportunity for such exceeded the use of OIR's own CEQ <u>on this campus</u> (their CEQ is widely used outside the University).

OIR generated the evaluation forms again in Sem. II. I have been unable to obtain use figures which tell how other departments liked our forms. If one examines the package of forms available (distributed earlier in the year by OIR), however, several new imitations of the SOCS forms will be found--sincere flattery. Moreover, our forms are now being made available outside the campus. My grapevine tells me that the cost to OIR of their own system of computer generation and processing of the forms is approximately 18 cents a copy; my estimate of the similar costs under the old printing system is 8 cents. Typical progress and economy are being made.

"Hand-in" performance by faculty was generally excellent this year. We do have problems with a few courses whose character is strongly dependent on the instructor. In some cases, there is really no point in using the forms at all. It is, however, a continuing mystery to me why we find this out through returns failure after the end of the semester instead of by area declaraction in mid-semester when we request information of courses, sections, and enrollments.

The pattern of returns as a percentage of "enrollment" does not seem surprising; in Sem I the percentages returned were FL, 61.7; FB, 60.5; TB, 75.9; TQ, 65.6; TV, 55.6 The high returns for TB reflect the fact that students must check out of laboratories near the end of the semester. I do not have any idea why the percentage return for form TV should be the lowest; a quick check of courses by level does not support the notion that General Chemistry returns are lower than those from more advanced courses.

Hand-in performance by TAs in Sem II was the worst since the first year of the School-wide evaluation program. Many TAs simply tossed their forms into a circular file as they took them out of their boxes; they seemed to forget that the secret agents of the Committee are skillful in identifying envelopes in the waste-containers of the mail rooms. We have relied entirely on an "honor" system, eschewing the more formal techniques employed customarily (which require that students collect and "mail" completed evaluation forms from each class) as demeaning of the professionalism of our TAs. Perhaps we must reconsider this approach.

We now have 8 semesters of data on all our courses. A book of summaries is being prepared which will permit individual faculty records to be looked at more quickly than heretofore. As "norming" becomes possible with some of the forms, diagnosis of specific difficulties becomes more reliable--but, still, only in a crude and highly relative fashion. Of the data in hand, that for one of the semesters is of poor quality because of difficulties three years ago with the form reading operation at OIR (created in part by our unwitting error of form overprint design). The length of the string of good data is now sufficient to permit some doctoral candidate in Education (or someone studying the Sociology of instruction) to get an <u>honest</u> degree.

Tabular summaries are made after each semester of those instructors whose "Grade" as awarded by their students places them in the TOP or BOTTOM 20 percent of instructors in the same or similar courses. The TOP list is expected to be helpful in identifying persons for teaching awards, including the merit increment in stipends of continuing TAs. The BOTTOM list requires much more subtle consideration, because particular courses occupy special approbation in the esteem of our students. (Persons wishing to see their own ranking may obtain it via the chairman of the committee--presently D. E. Applequist, or from Elsie Wilson who has only the summaries just mentioned.) The TOP lists for 1976-77 are given below for faculty.

Top Twenty Percent of Instructors in 1976-77

Form FL (Faculty member in a formal lecture course)

	Sem I	Sem II
100-level	101A Jorgensen	108 Reichgott
261 and 300-level	339 Katzenellenbogen	350 Clark
	373 Stadtherr	346 Gennis
	350 Storm	371 Stadtherr
		349 Flygare
400-level	443 Marcus	447 Marcus
	407 Shapley	433 Schuster

Form FB (Faculty member lecturing in a laboratory course)

	Sem I	Sem II
100-level	109 Henrickson (Chas.)	110 Henrickson
		181A Coates
300- and 400-level	322 Faulkner	422 Faulkner
	421 Malmstadt	316 Shapley

E. Regional Conference of Student Chapters of AIChE*

The 27th Annual North Central Region American Institute of Chemical Engineers Student Chapters Conference was held at the University of Illinois on April 1-2, 1977. This was the first time at IUCU. Dr. R. C. Alkire was faculty advisor for the meeting. Twenty-three universities in Illinois, Indiana, Ohio, Kentucky, Michigan, Wisconsin, and Minnesota comprise the region. An excellent attendance of 58 visitors plus about 50 local students was achieved. The program included talks by A. S. West, President of the National AIChE; Jack McWhirter, Vice President of Union Carbide Corp.; Keith McHenry, Vice President of Amoco; James Fair, Director of Engineering Technology, Monsanto Company; Mike Yao of Argonne National Lab; and three local professors--G. H. Miley of Nuclear Engineering, Gil Haight of Chemistry, and J. W. Westwater of Chemical Engineering. Student papers were featured at one session. Nine different industrial donors provided financial assistance for the conference. The unit operations lab was repainted in honor of the occasion!

*Lifted from the annual report of the Department of Chemical Engineering.

V. Services and Facilities

A. Chemistry Library*

In this year, the continuing need for space, both for the collection and its users, has become critical. Proposals to move books and journals to other branch libraries or to the central stacks have not proven feasible. If the library is to continue to provide essential service for our research and teaching, additional space will be needed soon.

Ruth Power, Chemistry Librarian for 27 years, retired in August, 1977. Her devoted service in establishing and maintaining a superior collection in our library has been a very important component in the School's record of outstanding research. Her efforts are greatly appreciated and provide a base from which her successor, Lucille Wert, should be able to build a continuing record of outstanding service.

During the year the School accepted a kind offer by Dr. Frank H. Stodola of Peoria to donate upon his death 250 volumes of historical interest. It is Dr. Stodola's wish that these volumes provide the basis of a collection in the History of Organic Chemistry, and the School has agreed to provide up to $1,500 per year in matching funds for several years to extend the collection. Initially, the collection will be housed in Professor Melhado's office.

Restrictions in funds for journals, books, and personnel continue, and special efforts have had to be made to keep the library open and to acquire the books and journals necessary to maintain the collection. A reduction in our serials budget was met by eliminating some journals which are available elsewhere on campus. This step was taken regretfully, but should result in our users not losing access to any materials, although trips to other libraries may become necessary. The use of our library may also go up, as we maintain some journals which have been eliminated elsewhere. The details of library use are essentially the same as those outlined in last year's report.

B. Placement Office†

Chemical science students who participated in industrial recruiting in 1976-77 had a much better chance of scheduling interviews with the companies which interested them than the preceding class did. This was because á number of companies expanded their schedules or extended their visits to talk to all the students who expressed an interest in them. Many schedules had large overflow lists which were accommodated in this manner. This is shown by comparison of the figures given below for 1975-76 and 1976-77.

	1975-76	1976-77
Employer Visits Scheduled:	195	194
Cancellations:	24	14
Employer Visits Completed:	171	180
Number of Employer Days:	232	337
Total Student Interviews:	2759	3205
Average Interview/Employer per day:	11.9	9.5

*Section prepared by D. Y. Curtin, Chairman of the Library Committee.
†Adapted from the report of G. Arsons, Director of the Placement Office.

The industrial employment rate for our baccalaureate chemists remained fairly constant while there was a slight increase in the fraction of our PhD candidates who accepted industrial offers. The chemical engineers at all degree levels continued to experience little difficulty in finding industrial employment. Only one BS chemical engineer seeking employment was unsuccessful in receiving any job offers, and he will attend graduate school.

The Placement Office and Phi Lambda Upsilon co-sponsored the usual pre-recruiting workshops each semester. Representatives from Amoco, Rohm and Haas, Mead Johnson and Union Carbide participated in discussing preparation for the interview, the campus interview, and the plant visit. As a new dimension added to the preparation this year, we offered the ACS presentation (slide and cassette tape) "Chemistry: A Job or a Career?" one week prior to the workshop itself.

Also, this year we initiated a new sign-up procedure for PhD candidates on a regular basis. The schedules were released each Monday morning at 7:00 a.m. in a room in the Union Building. Students were asked to schedule interviews on the basis of their interest in the companies' opportunities. To do this a student must make a choice of company lines which form in front of each schedule. We have found this procedure to be very equitable and well-received. We plan to continue its use in the future.

An important new program was begun this year when we placed an undergraduate chemistry major in a cooperative education position with Monsanto. By August we had three students working with Monsanto, three with Eastman Kodak and one with Dow Chemical U.S.A. This fall (1977) Mrs. Arsons began to administer the cooperative education program for chemical engineers as well. We have been pleased with our initial success with the chemistry cooperative program and anticipate that interest on the part of students and companies will grow.

Our survey of this year's baccalaureate graduates indicates that their future plans favor employment considerably more (75/159) than last year's graduates (60/165), continuing an earlier trend. This change is in large part due to the continued increase in size of the graduating class of chemical engineers. The data for 1976-77 are as given below. Improvement in the employment picture is shown by the decreased number (7/159) still seeking employment this fall (1977) compared with the number (15/165) a year ago.

Baccalaureate Graduates	Chem. Curric.	Science & Letters*	Chem. Engr.
Employed	12	15	48
Graduate/Professional School	13	43	11
No Information	1	7	2
Seeking Employment	2	5	0
Military Service	0	0	0
Totals	28	70	61

*Includes biochemistry and chemistry graduates.

We had 5 students complete a master's degree in chemical engineering who accepted industrial employment. Also, 9 out of 12 chemists who left with a master's degree accepted industrial offers.

Plans of chemists, biochemists and chemical engineers completing the PhD degree requirements during 1976-77 are as follows:

PhD Graduates	Chem.*	Biochem.*	Chem. Engr.*
Industrial/Government Employment	27	2	10
Academic Employment	4	0	3
Postdoctoral Research	12	2	0
Foreign, Returning Home or Still Looking	6	0	0
Totals	49	4	13

*Figures include those who worked through our Placement Office.

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

BS Graduates:	Salary Range	Salary Average
Chemistry Curriculum	$1205 - $ 775	$1064
Science & Letters Curriculum	1300 - 1083	1156
Chemical Engineering	1500 - 1167	1376
MS Graduates:		
Chemistry	$1534 - $1291	$1404
Chemical Engineering	1600 - 1415	1530
PhD Graduates:		
Chemistry	$1908 - $1450	$1728
Chemical Engineering	2083 - 1850	1919

Four PhD chemists accepted academic employment. Salaries ranged from $1555 to $1125 per month for nine months with the average being $1365.

Plans of the 62 postdoctoral people who had contact with this office during 1976-77 (given below) are similar to those for 1975-76, except that the fraction looking (2/62) is much less than the previous year (9/55), reflecting the increased fraction with employment elsewhere (21/62 vs 9/55). The average salary for postdoctoral chemists who accepted industrial employment was $1818 per month while that for academic employment was $1593 per month for nine months.

Plans for 1976-1977 Postdoctorates

Dep't.	No.	Indus./ Gov't.	Acadm. Emplmt.	Post-doc	No Info.	Looking	Stay UI
Biochemistry	15	2	1	2	5	0	5
Chem. Engr.	3	2	0	0	1	0	0
Chemistry	44	11	1	2	9	2	19

C. Shops and Service Facilities*

During the fall semester of 1976-77 a proposal was prepared for submission to the National Science Foundation for a multi-purpose laser facility. The total amount requested was $134,000. In the late spring we learned from the NSF that the proposal will be funded in the amount of $100,000. Plans are being made to set up the facility with a full-time technical person in charge of its day-to-day operation under the guidance of a three-member steering committee (K. J. Kaufmann, Chairman; D. N. Hendrickson, G. B. Schuster).

The evaluation of individual service facilities by small, ad hoc committees was continued this past year with evaluations of the mass spectrometry and machine shop facilities. On the whole, these evaluations have proved helpful to the facilities in directing their efforts toward providing better and more effective service. They also have clearly demonstrated that we already have a first-class set of departmental service shops and labs.

Personnel changes during the past year have been relatively few. Upon Ron Anderson's departure as director of the electronics facility, Chuck Hawley assumed the position of director. Carl Reiner recently assumed the position in the electronics facility formerly held by Bob Larsen.

D. Safety Activities†

The safety committee held no formal meetings during the year. There were two regular chemistry clean ups on October 21 and April 14 in which the usual 25-30 drums of waste chemicals were packaged and disposed of. The student members of the organic safety committee, who as usual carried out the work of identifying and packaging the materials, deserve our thanks for their efforts. In addition, a special chemical clean up was organized to dispose of toxic, pyrophoric, explosive and unknown materials. These were taken to the South Farm on March 17 and incinerated.

Jim Glaze of the Division of Environmental Health and Safety will present a twenty-two minute safety movie made by Fischer Scientific entitled "28 gm of Prevention". This film seems to be an effective introduction to safety in the chemical laboratory and will be shown during the orientation meeting for new graduate students.

Several improvements in safety facilities were made during the year. An eye wash station has been installed in 250 Noyes Laboratory and one is being planned for installation in 218 Noyes Laboratory. The safety showers in all SQCS facilities were checked in August 1976. The foam device located in the volatile storage room in RAL was checked on August 24, 1976 and was found to be not operating properly. The equipment was cleaned and placed in working order. It was checked again on November 22, 1976 and found to be working. It is planned to check this device every six months.

---

*Section prepared by T. L. Brown, Chairman of the Service Facilities Committee.

†Report of the Safety Committee Chairman, R. F. Nystrom.

A review of the accidental injury reports filed during the year indicates that there were two accidents of a sufficiently serious nature to mention individually. The first occurred in room 54 RAL on March 11, 1977. Marvin Strom, a glassblower, was assembling a new vacuum line and an explosion took place as he attempted to seal a large glass vessel to the line. It seems that the large glass vessel was rinsed with methanol and then dried. Apparently some methanol vapor remained in the flask and exploded when the glassblower heated the vessel.

The second incident occurred on March 23, 1977 in room 374 RAL. A flask containing dimethyl sulfoxide and calcium hydride was stoppered and placed in a heating mantle. The student thought that the power to the mantle was off but it was on. Consequently, heat was applied to the closed flask which caused an explosion.

Fortunately there seems to have been no serious consequences from these accidents and the injured appear to have fully recovered. A summary of all of the reported accidents is given below. The total of 55 is up 20% from last year's 45.

1.	Cuts, bruises, burns, and other minor injuries		40
2.	Chemical burns and accidents		
	caustic solutions	1	
	acidic solutions	8	
	nickel carbonyl	1	
	bromine	1	
	phenyl arsenic dichloride	1	
	miscellaneous	3	
			15
	Total reported accidents		55

E. Building and Space*

During the past year approximately $66,000 of School funds were spent on remodeling and renovation projects within the School. This represents an increase of about $20,000 over the previous year. The major sources of these funds were the School working fund (a portion of the state operating budget set aside for School-level assignment) and the SOCS ICR account. A list of the major projects completed during the year is as follows:

Expansion of PLATO Lab in Chem. Annex	$14,900[1]
Remodel SOCS Business Office in Noyes	11,300
Construct Constant Temperature Room (Bio)	6,500
Convert Rooms 20 and 30 NL to Research Labs	4,900
Paint Crane Bay	3,500[2]
Improvements in Inorganic Res. Lab (357 NL)	3,200
Remodel X-Ray Lab (62-64 NL)	2,700
Rework Elevator Controls in RAL Add'n	2,500

[1]Includes $3,100 from research grant funds.

[2]Excludes Physical Plant matching funds.

*Report of J. P. Hummel, the chairman of the committee.

At the present time, the most pressing space problems involve the necessity of finding space for the expansion of the Chemistry Library in Noyes Lab and of providing additional research space for the faculty being added in Chemical Engineering in response to their recent dramatic enrollment increases. Next come a considerable backlog of projects related to a general upgrading of the research and teaching facilities in Noyes Lab. Unfortunately, none of these needs are going to be met unless substantial campus funds are made available.

The responsibility for overseeing our maintenance and remodeling activities has been solely in the hands of Cope Hubert since Dick Lytle retired from the department two years ago. Cope has done a fantastic job and deserves the thanks of the School. Unfortunately for us, he cannot be on duty 365 days a year. However, during his absences, we are fortunate to have Frank Palmer available to serve as a contact person for these activities, which he has done quite willingly and effectively.

F. Dispensing and Storeroom Operations*

This committee operates primarily as a supervisory group in which individual members monitor the day-to-day operations of our storerooms. In each case, the committee member is responsible for the fiscal status of a storeroom and also serves as the personnel supervisor for that storeroom. The committee structure provides the means for a greater degree of School-wide coordination and monitoring than before. This year it has resulted in a much better fiscal picture at close-out time than previously. After correcting for credits that were held back in June, the largest year-end deficit in any storeroom was $2700 (out of total sales in that storeroom of $168,000) and the storerooms as a whole showed a net surplus of $29,000 (out of total sales of $570,000).

Work was begun during the year on an analysis of the duplication of items between our various storerooms. Although the Systems Group can easily supply quite detailed listings of the duplications that exist, it was quickly evident that the process of analyzing the duplications and deciding what to do about them is one that would require large amounts of time on the part of one or more persons intimately familiar with the expectations of our various faculty and student groups and the ability of the storeroom system to meet those expectations if duplications are removed or limited.

A large fraction of the 25,000 items we stock are duplicated in more than one storeroom; each has to be individually reviewed before a decision can be made on whether to continue, reduce, or eliminate that duplication. The individual storekeepers generally do not have the time available to do this nor do the committee members. Thus, the project is lying dormant until some staff time can be made available to restart it. It might be noted here that the potential (one-time) savings in inventory reduction could very easily pay for the additional staff needed to complete this project.

The various operations of the University are coming under closer state scrutiny via compliance audits mandated by the State Legislature for state agencies in general. Coopers and Lybrand, in such a report on campus fiscal activities for the year ending March 31, 1976, questioned the operation of our dispensing areas (which we have always called storerooms). Because of the volume of stock on hand and the presence of the good inventory control and charge-out procedures

---

*The first three paragraphs are the report of J. P. Hummel, Chairman of the Storeroom Committee.

we've established during the past several years, the auditors viewed these operations as "storerooms" in the fiscal sense of the word. As such, the inventory value would have to be assessed and included in the School's year-end financial statement. The auditors also recommended that the University review the controls and evaluation techniques used for the inventories and determine whether the quantities on hand are too large and/or obsolete.

Acceptance of this finding would reduce significantly our flexibility in meeting internal needs and require us to do a substantive amount of non- or marginally-productive work. Therefore, a number of conferences were held with campus officers to counter the finding of the Compliance Audit and develop arguments that would enable us (and other campus units) to continue operations in a manner that best suits our needs. By emphasizing the "dispensing area" rather than "storeroom sales" aspects of our operation, we have been able to enlist the support of the University in responding to the finding. However, the auditors have not yet indicated whether or not they will accept the University's position in the matter.

VI. Administration

A. Affirmative Action Program*

Our recruitment of minority students continued as in the past by contacting 33 predominantly black schools by letter and by telephone. Several schools were visited this year including Jackson State, Central State University, Georgia Tech and Texas Southern. These visits were made by Ana Jonas, Galen Stucky, Peter Beak and John Covington. John Katzenellenbogen and Galen Stucky took part in a seminar on increasing minority registration in graduate education in which representatives of minority schools were invited to the University of Illinois campus and given an opportunity to talk with graduate students, faculty and to view the facilities at the University of Illinois. Dr. Bernard H. Johnson of Central State University and Professor Jim Perkins of Jackson State University, who are both heads of their departments in chemistry, visited the Chemistry Department at the University of Illinois in conjunction with this program. Our primary competition for minority graduate students still appears to be the health-related professions.

The recruitment of women graduate students continues to be a strong component of our program. This year, in chemistry, we had 50 women applicants, five of whom were minority women, and 19 minority applicants, 7 of whom were black. Fourteen women, one of whom is black, one black male and one additional minority applicant accepted appointments for 1977-78. The number of women students in chemical engineering continues to increase. There are 17 freshmen, 23 sophomores, 8 juniors and 8 seniors who are women, i.e. 56 out of about 350. Two graduate students are women and two more accepted appointments for 1977-78. The number of minority students remains low; one senior is black.

B. Financial Support

1. State Support - The programs of the School have been squeezed increasingly for several years by high undergraduate enrollments and state budget increases that fall far behind inflation. Fortunately, some relief was provided for 1976-77. The operating budget (wages and expenses) was increased by about $50,000 after remaining static at $580,000 for five years in a row. Also, LAS "gave us back" 4% of the 5% allotment (about $40,000) that it has been receiving from the ICR (indirect cost recovery) funds on the School's grants and contracts. These additions enabled us to increase the operating budget allocations to the various budgetary units of the School, to reduce charges of several types to research grants that had been instituted the year before, and to try a program of providing up to $200 for out-of-pocket costs of senior research students (a total of $10,000 for the latter).

However, the accumulated deficiencies, in remodelling funds especially but also in operating funds and instructional and research equpment, are affecting adversely the quality of our teaching and research. Three major items are particularly troublesome: (1) More space for the Chemistry Library; (2) Remodelling of space in chemical engineering to enable 1 or 2 faculty to be added to help teach their greatly expanded (x 2.5) undergraduate enrollments; and (3) Major remodelling of obsolete and underutilized space in Noyes Lab mainly for inorganic where recruiting of new faculty has been inhibited for several years by poor space, but also some for physical.

---

*Taken from the reports of the School's Affirmative Action Committee, (G. D. Stucky, Chairman) and the Chemical Engineering Annual Report.

In last year's report a tabular and graphical synopsis was given of the School's fraction of the LAS College's teaching load and state budget. These data were used as the basis for a request that the Vice Chancellor of Academic Affairs review the School's budgetary problems and the lack of response thereto by the LAS College. The appeal met with some success. The Vice Chancellor agreed that we do have a budgetary problem, provided a non-recurring allocation of $100,000 for 1977-78 to help us out on the most critical remodelling items, and suggested that LAS review its policies with respect to our needs. Subsequently LAS provided a recurring allocation of $15,000 for a new faculty member in chemical engineering. Unfortunately, the expense portion of our state budget was increased by only 2.5% for 1977-78 (the average amount provided to LAS, although the University line was increased 4.0%). The gap between this and inflation is about 5%, so again we're getting an effective cut, this time by about $24,000 (0.05 x $480 K).

The graphical synopsis of our School's state funding and IUs compared to LAS as a whole has been updated by replacing last year's estimates for 1976-77 with the actual data (including the mid-year 2.5% salary increase) and estimating the IUs and recurring budget figures for 1977-78. The results are given on the next page. It is seen that in 1977-78 the School will have once again to deal with a substantial (6%) enrollment increase with token help of a non-recurring nature.

2. Outside Support - After two years in which outside support lagged slightly behind inflation, outside funding for 1976-77 was up 9%, a bit more than inflation, to give a modest but real increase. The distribution of funding sources and the numbers of grants were relatively unchanged from 1975-76. The data are summarized below for the six-year period 1971-77.

SOURCES OF OUTSIDE RESEARCH SUPPORT EXPENDITURES

*Six Year Synopsis***

	1971-72	1972-73	1973-74*	1974-75	1975-76	1976-77
NIH Research Grants	1,162	1,372	1,660	1,686	2,036	2,149
NIH Training Grants	230	279	208	272	323	282
NIH Postdoctoral Allowances	6	4	4	---	---	15
TOTAL NIH	1,398	1,655	1,872	1,958	2,359	2,446
Environmental Protection	---	80	52	65	---	---
National Science Foundation	1,019	1,126	1,303	1,364	1,426	1,652
Materials Research Lab (ERDA)	80	88	78	77	67	136
Materials Research Lab (NSF)	288	179	129	175	130	122
Materials Research Lab (AF)	---	---	119	78	46	32
Army Research Office	54	60	75	57	20	5
Office of Naval Research	29	31	27	48	23	61
Air Force OSR	1	15	28	22	29	35
Department of Agriculture	---	---	---	---	---	---
Department of Interior	35	10	---	---	---	---
TOTAL U.S. GOVERNMENT	2,904	3,243	3,683	3,844	4,100	4,389
Grants from Private Sources	204	219	214	232	314	425
Graduate Research Board***	233	113	194	208	187	180
GRAND TOTAL:	3,341	3,575	4,091	4,284	4,601	4,994

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.

***Includes computer allocation.

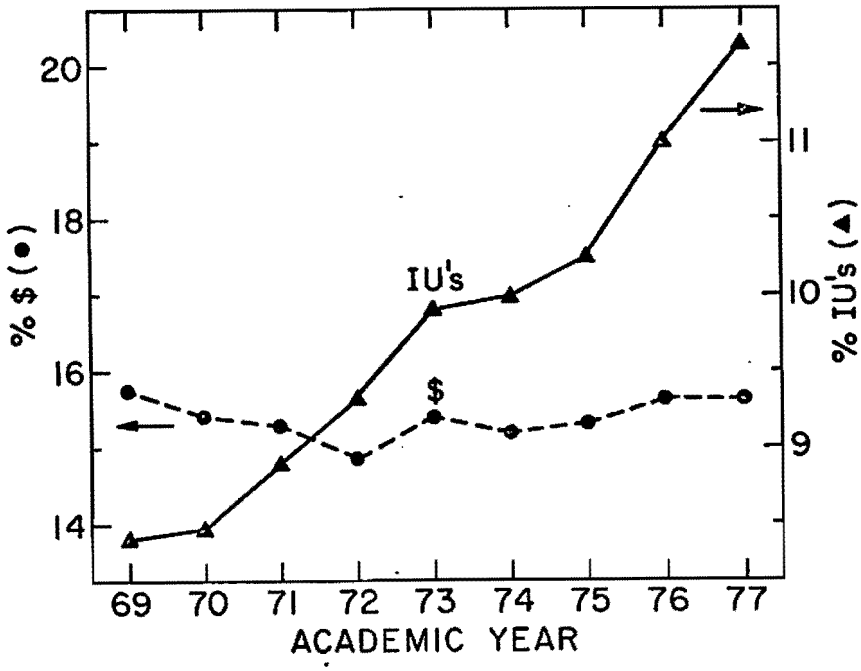

Fig. 1. The SOCS percentage of the LAS College's instructional units (IU's) and state budget ($)

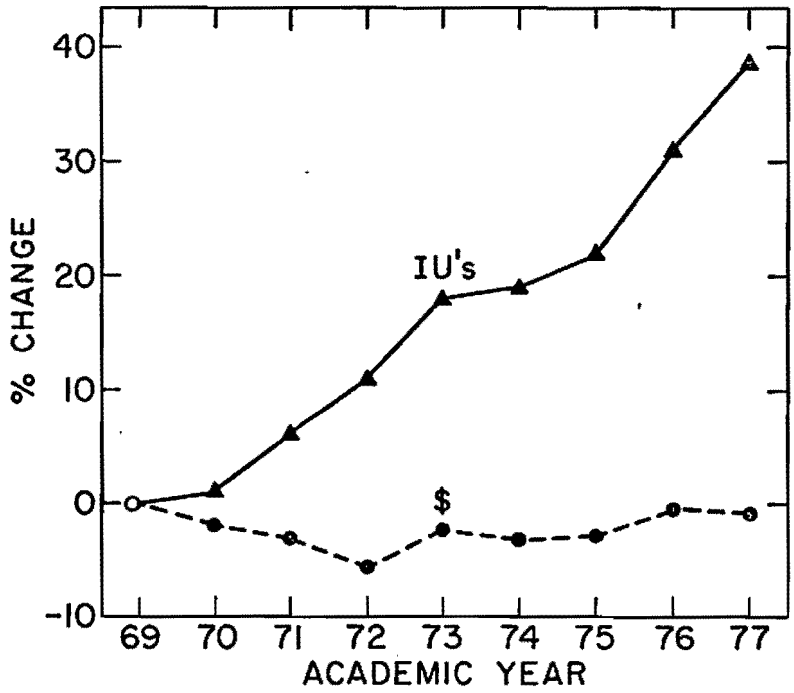

Fig. 2. The change in the SOCS's fraction of the LAS instructional units (IU's) and state budget ($), referred to the fractions for 1969-70.

C. Business Office

During 1975-76, a general review and study was made of the SOCS Business Office operations by an ad hoc committee with Professor J. W. Westwater as chairman. Their findings were outlined in the annual report for that year. Included was a recommendation that a more detailed study be made of the Systems Group. Such a study was made in 1976-77 by a group consisting of T. L. Brown, Chairman, L. R. Faulkner, D. Henard and J. P. Hummel.

A copy of their report is available in the School office. Some excerpts are as follows: "The tasks performed by the Systems Group are both useful and beneficial to SOCS. ...The...Systems Group has led the way in the development of (computer) programs which provide information and record keeping regarding research grants... storeroom activities. If...imitation is the most sincere form of flattery, then the SOCS Business Office can feel very flattered indeed... As a summary conclusion, this committee finds that the present operation of the Systems Group...is of a high quality. We deem the operations of this group useful and beneficial to the School as a whole, and conclude that the costs...are appropriate..."

Another noteworthy event related to the Business Office was the election of our Business Manager, Larry G. Hess, to the presidency of the Society of Research Administrators (SRA) for the year starting September 1976. The society has more than 1,200 members in the U.S. and Canada, from industry, colleges and universities, hospitals and medical centers, government agencies and non-profit organizations. Larry was president of the Midwestern Section of SRA in 1973-74, and has served on the society's national executive committee, education committee, subcommittee for development of a research administration curriculum and an ad hoc committee on committees. The SRA was organized in 1967; its primary objective is to improve the efficiency and effectiveness of research administration.

D. Evaluation of Academic Programs by COPE

For several years the Council on Program Evaluation of the Academic Affairs Office has been chipping away at the evaluation of the various programs on campus. The procedures employed have evolved considerably with time and by 1976-77 were largely of a self-evaluation nature, following a format and using a variety of statistical data provided by COPE. During the 1976-77 academic year the Biochemistry and Chemical Engineering Departments completed such an evaluation and the Chemistry Department is scheduled for one in 1977-78.

The evaluation consists mainly of the following components: 1) A questionnaire filled out by each faculty member reporting activities and accomplishments. 2) A comprehensive report completed by the department about its structure, programs, faculty, employees, students, policies, objectives, history, operations, etc. 3) Questionnaires filled out by undergraduate and graduate students majoring in the department's programs. 4) Questionnaires filled out by the faculty about departmental administration. These various items are analyzed by the COPE staff and presented to the Council for review and evaluation. Their conclusions are transmitted to the department head and some time later (several months or more) the Council releases a public Action Report. Also, depending upon the circumstances, COPE may recommend that a more detailed study of the department be made by a Task Force appointed by the Council.

It will probably still be some time before the more detailed action reports are available for the two departments. In the meantime, it seems appropriate to cite below the substance of the letters sent to the department heads by COPE:

Biochemistry--"...the Council voted unanimously against further consideration of a task group. ...They found much to praise and commented on the orderly governance and high standards of the department. Faculty and student morale is high, and research activity is productive. In effect, I (Richard Smock) was asked to give the department a "pat-on-the-back' and to convey the intention of the Council to assist the department in its objectives when it can."

Chemical Engineering--"...the Council voted unanimously against further consideration of a task group. ...The Council believes Chemical Engineering to be a solid department, with sound leadership, good faculty and student morale, and an exceptional record of research productivity. Your department reflects standards of scholarship that perhaps are among the highest on our campus. The level of quality you and your faculty have achieved over the years is recognized by the Council as well as by the campus in general. ...We appreciate your standards and your accomplishments.

"The Council believes that the rapidly increasing number of undergraduates enrolling in your department potentially threatens that quality. We encourage you to keep close contact with your student majors in order to continue offering a sufficient variety of courses and to maintain the educational climate conducive to producing outstanding graduates fully meeting your expectations. As Roger Martin pointed out in his letter, we encourage you to expand your program somewhat to meet the requirements of a larger number of students. The number of placement opportunities seems sufficient to make that course a reasonable one, and the campus benefits from expanding programs of high quality. If, after exploring this possibility, the department believes that physical constraints such as limited lab and classroom space or other factors preclude success, the Council recommends that the department, working with the school and college administration, move to limit and possibly decrease future enrollments to the number of students that can be reasonably accommodated. The department should work with the administration in advance to insure that reduced enrollments are accepted as an effort to maintain quality, and are not a reason to reduce funding."

VII. Alumni*

The alumni of the School have continued to win many awards during the 1976-77 school year as is evidenced by the following list of those that have come to our attention.

National Awards of the American Chemical Society

William J. Bailey (PhD, 1946), Professor of Chemistry at the University of Maryland, the Award in Polymer Chemistry.

Henry Gilman (former staff member), Professor emeritus of Chemistry at Iowa State University, the Priestly Medal.

Glen E. Gordon (BS, 1956), Professor of Chemistry at the University of Maryland, the Award for Nuclear Applications in Chemistry.

Robert W. Parry (PhD, 1946), Professor of Chemistry at the University of Utah, the Award in Chemical Education.

Awards Sponsored by ACS Divisions or Local Sections

Thomas T. Huang (PhD, 1968), Associate Professor of Chemistry, E. Tennessee State University, Speaker of the Year Award by the Northeast Tenneseee Section of the ACS.

Robert G. Roeder (MS, 1965), Professor of Biological Chemistry at Washington University, St. Louis, the Eli Lilly Award in Biological Chemistry of the ACS Division of Biological Chemistry.

Stanley Wawzonek (former staff member), Professor of Chemistry at University of Iowa, the Midwest Award of the St. Louis Section of the ACS.

Awards from Other Organizations

Philip J. Leider (BS, 1968), Group Leader at the Westvaco Corporation Laurel Research Center, the George Olmsted Award of the American Paper Institute.

Thomas W. Mastin (PhD, 1942), Chairman and chief executive officer of Lubrizol, Inc., the 1977 Honor award of the Commercial Development Association.

Edwin T. Mertz (MS, 1933; PhD, 1935), Professor of Biochemistry, Purdue University, the Chemical Pioneer Award of the American Institute of Chemists.

John H. Sinfelt (PhD, 1954), scientific adviser in the corporate research laboratories, Exxon Research & Engineering Co., The Dickson Prize ($10,000) awarded annually by Carnegie-Mellon University.

Robert C. Weast (PhD, 1943), Vice-pres. of Research, Consolidated Natural Gas Co., Cleveland, Research Award of the American Gas Association.

Thomas Baron (PhD, 1948), Director of Research at Shell Oil Company, elected to National Academy of Engineering.

---

*Adapted from the report of J. C. Bailar, Jr., Chairman of the Alumni Affairs Committee.