FY2011 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, for example in its active participation in programs like the Kansas Academy of Mathematics and Science (KAMS). 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 computer-based data acquisition technology to entry-level chemistry students.

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.

C. 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.

One of our Long-Term Strategic Initiatives for the past several years, specifically the revision of our B.S. degree program to better match American Chemical Society (ACS) guidelines for undergraduate chemistry curricula, has now reached completion. At the end of the 2008-09 academic year the Chemistry Department submitted a Pre-Application for ACS Approval of a Bachelor's Degree Program in Chemistry, and in FY 2010 we were informed that our Pre-Application was approved. Our formal application was completed and submitted in summer, 2010. The next stage, a meeting with the ACS Committee on Professional Training, took place in March 2011, and we are awaiting the committee's decision regarding our application. If the committee's decision is favorable the final stage will be a site visit, probably in the fall of 2011. Reaching this point in the ACS approval process must be viewed as a major departmental accomplishment, and much of the credit goes to Dr. Eddie Olmstead and the other members of our Assessment and Planning Committee. It is important to note that ACS approval is not in any way an "accreditation" of the degree or the department; and that the ACS is not an accrediting agency, rather it is a professional organization with an interest in standardizing chemistry curricula. Nonetheless, the department feels that the honor of ACS approval of its degree program will greatly benefit the department and the university, most directly by enhancing our ability to recruit top quality students as well as new and replacement faculty members. Our other major accomplishment in the area of educational improvement has been in connection with the Kansas Academy of Mathematics and Science (KAMS). The inaugural KAMS class completed their program this year, and the Chemistry Department was delighted to find that two of these students have chosen to stay at FHSU to complete a Chemistry degree. The second KAMS class that began in the fall of 2010 has been a very rewarding addition to our University Chemistry I and II classes this year, although it continues to be challenging to

meet the needs of these highly gifted students. Other educational challenges this year have included the department's efforts to orient and guide two new ongoing faculty members who joined the department, as well as a temporary adjunct professor: more than a quarter of the department's FTE. Nonetheless, selection of Chemistry faculty members for honors like nomination for the Pilot Award and two "Top Prof" designations from Mortar Board are concrete signs that the department as a whole is rising to meet these challenges.

Another challenge has been the effort needed to maintain scholarly activity at a time when increased enrollments and the KAMS program have meant unusually heavy teaching loads. This challenge has been met, as shown by the scholarly presentations and grant-writing activities outlined below. From our point of view, however, the most significant facet of our scholarly efforts has been that they invariably have involved student participation, a "mentoring" process that the Chemistry faculty members hold in very high esteem. The steady growth of the Chemistry emphasis within the MLS program has meant that some of those included have been graduate students, but the majority have been undergraduate and KAMS students. This is an important consideration: since these students have not yet received a complete and well rounded chemical education the research projects they participate in must be very carefully crafted and supervised. Support for these increased research efforts has also been an important consideration, and much of the grant funding received this year has been for stipends and materials for student researchers. Drs. Wiese and Law are especially to be commended for receiving such support, although it is important to note that all of the full-time Chemistry faculty members supervised research students this year.

In spite of the demands of large classes and extensive research commitments this year, service activities by departmental members remain strong and productive. Dr. Wiese served professionally as treasurer for the ACS Midwest Regional Meeting, and as coordinator for the state and national Chemistry Olympiad. Dr. Donnelly continued his contributions to the Wichita section of the ACS as newsletter editor and member of the Executive Committee. Dr. Olmstead contributed as an instructor for the FHSU Middle School Girls' Science Camp, and also served as the department's "point man" for educational matters, participating in KSDE/NCATE and COPTSP sessions. All departmental members, of course, remain active in campus-wide and departmental committee work, and in well established recruitment activities like the Science Day and Science Olympiad. 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.

II. DEPARTMENTAL PERFORMANCE METRICS

A. Department Performance Indicators

Key Performance Indicator	FY2007	FY2008	FY2009	FY2010	FY2011
Freshmen **[20TH DAY FALL SEMESTER, HEADCOUNT]**	**25**	**31**	**24**	**30**	**48**
Transfer Students **[20TH DAY FALL SEMESTER, HEADCOUNT]**	**6**	**7**	**7**	**2**	**5**
Undergraduate (first majors/second majors) **[20TH DAY FALL SEMESTER, HEADCOUNT OF FIRST MAJORS, HEADCOUNT OF SECOND MAJORS]**	**75/5**	**85/3**	**84/1**	**89/2**	**110/2**
MLS Majors **[20TH DAY FALL SEMESTER, HEADCOUNT OF ADVISEES WITH 120-4901]**	**0**	**1**	**1**	**1**	**3**
Major Retention **[20TH DAY FALL SEMESTER, PERCENT OF MAJORS RETURNING]**	**71.08%**	**73.97%**	**69.87%**	**72.29%**	**73.81%**
Undergraduate Student Credit Hours **[TOTAL UNDERGRAD SCH]**	**2058**	**1869**	**1990**	**2135**	**2344**
Graduate Student Credit Hours **[TOTAL GRAD SCH]**	**20**	**30**	**8**	**27**	**29**
Tenured or Tenure-track Faculty (Headcount) **[FTE OCCUPIED FROM POSITION CONTROL]**	**7**	**6**	**7**	**7**	**7**
Non Tenure-Track Faculty (Headcount) **[FTE OCCUPIED FROM POSITION CONTROL]**	**1**	**2**	**1**	**1**	**1**
Other Faculty (Headcount/Sections Taught) [OTHER FACULTY AT 4 SECTIONS = 1 FTE FORMULA; INCLUDE NUMBER OF FTE AND SECTIONS TAUGHT]				**0.5 CHEM 112/112L**	**0.5 CHEM 120L E, H 122L B, E**
Undergraduate Degrees **[UNDERGRAD DEGREES AWARDED]**	**6**	**7**	**6**	**9**	**7**
Briefly note 2-3 improvements over the last year prompted from the above enrollment indicators. Number of freshmen, total of majors, and MLS students all showed sizable jumps without any increase in FTE, a situation that cannot be maintained. Major retention and SCH are in their third straight year of increase.					
Number of books, book chapters, and **refereed** articles published [TOTAL NUMBER PUBLISHED]	5	2	2	2	0
Percent of faculty publishing **refereed** books, chapters, or articles [PERCENT OF FACULTY PUBLISHING FOR FY2011 (FACULTY PUBLISHING/TOTAL FACULTY)]	40%	28%	28%	28%	0
Number of **non-refereed** articles and presentations [TOTAL NUMBER COMPLETED]	0	0	0	0	0

Key Performance Indicator	FY2007	FY2008	FY2009	FY2010	FY2011
Percent of faculty publishing **non-refereed** articles or presentations [PERCENT OF FACULTY COMPLETING (FACULTY PUBLISHING/TOTAL FACULTY)]	0	0	0	0	0
Number of scholarly performances and other creative activities [TOTAL NUMBER OF CREATIVE PERFORMANCES]	3	2	3	2	5
Percent of faculty in scholarly performances or other creative activities [PERCENT OF FACULTY IN CREATIVE SCHOLARSHIP (FACULTY PERFORMING CREATIVE ACTIVITY/ TOTAL FACULTY)]	13%	27%	40%	13%	13%
Total number of external grant applications submitted/percent of faculty submitting [TOTAL NUMBER OF EXTERNAL GRANT APPLICATIONS/PERCENT FUNDED]	1/13%	3/13%	2/13%	2/13%	3/13%
Total number of funded external grants/percent of faculty funded [DOLLAR AMOUNT OF EXTERNAL GRANT APPLICATIONS, PERCENT OF FACULTY FUNDED]	1/13%	2/13%	1/13%	2/13%	1/13%
Briefly note 2-3 improvements over the last year prompted from the above scholarly/creative activities indicators. With two new faculty members, and huge increases in teaching loads due to increased majors and KAMS, the increases in numbers of scholarly performances and numbers of grant applications are quite remarkable. In addition to the above-mentioned external grant activity, another faculty member received Undergraduate Research Experience support for a student researcher. Every single full-time Chemistry faculty member worked with one or more students on research projects this year.					
[NOTE: Each department MUST report 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	39.2/43.1	35.9/43.1	34.0 (See Appendix 1)	33.9/43.1	42.8/43.1
Direct Outcome 2 Average grade in capstone course: Seminar in Chemistry	82.1%	80.5%	75.7%	81.5%	81.8%
Indirect Indicator 1 Alumni Achievement Award Winners	1	1	1	0	0
Indirect Indicator 2 Percent of Alumni Surveys returned describing the education in chemistry superior or above average	87.5%	50.0%	100%	100%	100%
Dept senior students' Level of Academic Challenge **[FHSU LAC SCORE, DEPT LAC SCORE]**	54.15 49.24	53.87 48.98	54.65 58.57	55.9 59.34	56.4 52.44
Dept senior students' Active and Collaborative Learning **[FHSU ACL SCORE, DEPT ACL SCORE]**	44.61 52.38	45.85 49.52	45.34 62.86	46.1 48.13	43.9 57.62

Key Performance Indicator	FY2007	FY2008	FY2009	FY2010	FY2011
Dept senior students' Student-Faculty Interaction **[FHSU SFI SCORE, DEPT SFI SCORE, N, %]**	44.19 61.67	44.73 52.00	45.34 61.33	41.0 48.15	38.5 61.67
Dept senior students' Enriching Educational Experiences **[FHSU EEE SCORE, DEPT EEE SCORE, N, %]**	33.44 40.08	34.09 45.08	34.72 51.83	34.0 43.98	32.9 43.08
Dept senior students' Supportive Campus Environment **[FHSU SCE SCORE, DEPT SCE SCORE, N, %]**	59.06 65.97	57.30 70.00	59.57 79.44	60.3 57.41	60.8 62.78
Number of NSSE participants **[NUMBER OF DEPT SR STUDENTS, PERCENT]**	4 33%	5 38%	13 39%	7 44%	10 71.4%
Briefly note 2-3 improvements over the last year prompted from the above student learning/engagement indicators. Active/Collaborative Learning, Student-Faculty Interaction, and Supportive Campus Environment all show remarkable improvements from last year, and are quite a bit above the overall campus average. All of these stem from the individualized attention we give to our senior students, but none of them can be maintained without additional FTE to keep teaching loads under control. High score on standardized exam (Direct Outcome 1) is probably somewhat anomalous.					
[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 members (excluding department chair)	16.1	13.3	14.6	15.4	13.7
Outcome/Indicator 2 Number of letters to prospective freshmen	1311	953	1099	1786	1362
Outcome/Indicator 3 Lab contact hours per week for B.S. degree, FHSU/Regional University average	38/27.3	38/27.3	36/27.3	36/27.3	36/27.3
Briefly note 2-3 improvements over the last year prompted from the above indicators. Contact hours returned to levels compatible with American Chemical Society limits (no more than 15 contact hours/week), thanks to adjunct professor taking on more duties. Letters to prospective freshmen, though still high, are more manageable.					

C. Department Quality Initiatives and Results

FY2011 Quality Initiatives	Results
1. Chemistry Faculty Teaching Overload Abatement As noted previously (FY 2010 Quality Initiative #2), excessive teaching contact hours threaten to over-stress our full-time faculty and may lead to denial of our request for ACS approval of our B.S. degree program. Furthermore, three of these faculty members will start FY 2011 at various stages of the tenure track, and it is vital for them to have time freed up to initiate or carry out research activities. Stop-gap measures will no longer suffice and solutions must be found to bring faculty teaching loads back to sustainable levels.	Thanks in large part to support from the KAMS program, the department was able to establish and fill both an adjunct faculty position and a graduate teaching assistant post, both enormously helpful in returning faculty teaching loads back to reasonable levels. Both of these individuals worked out very well, contributing mainly in the University Chemistry lab courses in lab supervision and grading. They contributed in other ways as well, such as helping in the selection of student winners of departmental awards and scholarship winners. It should be emphasized, however, that this is still only a slightly better stop-gap measure, and that the promise of a wholly new Chemistry faculty position to handle KAMS duties still stands. Our concern stems from the fact that neither of these individuals is expected to be here for FY 2012, and if we have to search each year for new people to fill these positions we cannot hope to always find individuals who are as dedicated, capable, and collegial. The KAMS students are the ones most likely to suffer from unevenness in the quality of the teaching they receive here since they generally arrive with no background of any kind in the field of chemistry. Making up for deficiencies in this area is likely to also have a negative impact on the tenure decisions of our tenure-track faculty.
2. Sustainability in Freshman Lab Experience Over the past two years the Chemistry Department has made extensive progress in redesigning freshman lab exercises to improve them in the areas of logistics, safety, and pedagogy. A logical extension of these efforts is to implement sustainability (or "green chemistry") into the freshman lab experience. The freshman lab classes have our largest numbers of students and use our largest quantities of chemicals, making the potential impact of sustainability efforts as great as possible. In addition, introduction of sustainability concepts at the freshman level makes possible the "carry-over" of these concepts into all their later college classes regardless of major.	Dr. Eddie Olmstead, our freshman Lab Supervisor in the fall of 2010, was assigned the duty of searching for freshman-level laboratory experiments that meet "green chemistry" expectations, and he found several possible candidates. In addition to the purchase of several resources (e.g. books) on green chemistry, his efforts led to the uncovering of a number of published green lab experiments suitable for our freshman-level courses in the chemical literature. He then assigned a senior in chemical education the task of identifying, adapting, testing, and formatting a suitable green lab procedure as a possible substitute for an existing CHEM 120L experiment. This required assessing both pedagogical utility and appropriateness for achieving maximum improvements in terms of safety and sustainability. The student completed this work, and also used the results as the basis for a technical presentation for our Seminar in Chemistry this year. The plan is to gradually phase in this or other green procedures, or parts of procedures, as part of our ongoing efforts to update and streamline the CHEM 120L and 122L lab courses. One two-week experimental block, on thermochemistry, has already been shifted down to microscale to reduce chemical consumption and waste production. We remain committed to the principles of green chemistry, and plan also to look for procedures for other lab courses to meet these goals. A tangential activity this year was a well received poster session on "Sustainability" organized by Dr. Kent Rohleder in connection with his sections of CHEM 100.

FY2012 Quality Initiatives	Responsible Party, Resources, and Plan
1. Chemistry Faculty Mentoring Program As noted above (FY 2011 Quality Initiative 1.), now that we have found at least a temporary solution to our chronic teaching overloads, we need to focus more attention on the quality of teaching provided by our adjunct and GTA individuals. In addition, we have four other members of the department, fully half of the individuals teaching Chemistry classes at FHSU, who do not have tenure, and we need to find ways to facilitate their development in all areas of teaching, research, and service. In addition to the standard needs of young faculty members, these individuals must be encouraged to align their efforts with the department's commitments to sustainability, safety, and hands-on laboratory experiences for our students.	**Responsible Party, Resources, and Plan** Dr. Jim Hohman will assess the needs of these relatively new members of the department, taking into account their roles in fulfilling the department's mission. This assessment will be over and above the standard Merit Review process, in part because it will take more into account the department's long-range needs and those of our students rather than focusing on the immediate set of circumstances. Where it seems most likely to be effective, a senior faculty member will be assigned as mentor to each of these individuals; given the duty of assessing the newer individual's progress in teaching, research, and service; and guiding future growth in these areas. It is possible that, in some cases, the best mentor may actually be a member of another department on campus. Though this will be an official departmental initiative, it should be emphasized that this process will be entirely separate from the tenure and promotion processes, partly in being an on-going activity rather than a "snapshot" of a faculty member's status at one particular time. The mentoring is also aimed at being more formative than summative. The mentors will be expected to make periodic reports of their activities to the department chair, and discussions between mentors and the chair will be used to plan future activities. A related activity will be to start development on an "Instructor's Administrative Handbook" to guide adjunct professors and other new faculty members in standard departmental procedures, especially in regard to freshman laboratory courses.
2. Scientific Writing in the Chemistry Curriculum Discussions among the Chemistry faculty during FY 2011 led to a consensus that the writing skills of our Chemistry and Pre-Professional majors are at disappointingly low levels. Our students currently get no real introduction to scientific writing until the sophomore year, when formal lab reports are rather abruptly required in Organic Chemistry. Later lab classes require similar reports, and although instructors give detailed directions and examples to aid the students in their writing, even at the senior level the results are sometimes discouraging. This may arise from a lack of appreciation of the unique format of scientific writing, and the organization and clarity of thought that both stems from and is a sign of such writing.	**Responsible Party, Resources, and Plan** Dr. Jim Hohman will begin to introduce the topic of scientific writing as part of the Orientation to Chemistry (CHEM 101) class in the fall, and will encourage the instructors of other freshman Chemistry classes to bring up the topic wherever possible. Resources such as the American Chemical Society's "Style Guide" will be made available to students starting in the freshman year, as will examples of good scientific writing. The instructors of CHEM 101 will be asked to look for ways to require the students to practice good scientific writing, and for ways to make such practice part of the assessment for this class. For example, if possible each student may be asked to submit a first draft of a brief field trip report, and then utilize peer evaluation as part of a system to locate flaws and weaknesses in the writing. The original writer may then be asked to compose a second draft based on the peer evaluation, and this second draft may then be assessed by the instructor. The instructors of CHEM 120 and 122 will also be asked to look for ways to introduce more scientific writing in their classes, although such activities will have to be judiciously assigned so as to avoid further taxing already over-burdened instructors. If successful, these activities should result in sophomore and higher level students being both more confident and more capable in the scientific writing required of them.

D. Institutional Quality Results

FY2011 University Initiatives	Department Activities/Results
Increase access and retention for Hispanic students	In the course of deliberations regarding the Academic Opportunity Awards (AOAs) this year, the department actively sought to increase the number of applicants, including Hispanic students. An effort was also made to make decisions on AOAs earlier than in past years. As of this date, both these efforts seem to have resulted in an increase in the number of acceptances of AOAs, including applicants with Hispanic backgrounds.
Increase the quantity and quality of K-12 teachers educated	Plans developed by our Chemical Education advisor, Dr. Eddie Olmstead, led to a smooth transition in the handling of our main teacher education course (CHEM 480) in the fall. Teacher education was also emphasized in the Orientation to Chemistry class.
Improve undergraduate students' foundational skills	In the course of deliberations among the Chemistry faculty in the spring, a consensus was reached regarding the unsatisfactory quality of scientific writing skills among our Chemistry students. Plans are in the works for addressing this issue in upcoming years. An effort to improve the math skills of freshmen by offering a workshop on chemical calculations was scuttled by tight budget constraints.
Enhance physical wellness of students, faculty, and staff	The Chemistry Department supports university-wide efforts to improve the physical health and well-being of all students, faculty, and staff, but views its direct involvement in these efforts to be outside the department's mission.
Internationalize the campus and curriculum	The study of chemistry is inherently international in scope, and all introductory Chemistry courses at FHSU include descriptions of contributions made to the field by persons from a wide variety of nations and backgrounds. On-going efforts to attract more Hispanic students (see above) are also part of the department's response to this initiative. Two recently hired faculty members are from outside of the U.S. Finally, it is noteworthy that we have one international student pursuing the MLS with an emphasis in Chemistry at this time, and graduated another in FY 2011.

III. FY2011 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 individuals who teach Chemistry classes at FHSU possesses the terminal degree, and they represent all the major sub-disciplines within the field of chemistry. Second, the department benefits from outstanding facilities in Tomanek Hall, and teaching tools (e.g. software, "clickers", etc.) well designed for a top quality chemical education. Finally, programs administered within the department – both major degree programs and pre-professional programs – are well established and highly regarded.	One chronic problem, that of excessive teaching contact hours (see II. A, under "Outcome/Indicator 1" as well as Appendix 3), remains a major concern. American Chemical Society (ACS) guidelines limit Chemistry faculty to no more than 15 contact hours, and maintaining this average this year has been possible only because of temporary measures (e.g. our new adjunct professor position). Our concern is less time that is available for curriculum development and for research – so necessary in a technical field like chemistry – and a very real inability to offer advanced elective classes. Also, we are the only Chemistry Department among the 6 four-year institutions within the Regents system that has no degree program approved by the ACS.
Future Opportunities	**Future Threats**
One positive development is the recently completed revision of our B.S. curriculum to better match guidelines set by the ACS for undergraduate degree programs in chemistry (see above and below). The application process for ACS approval of our B.S. program has been completed, and once approval is granted the results are expected to include tremendous recruitment opportunities. Another related opportunity is the increased emphasis on chemical research as a standard part of the undergraduate curriculum. Finally, new faculty members bring with them the energy and enthusiasm needed to inspire students for academic excellence and professional achievement.	A particular threat that has increased in importance this year has been the limited space available for laboratory research within the department. As noted above, two members of the inaugural KAMS class have chosen to stay at FHSU to complete Chemistry degrees, and their research plans along with those of our regular upper-class Chemistry students will stretch our facilities to near the breaking point. A number of possible solutions are being considered, but all will require potentially expensive re-purposing of spaces within Tomanek Hall. A related threat is the availability of technical instrumentation: some of our most useful pieces of lab equipment are old enough to require extensive servicing in the near future, while others are simply not state-of-the-art any longer.

B. Opportunities for Improvement

[DISCUSSION OF IDENTIFIED OPPORTUNITIES FOR IMPROVEMENT, WHICH MAY REQUIRE RESOURCES. THESE IDENTIFIED OPPORTUNITIES SHOULD ALIGN WITH ACTION PLAN REQUESTS GENERATED FOR UNIVERSITY STRATEGIC PLANNING.]

Opportunity for Improvement	Resources Required	Expected Result and Completion Date
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 have modified our B.S. degree to match ACS guidelines, and we have successfully completed pre-application for ACS approval. We completed the final application in early FY 2011, so now we need to plan for a site visit by ACS officials, making certain that we meet all minimum requirements.	ACS guidelines include strict restrictions on the number of teaching contact hours for each faculty member each year, and this will almost certainly require an increase in FTE Chemistry faculty. In FY 2010 we made a proposal for such an increase that was very nearly revenue-neutral, given the economic downturn, but this proposal was finally rejected. We need support for at least a 0.5 FTE increase in Chemistry faculty, and this could be a half-time Lab Director (as we have previously proposed). We also need small increases in OOE and student labor.	Once approval for a Lab Director or similar new position is in hand we will immediately search for and hire a person with appropriate qualifications, hopefully well before the end of FY 2012. Immediate adjustment of teaching loads will follow, ensuring that contact hours are at sustainable levels in FY 2013. This will allow us to not only meet ACS guidelines but also improve the quality of programs we currently administer or participate in, including KAMS. Other innovations, including across-the-board inclusion of sustainability concepts in our degree programs, are also expected.
2. About 6 years ago the department completed an Academic Audit of its B.S. degree program, which revealed important curricular improvements that were needed, and we are well advanced in making these changes. Course topics have been streamlined and (where necessary) coalesced, and in-depth coursework has been added to the B.S. curriculum. As noted above (under SNOT analysis) we now need to consider our needs in terms of research space and instrumentation; that is, we need to consider our "hardware" needs now that the "software" parts of our curriculum have been upgraded.	To solve the problem of laboratory space – for research as well as for expected increases in enrollments in advanced lab classes – we will need to complete an analysis of the types and amount (i.e. both quality and quantity) of lab space needed. Once those have been identified, resources will be needed for the re-purposing of spaces currently being used for other purposes. A similar process will be used to identify chemical instrumentation that is most urgently needed. Finally, reassigned time for the writing of Action Plans and grant proposals will complete this process.	In FY 2012 we will move forward with proposals and Action Plans based on the analyses described at left. It should be emphasized, however, that this will be a multi-year process given the expected growth in programs like KAMS and the challenges of high teaching loads described above. Individual faculty members will be given reassigned time to compose grant proposals and Action Plans designed to move us in the direction sketched out by the analyses. Given appropriate support, we anticipate within five years to be back at a sustainable and state-of-the-art level in our laboratory and instrumentation needs.

A. SUPPORTING MATERIALS Department Degree Program Affinity Diagram(s)

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
Knowledgeable Chemists must have an extensive base of fact, terminology, and theory in order to interpret results and solve problems. **Analytical/Precise** Chemists must use higher level reasoning skills to solve problems without allowing imprecise data to interfere. **Dedicated/Patient** Chemists must deal with problems that do not meet immediate success. **Creative/Resourceful/ Innovative** Chemists solve experimental and theoretical problems using a core of knowledge and available resources. **Objective/Intellectual ly Honest** Chemists must view all data without bias and must rigorously adhere to the premise that all data are reported without alteration. **Curious/Inquisitive** Chemists rely on experimentation to obtain information and test all inferences.	**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 **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 **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 **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	**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 **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 **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 andEngineers I Lab PHYS 212L Physics for Scientists andEngineers 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 **General Education Curriculum** **Develops the knowledge required to be educated** Liberal Arts component **Develops the skills required to be educated** Foundation Studies Component	**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. **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. **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. **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. **ALUMNI SURVEY:** All students who graduate with a degree in chemistry are surveyed two years after their gradation. The results are used to improve the program.	See Appendix 1 for typical results from Standardized Exam See Appendix 2 for Results of Capstone Course. In a recent Alumni Survey, 100% of alumni would strongly recommend FHSU Chemistry programs to a son or daughter.	This is a relatively new placement exam, and detailed studies of student preparedness are ongoing.

B. Department Staffing Plan

Department of Chemistry
Date Prepared – June 2011

(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 General	Bencze	Biochemistry Physical	02/17/1972	1.0	Assistant Professor, 2008	Ph. D.	Tenure Track
General Physical	Law	Physical Computational	04/20/1982	1.0	Assistant Professor 2010	Ph. D.	Tenure Track
General	Rohleder	General	10/09/1968	0.5	Instructor 2010	Ph.D.	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

C. Bibliography of Departmental Scholarly Activity

1. L-Fucose Metabolism in Developing Mouse Brain. Sara C. Rogers*, James R. Balthazor* and Thomas J. Wiese. Presented at the 9th K-INBRE Meeting; 15-16 January 2011.
2. The Investigation into Zebrafish prp1 and prp2 Gene Conservation in Two Common Kansas Lake Fish. Holly A. Miller* and Thomas J. Wiese. Presented at the 9th K-INBRE Meeting; 15-16 January 2011.
3. L-Fucose Metabolism in MCF-7 Breast Cancer Cells. Sara C. Rogers* and Thomas J. Wiese. Presented at the 45th Midwest Regional Meeting of the American Chemical Society; 27-30 October 2010.
4. L-Fucose Metabolism in Developing Mouse Brain. Sara C. Rogers* and Thomas J. Wiese. Presented at the 45th Midwest Regional Meeting of the American Chemical Society; 27-30 October 2010. Oral Presentation.
5. Towards the Mechanism of Copper Toxicity in Nerve Cells. Gulay Duman, Rainbow Yang* and Thomas J. Wiese. Presented at the 45th Midwest Regional Meeting of the American Chemical Society; 27-30 October 2010.

D. Department Program Assessment Results

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

Student No.	Spring, 2007	Spring, 2008	Spring, 2009**	Spring, 2010	Spring, 2011
1	36	40	18	30	53
2	29	41	42	50	38
3	63	52	25	26	49
4	46	37	31	33	34
5	52	32	32	27	47
6	38	47	47	35	38
7	29	21	30	26	49
8	34	39	49	45	31
9	34	31	60	42	39
10	36	30	33	35	36
11	39	45	26	38	64
12	33	25	35	16	50
13	41	37	47	31	47
14		37	26	48	43
15		38	29	26	28
16		37	26		39
17		21	26		45
18			36		41
19			28		
Mean Score	39.23	35.88	34.00	33.87	42.83
Std. Dev.	9.58	8.53	10.24	9.43	8.69

*American Chemical Society Cooperative Exam in Organic Chemistry, Form 2002. (Note: this exam is administered at the end of the sophomore-level chemistry course, CHEM 342 Organic Chemistry II.) Maximum score = 70.
**A different edition of the ACS Cooperative Exam in Organic Chemistry, Form 2008, was used.

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

Student Number	Fall, 2007	Spring, 2008	Fall, 2008	Spring, 2009	Fall, 2009	Spring, 2010	Fall, 2010	Spring, 2011
1	225.30	202.26	198.20	231.72	210.34	243.60	210.80	228.00
2		225.90	227.58	198.00	218.70	230.66		212.00
3		200.10		229.00	228.58	231.50		242.00
4		234.30		194.58		243.20		214.00
5		205.34		204.20		175.42		268.00
6						223.34		
7						246.66		
8						257.52		
Mean	225.30	213.58	212.89	211.50	219.21	231.49	210.80	232.80
Std Dev		15.48	20.77	17.58	9.13	25.08		23.09

*Maximum score = 280

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

Faculty Member	Fall, 2007	Spring, 2008	Fall, 2008	Spring, 2009	Fall, 2009	Spring, 2010	Fall, 2010	Spring, 2011**
1	14	11	15	18	17	14	13	12
2	16	12	13	13	15	12	14	15
3	16	16	17	15	15	15	16	13
4	13	12	17	12	18	14	14	14
5	11	11	14	13	16	18	14	13
6	14	14	14	14	16	15	13	
Mean Contact Hrs	14.00	12.67	15.00	14.17	16.17	14.67	14.00	13.40
Standard Deviation	1.90	1.97	1.67	2.14	1.17	1.97	1.10	1.14

*Full-time faculty members, excluding chair. Note that American Chemical Society guidelines specify no more than 15 contact hours per week per faculty member.
**One faculty member on sabbatical in Spring, 2011.

E. Other Departmental Information

[ENCLOSE ADDITIONAL INFORMATION, ACCREDITATION, AWARDS, ETC]

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

March 1	Draft template distributed to Deans.
April 15	Final template and Directions distributed to Department Chairs. Selected enrollment data (fall 20th day counts) distributed to Chairs and Deans in the departmental template.
June 1	Student system information (graduates, NSSE) 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 Annual Report due to Assistant Provost for Quality Management and Provost.