MISSION: The mission of the graduate program is to prepare students to be future leaders in the broad range of chemical disciplines within academia, industry, and government service. The goals for the graduate degree program in Chemistry are 1) to train students in modern methods and thinking used in scientific research; 2) to expose students to teamwork in research groups as a means of developing attitudes of service and leadership; 3) to train students as scientific educators in both classroom and laboratory environments. The first two goals are addressed through the graduate program and individual research groups, while the third is achieved through their role as teaching assistants and via opportunities to instruct undergraduate students in research related to their own dissertation project.

ADMISSION PROCESSES AND CRITERIA: Recruiting and admission activities for the Chemistry graduate program are administered by a four-member committee of faculty, assisted by a full-time staff member. Principal recruiting efforts consist of: (1) the production and distribution of both printed and electronic brochures and letters that describe the program, (2) organization of recruiting visits by Chemistry faculty to undergraduate institutions in Iowa and neighboring states, (3) arrangement of visits by prospective students to tour the Department and meet with faculty, and (4) organization of faculty contacts with students who have been offered admission to the program. In 2008-2009, an additional international recruiting effort was made by sending one faculty member to visit universities in China for the express purpose of recruiting students to Iowa.

Applications are evaluated by the committee on the basis of: (1) courses taken and grade-point average (GPA) earned in prior undergraduate or graduate work, (2) scores on the Graduate Record Examination (GRE), (3) three letters of recommendation provided by individuals familiar with the applicant, (4) an assessment of the quality and quantity of any previous research, (5) a written personal statement provided by the applicant, and (6) an assessment of English skills (test scores and course work) for international applicants. Each application is reviewed by at least three of the four committee members and a vote is taken to determine whether the applicant is to be offered admission into the graduate program. International applicants who have passed this evaluation procedure are then contacted by phone by one of the committee members in order to further assess their level of spoken English.

The review process is guided each year by a targeted size for the incoming class. This class size is determined in consultation with the DEO, and reflects the projected availability of funds to support Teaching Assistants (TAs) during the next academic year. Priority is given to domestic applicants, with offers being made to international students in stages as the number and quality of domestic applicants becomes clear.

In the Fall 2009 semester, the Chemistry graduate program will have 134 students total, with 129 and 5 students pursuing the Ph.D. and M.S. degrees, respectively. Most of the students in the M.S. program were originally admitted as Ph.D. students but have chosen to change their degree objectives after matriculating. Very few offers are made to students who apply directly to the M.S. program. The preference for Ph.D. students is a practical consequence of the significant time required to train students to perform modern chemical research.

Over the past five years, the size of the Chemistry graduate program has increased from 117 to 134 students, and a slight increase in the percentage of Ph.D. students has been observed (91% to 93%). The size of the entering classes has fluctuated somewhat, in accordance with funding levels for TA positions and the external funding available to support advanced students on Research Assistantships (RAs). Entering class sizes during the period of 2005-2009 have ranged between 22 to 35 students, with an average of 27. During the same period, the percentage of domestic students in each entering class has varied between 52 and 65%, with each of the last three classes having more than 64% domestic students.

The number of applications received each year during 2005-2009 has ranged from 153 to 189, with an average of 177. Total offers made have varied between 45 and 69, with 25 to 45% of applicants receiving offers. The percentages of students offered who have accepted and entered the program have ranged from 40 to 51%, with an average of 45%. When sorted by GPA, our student yield is a random sample of the
offered applicants rather than being skewed to the upper half. Obtaining a greater yield from the upper half of the applicants remains a challenge and represents a focus of our future recruiting efforts.

The diversity of the entering classes has been good, with approximately 36% of each entering class during 2005-2009 being female. The 2008 and 2009 classes are 44 and 50% female, respectively. In addition, funding from a Department of Education grant in the Graduate Assistance to Areas of National Need (GAANN) program has allowed us to recruit additional students from underrepresented groups. For example, seven African-American and two Hispanic students have been added to the program over the period of 2005-2009.

Student quality has been relatively consistent over the past five years. Overall GPA values of the entering classes have ranged from 3.38 to 3.54 on a 4.0 scale. The GPA values for the subsets of domestic students have ranged from 3.26 to 3.61, with 3.61 corresponding to the 2009 entering class. These numbers compare favorably to other University of Iowa programs on the basis of statistics provided by the Graduate College. The GRE scores (Verbal + Quantitative) for all students have ranged from 1160 to 1220. The corresponding range for domestic students is 1160 to 1205. These numbers are comparable with other University of Iowa graduate programs.

Entering graduate students are typically appointed as TAs, with the expectation that their support will shift to an RA at the end of two years, the normal time for completion of the comprehensive exam in the Department. Students pursuing the M.S. degree are expected to complete the degree in two years and no support is guaranteed past that time. For Ph.D. students, the department has a long history of providing continuing support as either a TA or RA throughout the student’s career. Entering students are supported at one of three stipend levels on the basis of their academic records. Stipend levels have remained constant since 2007 due to funding constraints. This represents one area of concern moving forward as we attempt to remain competitive with the large number of strong Chemistry Ph.D. programs in the Midwest.

PROGRAM OUTCOMES:

- The program has grown continuously in recent years (105 in 2001, 117 in 2004, and 134 enrolled students in 2009 per year). While we encourage most students to attempt a PhD degree, about 40% left with an MS degree after an average of 2.5 years. Much of this selection is conducted via the Comprehensive Examination. Normally, this is taken in the fourth semester; if it is not satisfactory, a second exam may be allowed before the end of the fifth semester in the program (not including Summer semesters). The PhD training periods range from 3.8 to 8.3 with average of 5.3 years (for the last five years).

- Graduate students in the department have been recognized and supported by personal fellowships and awards including: presidential or GAANN fellowships; CBB/NIH or Pharmacology training grants (awarded at the university level); and NSF, DOE, DOD, NASA fellowships or specialized awards like the Breast Cancer Research Program (awarded at the national level).

- All graduate students publish peer-reviewed papers in scientific literature and present their work in regional, national and international scientific meetings. The number of publications per student varies from 2 to 8 papers and averages at 4.0 ±1.5 papers per student (in the last 10 years). Most if not all students also present their work in scientific meetings (both oral and poster presentations).

- Graduate student placements: Students may seek tenure track and non-tenure track academic positions in 4-year colleges (24% over a five years period) or industrial positions (30%) directly after completing their degree. Many students continue to postdoctoral training (32%) with the goal of becoming principle investigators in R1 universities and research institutes (17%), or obtaining higher-level positions in industry. Students may also pursue positions in government programs (6%), with or without further training through postdoctoral or specialized internships.

PROGRAM CHARACTERISTICS: The program is ranked among the 100 Best Graduate Programs in Chemistry by US News and World Report. Its rank by this survey (which includes peer programs in CALTECH, Stanford, MIT, UC Berkeley, and Harvard) is 62 (together with Notre Dame, U. Illinois Chicago, and U. Kansas).
Currently we have an average of 5.4 students per research group (134 students and 25 PIs). This is an appropriate size for the graduate degree program, given the department’s current faculty size. In order for the department to reach its full promise as a leader within the Big Ten and on the national level, it needs to grow to about 32 tenure track faculty in coming years, and it has been targeted for this growth by CLAS. In Chemistry, size matters - such a growth would mean more departmental resources and would enable us to offer more diverse research programs, thus becoming more attractive to high-quality graduate students.

While the department needs about five students per research group, the expected size of the Graduate Program is limited by the availability of financial support to these students. Less than 10% of students are supported by personal fellowships and other individual sources. Most students are supported as TAs or RAs. The availability of TA lines is shrinking (recently reduced from 66 to 60 lines) due to budgetary limitations. This trend has a negative impact on the quality of undergraduate education because discussion sessions were increased in size, and on our ability to train more graduate students.

Program’s strengths: Given the current number of research groups (cf. number of tenured/tenure track faculty), the department offers an attractive diversity of training fields. The department is considered to be especially strong in the area of Environmental Sciences and Synthetic Chemistry. The external funding situation is also quite strong: not only are most of our research groups well-funded, but this funding comes from a wide variety of agencies with diverse goals and interests. These include federal (e.g. NIH, NSF, DOE, DOD, PRF), private trusts (e.g. The Roy J. Carver Charitable Trust), and industrial sources (e.g. Abbott Laboratories, Bayer). Consequently, a shift in national priorities and funding should not be as problematic as in case that most of our funding would come from a single agency. An additional and significant strength is the on-going renovation of the Chemistry Building - student recruitment as well as actual productivity is likely be enhanced as more renovated teaching and research space becomes available.

Program’s weaknesses: Our Inorganic Division has lost several members and we are now limited in our ability to offer an attractive variety of options to graduate students in that discipline. Additionally, while several research programs involve bio-related components, our impact in Biological Chemistry is limited: in many other Universities, there is but one Department of Chemistry and Biochemistry. We expect this situation to improve as faculty recruitment efforts proceed, and as newly renovated space becomes available. The department is also short of students with strong backgrounds in quantitative studies (e.g., math, physics, and statistics) and future recruitment efforts will take this into consideration.

REORANIZATION TO INMROVE GRADUATE PROGRAM EXCELLENCE: (i) Admission: The department is experiencing a shortage of students with strong quantitative background. We are working toward recruitment of international students with such backgrounds (e.g., from the PRC or Eastern Europe). The department is working with CLAS to revise the mechanism for the assessment of international students’ English proficiency, as the current method lacks departmental input. (ii) Training: The department will deliberate upon the option of maintaining its traditional divisions (Organic, Inorganic, Physical, and Analytical) in undergraduate education, but dissolving these boundaries in graduate education. This may lead to a broader scope and more diverse chemical education, which is of obvious importance in modern chemical education.

CONCLUSIONS: The Department of Chemistry has one of the larger graduate program at the UI, and has been successful in providing high quality graduate training to students, while preparing them to take leadership roles as chemists in academic, industrial, and governmental positions. As our graduate education is directly related to research activities, we expect our graduate program to grow with the expansion of the department. A larger program will improve the quality of training, because we will be able to offer more graduate level classes as well as diverse research projects.