

**FY2008 DEPARTMENTAL ANNUAL REPORT
OF CONTINUOUS IMPROVEMENT**

Department of Chemistry

Fort Hays State University

I. DEPARTMENTAL OVERVIEW

The Department of Chemistry exists to provide education in all the major branches of chemistry, and to carry out limited research and service activities related to the chemical sciences, for the benefit of the people of Kansas. As one of the liberal arts, chemistry is an important part of the educational mission of Fort Hays State University. In addition, chemistry is an essential part of the education of those pursuing careers in medicine, pharmacy, dentistry, optometry, nursing, and other health professions, as well as careers in chemistry and related sciences. As a “central science”, chemistry is a useful field of study for majors in other fields also, such as education, art, business, agriculture, and many others.

The Department offers both B.A. and B.S. degree programs, as well as degree emphases in the areas of Biological Chemistry, Environmental Science, Forensic Science, and Teacher Education. The Department also participates in the Master of Liberal Studies graduate program. Aside from advising Chemistry majors, Chemistry faculty advise for a large number of Pre-Professional programs – including Pre-Medicine, Pre-Pharmacy, Pre-Dentistry, and Pre-Optometry – even when those students do not complete a degree in Chemistry. Departmental members act as resource persons for individuals and organizations seeking advice in matters related to chemistry, such as faculty members at community colleges, small companies throughout western Kansas, and private individuals with questions about the use or handling of chemical products.

Within the University, the Department of Chemistry offers advice and assistance in chemical matters, and participates in activities involving other science departments. Among these are Science Day, the Science Olympiad, and the Research and Creative Activities week. The Department strongly supports efforts to improve science education throughout Kansas, sponsoring its own Speakers Bureau and regularly acting as host for the annual Kansas College Chemistry Teachers Conference. Chemistry faculty members support research in chemistry by, among other things, annually presenting seminars based on recent results from the chemical literature.

A. Departmental Mission and Vision Statements

The Chemistry Department provides undergraduate education in chemistry for chemistry majors; for other science majors including the biological sciences, geology, and physics; and for other majors with a chemistry requirement such as agriculture and nursing. The department also provides chemistry courses that satisfy General Education requirements of the University. Research activities of the department emphasize teaching upper-division undergraduate majors how to conduct research by providing the opportunity for them to work with a faculty member on a research project. The department serves as a regional resource on chemical matters through consultation and, if needed, laboratory analysis. The Chemistry Department seeks to prepare students for employment as chemists, for graduate school, for professional school, or for teaching, through a curriculum with major emphasis on laboratory instruction and computer usage in the chemical laboratory. The central focus of the department is to use the experimental nature of chemistry to help students develop their analytical and problem solving skills.

B. Departmental Goals, Objectives, and Strategic Priorities

DEPARTMENTAL GOALS

To work for improved scientific literacy in all Fort Hays State students.

To improve the quality of all entry-level chemistry courses, including The Chemist's View of the World, General Chemistry, and University Chemistry.

To utilize the assessment results in an ongoing review process to improve the quality of the chemistry programs.

To introduce direct data acquisition technology into the entry-level chemistry laboratories.

To obtain scientific instrumentation to replace non-functioning and/or obsolete equipment.

To obtain new scientific instruments representative of those currently used in the discipline.

To increase the sense of accomplishment students express in their evaluation of chemistry courses.

To improve the retention of qualified students as chemistry majors.

To increase the role of the Chemistry/Preprofessional Club in the activities of the department.

To expand the opportunities for students to participate in research projects.

To continue an active seminar program, and to make speakers available to high school science teachers.

To continue and expand the services provided to area chemistry teachers.

To encourage a regular pattern of faculty sabbatical leaves.

To bring the chemistry department into compliance with all state and federally mandated safety regulations as they evolve.

To aid the economic development of Western Kansas by providing expertise on chemical matters.

II. DEPARTMENTAL HIGHLIGHTS

A. Department Productivity and Distinctive Accomplishments

The Department of Chemistry views its duties of teaching, scholarly research, and service to be inter-related and inseparable. As a consequence, no single measure of departmental productivity can adequately assess the activities of the members of the department collectively or individually. Furthermore, many activities of departments and individuals are not amenable to simple measurement or assessment, even subjectively. For example, there is no way to measure the intellectual growth and maturation of students over four years of college, or to assess the value of professional advice provided to external individuals or organizations. It should also be emphasized that the Chemistry Department provides services over and above advisement and coursework for Chemistry majors. Pre-Pharmacy students, who normally do not complete any undergraduate degree, and Pre-Medical students, who often major in fields other than Chemistry, are all advised and instructed by Chemistry faculty members. At the same time, certain comments about efforts and outcomes of the Chemistry Department or its members have a place here, and can act as sign posts to mark out some of the accomplishments of the past year, accomplishments that do not fit well within the categories below.

A Long-Term Initiative (see below) that is now nearing completion was a major activity during FY 2008, specifically the revision of our B.S. program to better match American Chemical Society (ACS) guidelines for undergraduate Chemistry curricula. Extensive modification of two advanced lab classes (CHEM 634L and 656L) is now underway, and this is making it necessary to re-write lab procedures as well as develop wholly new ones. Drs. Eddie Olmstead and Stephen Donnelly are shouldering much of this burden with advice and input from other faculty members. When these changes are completed within a few years, the department plans to apply for ACS approval of this degree program. Once we have an ACS-approved degree program we will use this in recruitment of students and new faculty members, and in pursuit of grant support through the Bioscience Initiative and other venues. Other new activities in the name of improving educational opportunities for our students have included the equipping of the last few faculty members with tablet computers, the selection and testing of a new placement test (as noted below) for incoming freshman students, and the development of a "Dare to Dream" Initiative to change the name of the department to "Department of Chemistry and Biochemistry". This last activity is intended to point up the growing importance of biochemistry in both education and research. It should be noted that all of these new activities were in addition to special educational activities that got their start in past years and continued into FY 2008. Among these were participation in the Math/Science Summer Camp for Middle School Girls, supervision of Science Day and Science Olympiad events, and assessment of Mole Day posters. A Pilot Award nomination this year was an outward sign of teaching achievement by the Chemistry faculty.

Scholarly activity was similarly productive this year. Several grants received by Dr. Wiese, including some in support of undergraduate student researchers, were noteworthy highlights. Scholarly presentations by Drs. Wiese and Olmstead, and scholarly publications by Drs. Wiese and Hohman, were likewise notable. Time available for research accomplishments was limited by several factors, including the retirement of one faculty member and unpaid leave for another, but still significant progress was made.

Service continues to be important to members of the Chemistry Department, as the following highlights illustrate. Under the category of professional service, Dr. Donnelly completed his term as chair of the Wichita Section of the American Chemical Society in FY 2008, and Dr. Wiese continued his service on the Executive Committee of that section. Under University service, Dr. Olmstead served on the General Education and Scholarship committees, and evaluated teaching unit plans for a Middle School Science Teacher Modeling Workshop. In service to the community, Dr. Donnelly continues on the Ellis County Local Emergency Planning Committee. The value of these contributions in teaching, research, and service cannot be simply assessed by numbers, but in the eyes of the members of the Chemistry Department their importance is unquestionable.

B. Department Performance Indicators

Key Performance Indicator	Baseline FY2004	Actual FY2005	Actual FY2006	Actual FY2007	Actual FY2008
Freshmen [END OF FALL SEMESTER, HEADCOUNT]	34	33	30	25	31
Transfer Students [END OF FALL SEMESTER, HEADCOUNT]	8	8	7	6	7
Majors					
Undergraduate (first majors/second majors) [END OF FALL SEMESTER ONLY, HEADCOUNT OF FIRST MAJORS, HEADCOUNT OF SECOND MAJORS]	96/8	93/4	84/3	75/5	85/3
Graduate majors [END OF FALL SEMESTER ONLY, HEADCOUNT]	0	0	0	0	0
MLS students [END OF FALL SEMESTER ONLY, HEADCOUNT OF ADVISEES WITH 120- 4901]	0	0	0	0	1
Major Retention [PERCENT OF MAJORS RETURNING]		73.40%	67.03%	71.08%	73.97%
Student Credit Hour					
Undergraduate [TOTAL UNDERGRAD SCH FOR FY2006]	3151	2977	2649	2649	2454
Graduate [TOTAL GRAD SCH FOR FY2007]	27	2	13	20	30
Faculty					
Tenured or Tenure-track Faculty (Headcount) [FTE OCCUPIED FROM POSITION CONTROL FOR FY2008]	6	6	6	6	7
Non Tenure-Track Faculty (Headcount) [FTE OCCUPIED FROM POSITION CONTROL FOR FY2008]	1.25	1.25	1.25	1.5	0.5
Other Faculty (Headcount/Sections Taught)	0	0	0	0	0

Key Performance Indicator	Baseline FY2004	Actual FY2005	Actual FY2006	Actual FY2007	Actual FY2008
Degrees Undergraduate degrees [TOTAL NUMBER OF UNDERGRAD DEGREES AWARDED IN FY2008] Graduate degrees [TOTAL NUMBER OF GRAD DEGREES AWARDED IN FY2008, NOT MLS] MLS degrees [TOTAL NUMBER OF MLS DEGREES AWARDED IN FY2008 BASED ON 120-4901 ADVISEES IN DEPT]	14	5	5	6	7
Scholarly Activity (See Section IV for documentation requirement) 1. Number of books, book chapters, and refereed articles published 2. Percent of faculty publishing refereed books, chapters, or articles 3. Number of non-refereed articles and presentations 4. Percent of faculty publishing non-refereed articles or presentations 5. Number of scholarly performances and other creative activities 6. Percent of faculty in scholarly performances or other creative activities 7. Total number of external grant applications submitted/percent of faculty submitting 8. Total number of funded external grants/percent of faculty funded	0	5	3	5	2
Service Activity 1. Percent of faculty meeting acceptable standard of service activity [NOTE: this percent includes faculty meeting exceptional standard of service activity.] 2. Percent of faculty meeting exceptional standard of service activity	100%	100%	100%	100%	100%
Assurance of Student Learning [NOTE: Each department should pick at least two direct measures of student learning outcomes and two indirect measures. Examples of direct measures include: first-time pass rate or average scores on standard exit exam, number of students successfully completing reviewed portfolios. Indirect measures would include student satisfaction, alumni and employer data, or any other perception based data.] Direct Outcome 1 Score on standardized exam taken by majors at end of sophomore-level course; mean score/national mean	41.6/43.1	42.0/43.1	42.6/43.1	39.2/43.1	35.9/43.1

Key Performance Indicator	Baseline FY2004	Actual FY2005	Actual FY2006	Actual FY2007	Actual FY2008
Direct Outcome 2 Average grade in capstone course: Seminar in Chemistry	87.6%	82.9%	80.7%	82.1%	80.5%
Indirect Indicator 1 Alumni Achievement Award Winners	0	0	1	1	1
Indirect Indicator 2 Percent of Alumni Surveys returned describing the education in chemistry superior or above average	100%	100%	85.7%	87.5%	50.0%
Other Department Key Performance Indicators (up to 3 additional measures, optional) [NOTE: Departments may pick up to three key performance indicators they currently measure but are not captured above. These measures could be used to track departmental results on specific yearly goals. Examples might include: number of SRPs attended, number of new freshmen contacted. (These will vary by department based on goals.)]					
Outcome/Indicator 1 Contact hours per week/full-time faculty (excluding department chair)	17.6	14.7	16.9	16.1	13.3
Outcome/Indicator 2 Number of letters to prospective freshmen	>1000	1138	1368	1311	953
Outcome/Indicator 3 Lab contact hours per week for B.S. degree, FHSU/Regional University average	38/27.3	38/27.3	38/27.3	38/27.3	36/27.3
Number of Faculty Visiting Foreign Campuses	0	0	0	0	0
Number of Students (majors) Participating in Study Abroad and Exchange Programming	0	0	0	1	0

C. Department Quality Initiatives and Results

FY2008 Quality Initiatives	Results
<p>1. New Approaches to Student Recruitment Over the past few years the Chemistry Department has developed a wholly new degree emphasis (Forensic Science), begun extensive renovation of our B.S. curriculum (see Long Term Quality Initiative 1. below), and initiated mobile teaching and learning approaches (see next section). With a new departmental brochure as well as an inter-disciplinary science education brochure now available, it is a logical time to make innovations in the way we inform prospective students about what we have to offer.</p>	<p>Efforts to increase the department's visibility among prospective students were highlighted by a very active Speakers Bureau program during 2007-08: nearly 20 presentations to area high school students were made by Chemistry faculty members. The Chemistry/Pre-Professional Club also held numerous "Magic Shows" for nearby elementary and middle schools to interest young people in the study of chemistry. The response to both of these efforts in many cases was enthusiastic approval, though it should be noted that there is necessarily a "lag" time before such activities result in increased numbers of freshman Chemistry students. Mailings to high school science teachers and counselors, the updating of information on our departmental web site, and involvement of faculty members in Science Day and Science Olympiad activities were other noteworthy recruitment efforts this year.</p>
<p>2. A New Placement Exam for Entering Chemistry Students. The Iowa Placement Exam (IPE) has been used for decades by the Chemistry Department to advise incoming chemistry students about their prospects for success in freshman chemistry. Though helpful in this context the IPE is no longer the best available tool for assessing student preparedness.</p>	<p>The California Chemistry Diagnostic (CCD) test was selected as the best placement and advising instrument for our incoming freshman students, and pilot tests were conducted during the 2007-08 academic year in our CHEM 120 classes. The results of this test are being compared with results from the IPE (which was also given to these students this year) so that we can soon make a smooth transition to eventual exclusive use of the CCD test for advising students. An important consequence of adopting the CCD test to assess our entering freshman students is that we will be able to compare their preparation for freshman chemistry with that of entering students from around the country.</p>

FY2009 Quality Initiatives	Responsible Party, Resources, and Plan
<p>1. Preparation for the Kansas Academy of Math and Science (KAMS) All of the natural science departments on campus are making plans for the arrival of the first KAMS students in the Fall of 2009, but there are special concerns that the Chemistry Department must work to manage. Among these are sharply increased numbers in our CHEM 120 and 122 lab classes, liability and logistical issues in having high school students working on research projects, and pedagogical changes required for achieving educational goals with these gifted but younger students.</p>	<p>Dr. Jim Hohman will ask Chemistry faculty members to suggest criteria for the new faculty member to be hired to take on the major activities connected with the Chemistry Department's part of the KAMS program. Among these criteria may be experience and/or certification in teaching gifted high school science students, something that's not currently available in the department. Once this search is initiated, the instructors of CHEM 120 and 122 will be asked to develop detailed plans for handling the sizable influx of KAMS students expected to arrive in 2009. All full-time faculty members will be asked to propose research projects that would be suitable for involvement of these students, and will also be called upon to assist in devising other activities to maximize the educational opportunities for them. Cross-disciplinary and service-oriented activities and research projects will be particularly emphasized as appropriate for the KAMS students.</p>
<p>2. Revisions to Freshman Chemistry Lab Experiences The Long-Term Strategic Initiative to move towards American Chemical Society (ACS) approval of our B.S. degree program (see below) has focused on advanced classes in the program. The activities of our Freshman Lab Supervisor have been very beneficial, but have focused mainly on the details of established lab procedures and the mechanics of report writing and grading. It is time now to consider the pedagogy of freshman lab experiences in light of modern views of chemical educators, particularly with regard to safety and educational utility.</p>	<p>Dr. Jim Hohman will revise and re-submit the Action Plan for a Freshman Lab Director, a new faculty position with the duties of developing wholly new freshman lab experiences and assessing the merits of all freshman lab activities, new and old. Once this educator is on board, rapid development of innovative approaches to freshman lab instruction and greater flexibility in adapting to the latest trends in chemical education will be expected. Replacement of outdated and unproductive lab experiences will be particularly important in connection with the KAMS students (mentioned above). Another criterion for assessing the merits of new lab procedures will be the tenets of "green chemistry", an effort to minimize safety concerns and environmental impacts in the production, handling, and disposal of chemical substances. Revisions will also make possible the establishment of standard waste minimization/neutralization/removal procedures for each experiment. It is noted that among the results expected from the establishment of a Freshman Lab Director should be considerable savings in resources and money, as well as time for the freshman lab instructors.</p>

D. Institutional Quality Results

FY2008 University Initiatives	Department Activities/Results
Improve undergraduate student's writing abilities	Two major types of scientific writing, lab reports and seminar presentations, are required from all Chemistry majors at different stages in their education. Formal lab reports are introduced at the sophomore level and are an expected part of all later Chemistry lab classes. Seminar presentations – which require writing an abstract and development of presentation materials (e.g. PowerPoint slides) based on research of the chemical literature – are required of senior students. Both types of scientific writing are assessed by means of rubrics developed by Chemistry faculty, and the assessments include standard composition criteria (e.g. organization, content, bibliography, etc.). Notable improvements in students' writing skills are regularly observed, and alumni survey results include an appreciation of lessons learned from the assignments.
Develop mobile computing teaching and learning environment	As noted above (under Departmental Highlights), the last few Chemistry faculty members are currently being equipped with tablet computers, and are beginning to apply them not just to ordinary classroom instruction but also in discipline-specific ways (e.g. molecular modeling). In addition, a Classroom Response System (“clickers”) was used regularly in at least one lecture class, and students in CHEM 120 and 122 now regularly use a specialized computer-based system for homework problem submission. Though tentative, these initial forays into mobile computing led to positive results, such as increased flexibility and content in lecture presentations, and further developments are expected in upcoming years.
Internationalize the campus and curriculum	Popular freshman Chemistry classes include a brief survey of the historical development of important chemical concepts, and such a survey is inherently international in scope. Later Chemistry classes – especially our capstone course, Seminar in Chemistry – reinforce this by pointing up the irrelevance of national boundaries in scientific study.
Strategically manage new enrollment opportunities	Tiger Tracks is now routinely used by all Chemistry faculty advisors, and standard procedures for communicating particularly with freshman advisees are being developed. Faculty members also participated in new freshman and transfer enrollment days, and provided guidance to Orientation Advisors regarding popular Chemistry programs of study. Rapid and efficient enrollment of our advisees resulted.

Improve student learner outcomes in computing	As noted above (under “Develop mobile computing teaching and learning environment”) the tablet computers, “clickers”, and the computer-based system for homework in freshman Chemistry classes adopted by faculty members have led to increased classroom flexibility, and they have also improved learning.
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III. FY2009 STRATEGY AND OPPORTUNITIES FOR IMPROVEMENT

A. Departmental Reflection of Strengths, Needs, Opportunities, and Threats (SNOT)

Current Strengths	Current Needs
First, it must be stated that the Chemistry Department is what it is because of highly dedicated and capable faculty members. Each of the full-time faculty members possesses the terminal degree in chemistry, and they represent all the major sub-disciplines within the field. Second, the department benefits from outstanding facilities in Tomanek Hall, and numerous pieces of state-of-the-art equipment and instrumentation. Finally, programs administered within the department – both major degree programs and pre-professional programs – are well established and highly regarded.	One chronic concern, that of excessive teaching contact hours (see II. B, under “Other Departmental Key Performance Indicators” as well as Appendix 3), has eased over the past year but remains a concern. This reduces time available for curriculum development and for research – so necessary in an advancing technical field like chemistry – and it may block our participation in new and proposed programs like KAMS and the PSM. Another concern is that we are the only Chemistry Department among the 6 four-year institutions within the Regents system that has no degree program approved by the American Chemical Society (ACS).
Future Opportunities	Future Threats
One positive sign for the department is the addition of new faculty members: one recently hired to replace a retiring faculty member and another expected shortly to take on duties in connection with the Kansas Academy of Math and Science (KAMS). Another positive development is the extensive progress made in the revision of our B.S. degree program in pursuit of American Chemical Society (ACS) approval of that program (see below). Finally, the activities carried out in connection with student recruitment during FY 2008 (see above under FY 2008 Quality Initiatives) are expected to pay dividends in the near future.	One ominous development is KAMS: as noted above under FY 2009 Quality Initiatives, the Chemistry Department has special concerns and challenges in both the expected numbers and the expected educational needs of these students. Even with the new Chemistry faculty member expected to come on board to manage many of the KAMS activities, every member of the department will have to quickly adapt to unfamiliar circumstances. Another looming problem is the limited space available for laboratory research within the department, and it should be noted that research is also a required activity for the KAMS students.

B. Opportunities for Improvement

[NOTE: Long-term OFIs are meant to be resource-intensive changes requiring permanent or one-time resources that can favorably impact the department over the long-term.]

Long-Term Strategic Initiatives	Resources Required	Expected Result
<p>1. As discussed above (under SNOT analysis), we are the only Chemistry Department among the 6 four-year institutions in the Regents system that does not have a degree program approved by the American Chemical Society (ACS). For both recruitment and assessment purposes, we seek to develop a modified version of our B.S. degree program that would meet ACS guidelines for approval</p>	<p>To move towards ACS approval, several advanced courses are being extensively modified, and we are now ready to institute the changes needed in our degree program. Since student research hours are expected to sharply increase, a budget for research equipment and supplies may have to be established. Finally, to maintain the reduced teaching contact hours so that they meet ACS guidelines an increase in FTE appears to be needed.</p>	<p>In FY 2008 our departmental Planning and Assessment committee finalized the program changes needed to seek ACS approval of our B.S. degree. As these changes are instituted we will publicize the improvements in our curriculum for use in recruitment and in a few years we will be able to apply for ACS approval. The results are expected to be a more popular B.S. degree option, and better prepared students pursuing it.</p>
<p>2. The B.A. Teacher Education program in Chemistry is very small at a time when chemistry teachers, like other science teachers, are badly needed throughout Kansas. Several inter-related proposals to increase the popularity and effectiveness of our program to prepare science teachers are being considered.</p>	<p>The Chemistry Department has been undergoing a degree of upheaval in its Teacher Education program because of the retirement of one key faculty member and the expected retirement of another within the next few years. The hiring of a new KAMS faculty member (see FY 2009 Quality Initiative 1. above) is expected to help us in this effort as will the new Lab Director position (FY 2009 Quality Initiative 2.). A committee will be established to develop and assess courses, workshops, etc. aimed at improving and expanding science teacher education programs.</p>	<p>Once the Chemistry Department's Teacher Education faculty, including the new KAMS faculty member, are "on the same page" regarding the needs of the program, the Teacher Education committee will begin looking at proposals aimed at attracting more students into science teaching, retaining of current teacher education students and methods of improving the skills of current science teachers. Within a year of the establishment of this committee it is expected that specific proposals to enhance the B.A. Teacher Education program will be forthcoming.</p>

I. SUPPORTING MATERIAL

A. Department Degree Program Affinity Diagram(s)

Department of Chemistry Affinity Diagram for Baccalaureate (B.A./B.S.) Program

Characteristics of Chem Program	Expected Learning Outcomes	Curriculum	Assessment Approach and Methods	Results	Curricular and/or Pedagogical Changes
<p>Knowledgeable Chemists must have an extensive base of fact, terminology, and theory in order to interpret results and solve problems.</p> <p>Analytical/Precise Chemists must use higher level reasoning skills to solve problems without allowing imprecise data to interfere.</p> <p>Dedicated/Patient Chemists must deal with problems that do not meet immediate success.</p> <p>Creative/Resourceful/Innovative Chemists solve experimental and theoretical problems using a core of knowledge and available resources.</p> <p>Objectively/Intellectually Honest Chemists must view all data without bias and must rigorously adhere to the premise that all data are reported without alteration.</p> <p>Curious/Inquisitive Chemists rely on experimentation to obtain information and test all inferences.</p>	<p>Goal A to become highly proficient in laboratory techniques used in research in chemistry and related fields Objective #1 to make experimental observations Objective #2 to manipulate common laboratory apparatus Objective #3 to operate common instrumentation and to properly use the results in experimental work Objective #4 to develop the skill necessary to acquire experimental data directly by computer Objective #5 to interpret experimental results and use the data to make valid inferences</p> <p>Goal B to acquire the ancillary skills that are required of a practicing chemist Objective #1 to solve chemical problems of both a theoretical and experimental nature Objective #2 to retrieve chemical data from the original literature by using printed abstracts and computer database methodology Objective #3 to communicate scientific findings in writing and/or orally Objective #4 to be proficient in the application of computer technology to solve chemical problems as well as the use of databases, word processing, and spreadsheets</p> <p>Goal C to attain a theoretical background which provides a thorough understanding of the discipline Objective #1 to be thoroughly based in the major areas of chemistry Objective #2 to use basic knowledge to explore the interdisciplinary areas of chemistry Objective #3 to apply chemical knowledge to appropriate problems in the other natural sciences Objective #4 to relate chemical knowledge to other scientists as well as to non-scientists</p> <p>Goal D to instill in the learner scientific methodology Objective #1 to be objective in the evaluation of data Objective #2 to demonstrate leadership characteristics Objective #3 to maintain intellectual honesty</p>	<p>Program Core Curriculum Introduces the discipline CHEM 101 Orientation to Chemistry Develops knowledge and problem-solving skills MATH 110 College Algebra CHEM 120 University Chemistry I CHEM 122 University Chemistry II CHEM 350 Chemical Analysis CHEM 340 Organic Chemistry I CHEM 342 Organic Chemistry II Develops laboratory and experimental skills CHEM 120L Univ. Chem. Laboratory I CHEM 122L Univ. Chem. Laboratory II CHEM 350L Chemical Analysis Laboratory CHEM 340L Organic Chem. Laboratory CHEM 342L Organic Chem. Laboratory II Develops scientific communication skills CHEM 675 Seminar in Chemistry</p> <p>B.A. Curriculum Develops knowledge and problem-solving skills MATH 331 Calculus Methods PHYS 111 Physics I PHYS 112 Physics II CHEM 430 Survey of Physical Chemistry Develops laboratory and experimental skills PHYS 111L Physics I Laboratory PHYS 112L Physics II Laboratory CHEM 430L Sur. of Phys. Chem. Laboratory Broadens the knowledge base CHEM Electives</p> <p>B.S. Curriculum Develops knowledge and problem-solving skills MATH 234 Analytic Geometry and Calc. I MATH 235 Analytic Geometry and Calc. II PHYS 211 Physics for Sci. and Engin. I PHYS 212 Physics for Sci. and Engin. II CHEM 632 Physical Chemistry I CHEM 634 Physical Chemistry II CHEM 656 Instrumental Analysis CHEM 666 Inorganic Chemistry Develops laboratory and experimental skills PHYS 211L Physics for Scientists and Engineers I Lab PHYS 212L Physics for Scientists and Engineers II Lab CHEM 360L Biochemistry Laboratory CHEM 632L Phys. Chem. Laboratory I CHEM 634L Advanced Physical and Inorganic Lab CHEM 656L Advanced Instrumental and Physical Lab</p> <p>General Education Curriculum Develops the knowledge required to be educated Liberal Arts component Develops the skills required to be educated Foundation Studies Component</p>	<p>WRITTEN EXAM: California Chemistry Diagnostic Examination is administered to all students who take CHEM 120, University Chemistry I. The results are used as a measure of the starting level for chemistry majors.</p> <p>WRITTEN EXAM: American Chemical Society Cooperative Examinations are administered at the conclusion of several courses in the core, B.S., and B.A. curricula. The results are used to compare the performance of FHSU chemistry majors to the performance of other students on nationally standardized exams.</p> <p>PROGRAM AUDIT: A program audit that includes the course prospectus, final comprehensive examination, chemistry majors' grades and final exam scores, and a class average of the final exam is maintained for each required chemistry course.</p> <p>CAPSTONE COURSE: CHEM 675, Seminar in Chemistry, challenges the students to research, organize, and present seminars during their senior year. The entire chemistry faculty have input into the grading of the students in this course.</p> <p>ALUMNI SURVEY: All students who graduate with a degree in chemistry are surveyed two years after their graduation. The results are used to improve the program.</p>	<p>See Appendix 1 for typical results from Standardized Exam</p> <p>See Appendix 2 for Results of Capstone Course.</p> <p>In a recent Alumni Survey, 100% of alumni would recommend FHSU Chemistry programs to a son or daughter.</p>	<p>As noted above (FY 2008 Quality Initiative 2), this is a new placement exam, and it will be used to determine student preparedness.</p>

I. Supporting Materials

A. Department Staffing Plan

**Department of Chemistry
Date Prepared – June 2008**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Current Department Needs	Faculty Member	Faculty Expertise	Retirement (Birthdate)	Assigned Instructional FTE	Rank Current Date	Degree Completed	Track
Analytical General Inorganic	Olmstead	Analytical Inorganic Chem. Ed.	08/08/1967	1.0	Assistant Professor, 2002	Ph. D.	Tenured
Biochemistry Physical	Bencze	Biochemistry Physical	02/17/1972	1.0	Assistant Professor, 2008	Ph. D.	Tenure Track
General Inorganic	Rumpel	Inorganic Physical	03/17/1936	1.0	Professor 1968	Ph. D.	Tenured
General	Scott	General	03/11/1945	0.5	Instructor 2000	M.S.	Temporary
Organic General	Hohman	Organic	08/18/1952	0.5 (Admin), 0.5 (Instruct)	Professor 1997	Ph. D.	Tenured
Physical General Environmental	Donnelly	Physical Environmental	10/31/1964	1.0	Assistant Professor, 2003	Ph. D.	Tenure Track
Organic General	Dorn	Organic	09/05/1961	1.0	Associate Professor, 2001	Ph. D.	Tenured
Biochemistry General	Wiese	Biochemistry	01/09/1964	1.0	Professor 2007	Ph. D.	Tenured

B. Bibliography of Departmental Scholarly Activity

1. Copper Ions Disrupt Dopamine Metabolism via Inhibition of V-H⁺-ATPase: A Possible Contributing Factor to Neurotoxicity. D. Shyamali Wimalasena, Thomas J. Wiese, and Kandatege Wimalasena. *J. Neurochem.* **101**: 313-326, **2007**.
2. Fermi Questions. Germaine L. Taggart, Paul E. Adams, Ervin Eltze, John Heinrichs, James Hohman, and Karen Hickman. *Mathematics Teaching in the Middle School*, **13**, 164-167, **2007**.

C. Department Program Assessment Results

- a. [See Appendix 1, Raw Scores on Standardized Exam.]
- b. [See Appendix 2, Scores for Capstone Course CHEM 675 Seminar in Chemistry.]
- c. [See Appendix 3, Department of Chemistry Faculty Contact Hours per Week.]

D. Other Departmental Information

E. Special AQIP Report

Appendix 1: Raw Scores on Standardized Exam*, Department of Chemistry

Student No.	Spring, 2004	Spring, 2005	Spring, 2006	Spring, 2007	Spring, 2008
1	62	53	43	36	40
2	46	37	30	29	41
3	47	44	50	63	52
4	48	56	36	46	37
5	38	53	33	52	32
6	34	47	60	38	47
7	33	52	55	29	21
8	29	55	56	34	39
9	42	38	27	34	31
10	45	33	34	36	30
11	36	40	51	39	45
12	36	35	61	33	25
13	55	40	32	41	37
14	43	48	29		37
15	59	33			38
16	35	31			37
17	36	25			21
18	40	46			
19	37	47			
20	31	27			
21		51			
22		34			
23		40			
24		43			
Mean Score	41.60	42.00	42.64	39.23	35.88
Std. Dev.	9.12	8.99	12.43	9.58	8.53

*American Chemical Society Cooperative Exam in Organic Chemistry, Form 2002. (Note: exam is administered at the end of the sophomore-level chemistry course.) Maximum score = 70.

Appendix 2: Scores* for Capstone Course CHEM 675 Seminar in Chemistry

Student No.	Fall, 2004	Spring, 2005	Fall, 2005	Spring, 2006	Fall, 2006	Spring, 2007	Fall, 2007	Spring, 2008 (Scores N/A)
1	201.9	250.4	234.5	239.7	257.4	205.1	225.3	
2	225.31	248.2		233.5	200.5	260.7		
3	234.36			206.3		243.1		
4				206.4		184.7		
5				244.4		256		
6								
Mean Score	220.52	249.30	234.50	226.06	228.95	229.92	225.3	
Std Dev.	16.75	1.56		18.40	40.23	33.40		

*Maximum score possible = 280

Appendix 3: Department of Chemistry Faculty Contact Hours per Week*

Faculty Member	Fall, 2005	Spring, 2006**	Fall, 2006	Spring, 2007	Fall, 2007	Spring, 2008
1	16	20	16	17	14	11
2	15	19	17	19	16	12
3	17	17	14	18	16	16
4	17	19	15	18	13	12
5	16	16	22	15	11	11
6	14		11	11	14	14
Mean Contact Hrs	15.83	18.20	15.83	16.33	14.00	12.67
Std. Deviation	1.17	1.64	3.66	2.94	1.90	1.97

**One faculty member on sabbatical this semester.

*Full-time faculty members, excluding chair. Note that American Chemical Society guidelines specify no more than 15 contact hours per week per faculty member.

General Parameters

1. No more than 20 pages, excluding appendix information.
2. Report submitted electronically to Dean, Assistant Provost for Quality Management, and Provost.
3. Note deadlines attached below.

Annual Timeline for Department Annual Report

February 15	Draft Template distributed to Deans.
April 1	Final Template and Directions distributed to Department Chairs. Selected enrollment data (fall 20 th day counts) distributed to Chairs and Deans.
June 1	Student system information (graduates, SCH) delivered to Chairs.
June 1	Final cutoff date for elements to be considered in the Department's Annual Report.
June 30	Complete Department Annual Report due to Deans, Assistant Provost for Quality Management, and Provost. Submit electronically.
August 15	Completed College/Unit Annual Report due to Assistant Provost for Quality Management and Provost.