

Indiana State University

2005 - 2006 Academic Annual Report

Department of Chemistry

Year in Review

Accomplishments

As you have heard, increasing public awareness of Indiana State University's accomplishments is crucial to building student enrollment, influencing policy makers, and developing a place of pre-eminence in the Midwest. What do you consider to be your department's accomplishments for the 2006-2007 year that will contribute to this effort? [Please list in priority order and limit to no more than 8.]

1. A \$284,000 grant from the National Science Foundation was awarded to the Chemistry Department for the purchase of a new nuclear magnetic resonance (NMR) spectrometer. This spectrometer, which is central to the instrumentation used by scientists in all subfields of chemistry, was installed in the spring semester of 2006. 2. Four external research grants, totaling \$305,000, were awarded to faculty of the Department during the 2005-2006 year. Awards were made by the National Institutes of Health, Research Corporation, and the Dreyfus Foundation. 3. Five faculty members are engaging a total of sixteen undergraduates and one high school student in research during the summer of 2006. Twelve of these students are participating in a formal, ten-week research experience supported by a combination of external research funds (NIH, RC, DF), internal funds (CPSCE and CIRT), and one-time dollars from the College of Arts and Sciences. 4. Research projects for six of our undergraduates were accepted for presentation at the National American Chemical Society meeting in Atlanta in March 2006. The students travelled to the meeting with Profs. Rick Fitch and Eric Glendening. This is the tenth year that the Chemistry Department has sent students to the National ACS meeting. Over 50 students have made presentations based on their research experiences in the Department.

Research and Scholarship

What is your assessment of accomplishments in the area of research and scholarship that is focused primarily on contributions to practice and discipline-based scholarship? Are you satisfied overall? In which areas do you feel your department does particularly well? In which areas do you feel your department needs to improve?

Eight of the eleven tenured-tenure track faculty in the department are actively engaged in discipline-based scholarship. Seven have published at least one or two papers in mainstream, peer-reviewed chemistry journals within the past year. This is an excellent level of productivity considering that the Chemistry Department does not have a graduate program. Seven of the chemistry faculty have worked with undergraduates in research during the 2005-2006 year. Nineteen students participated in research during the academic year, and an additional seventeen students had a summer research experience in 2006. We are very satisfied with the research experiences that the Department offers its students. The number of research opportunities that we provide students and the number of students who seek to participate is excellent. Ideally, we would like to engage all of our students in research at some point during their undergraduate studies, but we do not have sufficient research lab space or enough time for the faculty to mentor all students. Mentoring students in research is a highly time-intensive endeavor. We are able, however, to engage all students who request participation in research. The distribution of effort in the Department could improve. Some faculty engaged in research have only worked with one or two students during the year, whereas others have had as many as ten.

Grants, Contracts & Off Campus Professional Service

What is your assessment of accomplishments in the area of grants, contracts, and off campus professional service? Are you satisfied overall? In which areas do you feel your department does particularly well? In which areas do you feel your department needs to improve?

Six proposals submitted by the faculty were funded during the 2005-2006 year. One of these grants (\$284,000 from the NSF) allowed the Department to replace its aging with NMR spectrometer with a new instrument that will likely serve our faculty and students for the next ten years. Four grants (totaling \$305,000) were obtained that support the research activities of the Department. One additional grant (\$10,000) from the State allowed us to continue our equipment loan program for area high schools. It has been an excellent year for the Chemistry Department, certainly the most productive with regard to securing external funding in the past decade. We would like to see additional members of the chemistry faculty pursuing external funding for their research programs. Of the eight faculty engaged in research, only three obtained outside funding.

Teaching

We would like to highlight innovative approaches to teaching. Has your department developed any pedagogies or practices you'd like to share with us? Please describe briefly.

None of note. While the faculty of the Chemistry Department are not exploring innovative approaches to teaching, we do note that the education we provide our students is excellent. One clear measure of excellence is the exceptionally high admission rate that our majors have to medical school. Over 90% of ISU chemistry majors applying to medical school are admitted, nearly all to the program of their first choice (typically the IU Medical School). The national average for students with chemistry degrees is about 45%.

Course Scheduling/Enrollment Management

What have been your greatest challenges in scheduling courses to meet student needs this year? How were you able to overcome them?

Course scheduling is usually not a significant issue for the Chemistry Department.

Outreach

What are the outreach opportunities for your discipline? (non-traditional modes of delivery and timing, etc)

The courses offered by the Chemistry Department do not lend themselves conveniently for distance-based education because most courses include a laboratory component. Distance or web-based delivery of chemistry courses is uncommon.

Strategic Initiatives

Development Activities

What steps have you taken to support development activities in your department? How can your efforts be supported?

An undergraduate research fund for chemistry will be established through the ISU Foundation in July 2006. The Department intends to solicit donations from alumni in September (through a letter from a former student), and again in November (through a letter from the chair). The outcome of this effort is uncertain, but we hope that we are able to raise sufficient funds (\$3000-\$6000) every year to pay for one or two summer research stipends for undergraduate students. Abigail Miley in the CAS

Development Office has provided valuable advice regarding the establishment of the research fund and soliting alumni.

Community Engagement I

Please summarize your faculty's efforts in community engagement this year.

The Department, through funding from the State, maintains an equipment loan program that provides chemical instrumentation for area high school, instrumentation that these high schools probably cannot afford to purchase. The equipment loan program is coordinated by Prof. Sandra Allen, with help from Dr. Donald Reuland (emeritus). Our student chapter of the American Chemical Society worked at the Terre Haute Children's Museum one Saturday every month during 2005-2006 giving chemical demonstrations. Several school groups also visited campus to chemical demonstrations given by Prof. Larry Rosenhein.

Experiential Learning

We are interested in hearing about any innovative approaches you might have taken to incorporate experiential learning into your course or departmental work this year.

The Chemistry Department is currently running, for the first time, a formal summer research program for undergraduates. Twelve students are receiving stipends for full-time (9) or part-time (3) effort on faculty-directed research projects. Over half of the stipend support has been obtained through external research funding. An additional five students are engaged in research in the Department through the Rural Health Program or for research credit (CHEM 399/499). Five members of the Chemistry faculty are mentoring these students. Our summer research program is a ten-week experience that began on May 17 and will conclude on July 28. Students committing full-time effort receive a \$3000-\$3500 stipend (depending on the source of funding) and spend 7-8 hours in the Department research labs every weekday. (Half-time students receive \$1500 for their effort.) All students and faculty meet on Fridays at noon for a research seminar in which the students give brief updates on their work, each student making a total of five presentations during the course of the ten-week experience. The Department provides lunch at these seminars. Most of these participating students will continue their research effort into the forthcoming academic year. Some will present their work at research symposia during the fall semester (e.g., at the Indiana Academy of Science, Career Night for the Indiana Section of the American Chemical Society, Undergraduate Research Symposium at Argonne National Laboratory). Furthermore, we anticipate that a number of the students, perhaps as many as ten, will travel to Chicago in the spring of 2007 to present their research at the National American Chemical Society meeting. As always, we look forward to traveling with our students to professional meetings and appreciate the travel support provided by Sponsored Programs and the College of Arts and Sciences. In the past, the Chemistry Department has principally encouraged only upperclassmen to get involved in research. During the 2005-2006 year, we invited twelve freshmen (students who had completed only one semester of chemistry) to get involved. Seven students accepted our invitation. We believe that this was a very positive experience for these seven students. Coursework in chemistry is quite challenging. Funding agencies, like the National Science Foundation, suggest that engaging students early in their academic careers gives them greater insight into and appreciation of the theoretical aspects of chemistry that are learned in the classroom, thereby increasing retention within the science disciplines. We plan to continue encouraging first-year students to participate in research and hope that most, if not all, will come to view their research activities as a three- or four-year experience rather than the one- or two-year experience that students have generally had in the past. (Note that six of the twelve students participating in our summer research program just completed their freshmen year at ISU.)

Future Goals

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The University is highlighting experiential learning, community engagement, and eminent programs as aspects of our campus that will attract students and resources. How is your department planning to contribute to these strategic initiatives in ways that will help ISU be recognized as a Pre-eminent University?

Our goal is to increase the number of research opportunities in chemistry for undergraduates and to seek continuing internal and external support for a summer research program. The external review of the chemistry program, conducted by the Council for Undergraduate Research, strongly encouraged the Chemistry Department to strengthen its undergraduate research activities and noted that supported summer research programs are frequently considered a leading indicator of high quality educational programs in the chemical sciences.

Feedback

This section is to allow you to share your ideas for enhancing enrollment or dealing with budget and other challenges facing the administration.

ISU must distinguish itself from the Ivy Tech Community College system and from the major (graduate) research universities of Purdue and IU to ensure its (ISU's) survival. Thus, the faculty agree with the administration that the University must have distinctive programs that differ from those at other institutions. The Chemistry Department strives to offer a program of strong classroom and laboratory instruction (which we already have) with a focus on distinctive undergraduate research activities (which we need to expand). The administration could help us by ensuring that Chemistry can hire one or two laboratory support personnel to replace Profs. B. Ramachandran (who is taking a faculty position at St. Mary-of-the-Woods College) and Alan Siegel (who retires in May 2007). Without new hires, the reduction of our faculty by two members, two who collectively teach nine or ten assignments (27-30 contact hours), will require that research-active faculty (importantly, those who involve students in research) will have to carry sufficiently high teaching loads that research opportunities for students will be severely limited. Offering a distinctive program of research in chemistry demands adequate teaching personnel so that faculty have sufficient time to study the current literature, seek external funding, and actively engage students in the laboratory. The academic advisors in the Chemistry Department agree that it is a mistake to give any upperclassman their registration PINs without first seeking the council of their advisor. In the spring semester, the chair and advisors had to track down a number of students (who had not met with their advisor prior to spring registration), to have these students make corrections to their schedule because they did not meet the prerequisites of the courses for which they were registered or had not registered for the appropriate courses so that the student could complete the chemistry degree within four years. The new policy allows students to unknowingly register for courses for which they are likely to fail (having completed the prerequisites is essential) or that will extend their stay at ISU beyond four years.