

Audit and Review

1996 - 2001

Department of Chemistry

Major/Minor BA, BS, BSE programs

October 15, 2001

University of Wisconsin

Whitewater

**UNIVERSITY OF WISCONSIN-WHITewater
FORMAT FOR AUDIT AND REVIEW SELF-STUDIES**

I. Academic Assessment

A. Highlights/Initiatives

1. Overview the current curriculum, including options available within the program (e.g., discussion of the different emphases).

The chemistry curriculum is aimed at preparing the chemistry major and the numerous pre-professional students for a wide variety of careers. To accomplish this the chemistry curriculum is exceptionally structured in a vertical fashion. The high degree of structure is a unique feature of a chemistry curriculum although virtually all chemistry curricula have this feature. The prerequisites are strictly enforced. Even with the high degree of structure it is easily possible to complete a degree in four years as can be seen in Appendix I.

In the last five years the largest overall effort has been and will continue to be the attainment of American Chemical Society (ACS) approval. This has resulted in the addition of Advanced Inorganic Chemistry (640-460) and its successful first offering, the offering of Physical Chemistry (460-370,371,470,471) every year, and most importantly the decrease in faculty load from an average of 17 contact hours as stated in the last report, the largest load of any chemistry department in the system and greatest contact load in the College of Letters and Sciences, to 12.9 last year. The ACS requires less than 15 contact hours and encourages a load of 12 contact hours. This more normal load has allowed the faculty a reasonable amount of time for class preparation. More importantly the faculty have used this time to be active in chemical research, mostly with students. Currently seven (7) students are actively engaged in scientific research with the chemistry faculty.

Two members of the Chemistry Department met with a subcommittee of the American Chemical Society - Committee on Professional Training (ACS-CPT) on August 25, 2001. The members of the subcommittee were pleased with our progress towards meeting their requirements. Should ACS approval be forthcoming an ACS approved track in the Chemistry major will be proposed.

Except for the constant updating that is always necessary for courses and particularly those in the sciences, our curriculum largely remains constant. Another significant revision in the established courses has been the expansion of computer use at all levels. A web page has been established for the introductory level chemistry course that allows the students to access such information as exam schedules, syllabi, practice exams and other types of information. Blackboard was used extensively for the Organic Chemistry courses (CHEM 251,252, and 455) and in the Consumer Chemistry (CHEM 100) course. For the laboratory sections of the introductory level courses, there are Excel macro programs that guide students in performing experimental calculations, preparing graphs and downloading and turning in laboratory reports. In advanced courses students use the World Wide Web to access toxicity data and simulation programs to better understand laboratory procedures as well as word processing, spreadsheet and graphing programs for report preparation. With the availability of the new

Upham Hall computer laboratory for the sciences, it is expected that computer use will be further integrated into all of the chemistry courses.

2. Highlight any new academic assessment initiatives you anticipate for the upcoming review period.

(Attach the program's APR(s) as Appendix A.)

Again, the greatest change anticipated is the assessment afforded by the ACS. Should we be approved we will need to submit annual reports and five-year renewal reports.

B. Educational Objectives and Assessment Techniques

1. State the subject matter, cognitive development, and skill objectives for the program, indicating what students will know and be able to do upon completion of the program.

a. Subject Matter

i. Students completing the major program in the Department of Chemistry should have a demonstrable command of the body of general knowledge relevant to the areas of Organic, Inorganic, Analytical, and Physical chemistry as identified by the Division of Education of the American Chemical Society.

ii. Students completing the major program in the Department of Chemistry should have a demonstrable understanding of the energy based fundamentals of bond formation and the resultant spectral phenomena related thereto.

iii. Students completing the major program in the Department of Chemistry should have a demonstrable understanding of the fundamental factors affecting both the rates of chemical reaction and the resultant state of equilibrium.

b. Cognitive Development

i. Given an original chemical problem typical of those experienced by a professional chemist in the areas of theory, synthesis, quantitative analysis, or qualitative analysis, the student completing the major in the Department of Chemistry should be able to propose potential viable routes to the solution of the problem.

ii. Given an original problem in experimental design typical of that which could be experienced by a professional chemist as a result of the need to acquire new experimental data, the student completing the major in the Department of Chemistry should be able to propose an experimental design which would generate, in a reliable and reproducible manner, the particular data sought.

c. Skills

i. Students completing the major program in the Department of Chemistry should be able to perform experimental measurement manipulations with such skill as to produce results which are both precise and accurate.

ii. Students completing the major in the Department of Chemistry should be able to unequivocally demonstrate the written communication skills necessary to author formal reports which are clear, concise, and comprehensive.

iii. Students completing the major program in the Department of Chemistry should be able to demonstrate their understanding and practice of safe laboratory procedural techniques and subsequent waste disposal.

2. Describe the data collection techniques used to determine if the program has been successful in achieving the desired outcome for each objective above.

A. Subject Matter

i. To be assessed through a combination of the following:

a. Students will be assessed and tracked annually during the full course of study by scores on American Chemical Society National Cooperative Exams in the subject areas indicated.

b. Students will be assessed, during the final semester of study, by scores on the American Chemical Society Graduate Level Placement Exam.

c. Students will be assessed by means of comprehensive oral exams administered by a departmental faculty body during the final semester of study in order to provide faculty and students with an opportunity to explore the student knowledge base with latitude and flexibility.

ii. To be assessed through a combination of the following:

a. Students will be assessed, during the final semester of study, by a specific comprehensive exam, developed by departmental faculty, covering the principal areas of spectroscopy to which students have been exposed, in theory and/or practice, during the full course of study.

b. Students will be assessed, during the final semester of study, by scores on the American Chemical Society Graduate Level Placement Exam.

c. Students will be assessed by means of comprehensive oral exams administered by a departmental faculty body during the final semester of study in order to provide faculty and students with an opportunity to explore the student knowledge base with latitude and flexibility.

iii. To be assessed through a combination of the following:

a. Students will be assessed by scores on American Chemical Society National Cooperative Exams in Analytical Chemistry, Organic Chemistry and Physical Chemistry.

b. Students will be assessed, during the final semester of study, by scores on the American Chemical Society Graduate Level Placement Exam.

c. Students will be assessed by means of comprehensive oral exams administered by a departmental faculty body during the final semester of study in order to provide faculty and students with an opportunity to explore the student knowledge base with latitude and flexibility.

B. Cognitive Development

i. To be assessed through a combination of the following:

a. Students will be assigned problem projects which do not duplicate those experienced in previous formal training. Assessments of proposed solution routes will be made by a faculty team critique, which will incorporate an opportunity for student oral defense and enlightened modification of the proposed solution.

b. Follow-up surveys of employers (or graduate research advisors) will assess the workplace performance of program graduates as they address “on the job” creative challenges.

c. Use of a capstone experience via Independent Study in Chemistry (640-498) where the student has an extended opportunity to demonstrate problem solving techniques.

ii. To be assessed through a combination of the following:

a. Students will be assigned data acquisition projects which do not duplicate those experienced in previous formal training. Assessment of proposed experimental designs will be made by a faculty team critique which will incorporate an opportunity for student oral defense and enlightened modification of the experimental design.

b. Follow-up surveys of employers (or graduate research advisors) will assess the workplace performance of program graduates as they experience the need to design experimental systems for the collection of new data.

c. Use of a capstone experience via Independent Study in Chemistry (640-498) where the student has an extended opportunity to demonstrate effective experimental design techniques.

C. Skills

i. To be assessed through a combination of the following:

a. Follow-up surveys of employers (or graduate advisors) to assess the graduate's performance in demonstrating manipulative skills in the workplace environment.

b. Use of a capstone experience via Independent Study in Chemistry (640-498) where the student has an extended opportunity to demonstrate manipulative skills.

ii. To be assessed through a combination of the following:

a. Follow-up surveys of employers (or graduate advisors) to assess the graduate's communicative skills in the workplace.

b. Use of a capstone experience via Independent Study in Chemistry (640-498) where the student has an extended opportunity to demonstrate written communication skills.

iii. To be assessed through a combination of the following:

a. Use of a capstone experience via Independent Study in Chemistry (640-498) where the student has an extended opportunity to demonstrate safety skills.

3. Explain how individual courses are related to the student outcomes that are part of the program's assessment plan.

Chemistry is a vertically integrated program. Success in subsequent courses indicates successful learning in the previous course. There are essentially no options in a Chemistry major, as a complete knowledge of Introductory, Organic, Analytical, Biochemistry and Physical Chemistry is needed to be a Chemist.

The following is a list of the courses taught and the assessment goals they fulfill. The outcomes refer to the skills in 1. Above. A one word summary of the skill heads each column.

| | a. subject matter | | | b. cognitive development | | | c. skills | |
|------------------------------|-------------------|--------|----------|--------------------------|--------------|--------------|-----------|--------|
| | i | ii | iii | i | ii | iii | i | ii |
| | General | energy | kinetics | problem | experimental | manipulation | writing | safety |
| Consumer(100) | X | | | X | X | X | | X |
| Intro Chem(102-104) | X | X | X | X | X | X | | X |
| Organic Chem Lect (251-252) | X | X | X | X | | | | |
| Organic Chem Lab (261-262) | X | X | X | X | X | X | X | X |
| Quantitative Analysis (352) | X | X | X | X | X | X | X | X |
| Physical Chem Lect (370,371) | X | X | X | X | | | | |
| Physical Chem Lab (470,471) | X | X | X | X | X | X | X | X |
| Advanced Organic (455) | X | X | X | X | | | X | |
| Biochemistry(456) | X | X | X | X | | | X | |
| Advanced Inorganic (460) | X | X | X | X | X | X | X | X |
| Independent Study (498) | X | X | | X | X | X | X | X |

4. List any dual-level courses and indicate how course content, pedagogical processes, assignments, etc. create different educational experiences for graduate and undergraduate students.

The only dual-level course in the Chemistry Department is Advanced Organic Chemistry (455/655) . Graduate students in this course are required to write an additional research paper.

(Attach a list linking courses to assessment objectives as Appendix B. Attach a list of any dual-listed courses delineating graduate expectations as Appendix B1.)

C. Assessment Data

1. Summarize the assessment data gathered during the review period. If it is helpful to include data from previous years for comparison purposes, then please do so. (Use tables where necessary.)

a. Exit interviews have been given to the graduating seniors. Following are the questions asked and some responses from last year. The responses were similar through the years.

The following are the questions asked of the students, and representative responses.

1. How well did the chemistry program meet your needs relative to your current/future employment? "I think quite well,".
2. Was the laboratory instrumentation/computers appropriate in preparing you for your present/future employment? "Yes" "The spectroscopy in Organic Laboratory has been especially helpful." "As a BSE student I would have liked to see less micro scale experiments in Organic"
3. What other instruments/computers would be helpful? "As far as I know instrumentation appeared to be sufficient." "Impressed with the amount of instrumentation for a small department."
4. What other courses would be helpful to the chemistry program? One mentioned Industrial Chemistry and a BSE student would have liked to have taken Consumer Chemistry.
5. Was the course content appropriate? If not, what changes would you recommend? "Yes."

The BSE would have liked additional lower level courses.

6. Did you find the faculty to be helpful? "Yes, very personable and approachable."
"Faculty were available any time I needed help."
7. How would you rate the laboratory facilities? What changes or improvements would you recommend? "More modern laboratory facilities would be an improvement although there was really nothing wrong. The remodeling of Upham Hall should help."
"The Physical Chemistry laboratory was crowded with seven of us doing separate experiments."
8. Would you be willing to return to the department to speak to undergraduates about your career experiences? All stated "Yes."
9. Did the chemistry program adequately prepare you to address "on the job" creative challenges? "Especially Physical Chemistry Laboratory where we had to solve problems and fix equipment." also " Research was especially helpful." "Taught to learn how to learn."
10. Did the chemistry program adequately prepare you for graduate studies? "Yes."
11. Do you plan on pursuing graduate studies or taking a job in industry/ government? If so, please specify where you will be going and the type of study/work you will be engaged in. SEE APPENDIX D2
12. Was your advisor helpful? Did you get good and timely advice. Yes. Dr. Drexler kept me on track.
13. Is there anything else you would like to add? " Not right now." " I think I am well prepared."

b. American Chemical Society standardized national examinations were given in Organic chemistry, Quantitative Analysis and Physical Chemistry. In Organic Chemistry until this last year the examination could be dropped so many students did not take the exam seriously. Last year the exam could not be dropped and the average was in the 60 percentile when compared to national averages. In Quantitative analysis the average has ranged from 57 percentile to 61 percentile. In Physical Chemistry the average last year was 55 percentile with a high of 86 percentile.

D. Program Improvement Resulting from Assessment Efforts

1. Highlight some of the important changes to the curriculum, the assessment objectives, and/or the data collection techniques/processes that have occurred during the review period. Make sure to link the changes to the data collected during the review period.

- a. In Organic Chemistry more time is being spent on synthesis due to the results of the standardized ACS test.
 - b. The new Advanced Inorganic Chemistry course is required by the American Chemical Society. This course was also requested by graduating seniors in exit interviews.
2. Indicate how the program has responded to recommendations relevant to assessment from the most recent Audit and Review Evaluation Report.

(Attach Audit and Review Evaluation Report from last review as Appendix C.)

Program Strengths

1. The program supports the mission, strategic plan, and general education program of the University and provides essential background courses for a wide range of majors. This has continued.
See II. A. 2 below.
2. Students are engaged in experiential learning, including undergraduate research and much hands-on experience with instrumentation.
This has continued. See appendix F-2 for publications involving students.
3. The assessment plan includes both internal and external measures of students learning outcomes and results are being used effectively to improve the program.
See 2 above.
4. Students perform at or above national norms on standardized examinations.
See I-C-1-b above.
5. Alumni are closely tracked.
Continued
6. Faculty are highly student oriented and are active teaching scholars who are:
 - integrating technology into the curriculum, including distance education
 - engaging students in their research and co-authoring publications with them
 - writing competitive grant proposals to meet the needs of the program
 - providing significant professional and public service
 - participating in faculty development initiatives such as teaching enhancement sessions.*All except distance learning continues as seen through out the report.*
7. The program has met its affirmative action goals.
This continues to be the case.
8. Laboratory instrumentation has been significantly upgraded since the last program audit and review.

9. The number of minors have steadily increased over the past five years, with fall enrollments raising from 36 to 58 and the number of graduates increasing from 9 to 22.

- Number of minors has risen to over 70. These numbers may decrease with the new Physical Science minor housed in the Physics Department but requiring more Chemistry courses. The number of graduates has increased to 28.

10. Job opportunities for graduates are the best they have been in recent years:

95% of graduates over the past five years have been employed as chemists or are in graduate school. see 2.D below.

Program weakness:

1. The number of students enrolled in the major during each fall of the past five years is 15, 25, 33, 34, and 14, averaging 24 per year.

- The number of majors has increased to an average of 40.

2. The total of only 19 students graduated with the major over the past five years.

- This has increased to 28.

3. Majors are graduating with an excessive number of credits, with averages of 140, 104, 133, 145, and 132 over the past five years.

| 1996 | 1997 | 1998 | 1999 | 2000 |
|------|------|------|------|------|
| 140 | 172 | 143 | 144 | 134 |

In 1997 we only had one student graduate. This student with 172 credits obtained her second degree in Chemistry. As can be seen in the plot of the Chemistry major (appendix I) it is easily possible to get a degree with the minimum of credits. Many of our majors do not start college intending on being Chemistry majors. Other students are transfers. Both of these situations lead to an excess of credits, especially considering the vertical integration of the major.

4. The average faculty workload is 17 contact hours per semester.

-This has been decreased to below 15 for the last 2.5 years.

5. The program is the only one among the comprehensive institution within the UW System that is not accredited by the American Chemical Society.

- See 2 E below. We think that we are close to becoming accredited.

6. The program lacks an inorganic chemist.

-See below (idem 1 under required actions)

7. Physical Chemistry may not be offered on an annual basis, impeding accreditation and student progress to degree.

Only once over the last six years has it not been offered.

8. Library holdings and periodical subscriptions are inadequate to support research initiatives and accreditation.

*- New on-line subscriptions make many journals (including **all** ACS journals) now available.*

9. There is a need for more multi-media classrooms.

- Room 237 and 126 have been remodeled. All the classrooms in the remodeling of Upham and the new addition will be multi-media.

10. The Physical Chemistry lab is outdated.

- The Physical Chemistry Laboratory was remodeled through laboratory modernization funds.

11. There is a shortage of adequate lab space for research.

- The remodeling of Upham will give adequate research space.

12. The automatic fire control system in a storage area is non-operative. *Still the case. Will be taken care of during laboratory modernization.*

Specific Actions Required:

1. Hire an inorganic chemist at the next opportunity, if possible.

Over the years the Department has submitted staffing plans to increase the number of faculty in the Department. The primary expertise requested has been an Inorganic Chemist.

2. Investigate the possibility of reducing the faculty workload to 12 contact hours per semester by May, 1999.

While the course load has not been reduced to the desired 12 contact hours, for the last four semesters the load has been less than 15 with an average load last spring of 12.9 contacts. The load for this fall and next spring will again be less than 15 contact hours.

3. Offer Physical Chemistry every year beginning in 1997-98.

Taught the last 3 years and 5 of the last 6.

4. Attain evaluation for accreditation by the American Chemical Society by May, 1998.

- See 2 E below. We think that we are close to becoming accredited.

5. Develop a plan for recruiting new majors from feeder high school in consultation with Enrollment Services by February, 1998.

The following plan was submitted to Lon Sherman in December 1997 who expressed his approval of the plan. We have been following the plan.

Recruitment and Retention of Chemistry Majors

A Plan

I. Recruitment:

A. Prospects.

i. Current efforts

a. Currently prospects are identified by their showing interest in Whitewater and the Admissions Office giving us their names. We write to these students mentioning the strengths of the major, the strong placement of our graduates and inviting these students to visit us.

b. Prospects will also visit us during "On Campus Days". A faculty member is always present to talk to these students and walk the students through the department.

c. Students who have been accepted receive a letter congratulating them welcoming them to the department.

d. The distance education project, where Science Technology in Society is taught to advanced High School students. This gives direct contact with quality students for recruiting not only for the Chemistry Department, but for the entire University.

ii. New initiatives

a. In the future we will write students, thanking them for visiting us and encouraging them to contact us if they have any questions.

b. Dr. Kumpaty has written an excellence proposal to obtain equipment so that faculty members can visit area chemistry

classes in high schools giving a talk where they will explain the advantages of a chemistry major. This was not funded.

c. The department is looking into the purchase of ACT Educational Opportunity Service(EOS) mailing lists. These lists contain students who have identified an interest in Chemistry. We could request student names from the surrounding counties and counties in northern Illinois.

d. We are working on enhancing our WEB page outlining opportunities for student research.

e. With the remodeling of Upham Hall, it is proposed that a computer controlled kiosk be installed in the lobby. This could be used by prospective students who may not take the time to visit the Department directly or by students already here to learn about the department.

f. A brochure will be developed expanding upon the Chemistry Department fact sheet. This brochure will tell prospects about the many instruments in the department and tell how students are involved in faculty research.

B. Recruitment of students already on campus.

In Freshman Chemistry we currently promote the Chemistry major. The instructor points out the many advantages of the Chemistry major: that Chemistry majors get good jobs with a bachelors degree or if they decide to go to graduate school they get paid while in graduate school. The instructor also points out that many preprofessional programs require more Chemistry than any other science. As a fall back position to the more difficult professional programs (i.e.. medicine), again, the chemistry major will get them a job upon graduating.

As an added initiative the Chair, at the beginning of the semester, will emphasize the above points in a classroom visitation.

Retention:

A number of freshman students who start out as chemistry majors fail to continue on this career path. The primary reason (also the primary reason for recruiting students in the first place) is the amount of mathematics required for the major. Calculus is a requirement for the

chemistry major regardless of where the chemistry major is earned. It would therefore be a disservice to the students to modify this requirement.

The following initiatives have been taken in an attempt to help our students be successful and thereby keep them as majors.

a. A welcome get together with all chemistry majors was held (and will be held) in September.

b. The majors are frequently contacted by their advisor via e-mail and encouraged to get help should they have problems. A special contact is made to students who received D-F slips. The students are encouraged to see not only their classroom instructor but also any other faculty member of the department.

c. Students are encouraged to take part in the Chemistry Club. By taking part in the Chemistry Club students can become acquainted with other chemistry students, learn how to write resumes, and learn about career paths and job opportunities.

d. Periodic informal meetings with chemistry majors are planned where the students can voice concerns or just get to know the faculty so that they can feel free to contact the faculty when they have problems.

6. Modernize the Physical Chemistry lab within the next three years?

This was done during the 1999-2000 academic year.

7. Formulate a college level plan for the routine replacement and repair of equipment by May, 1999.

8. Have the automatic fire control system in a storage area repaired by December, 1997.

9. Increase funds for Uncover/Reveal costs by July, 1998.

10. Increase the number of grant proposals being submitted in consultation with the Office of Research and Sponsored Programs to attain funding for faculty/program initiatives and needs (e.g. lab instruments, updating the Physical Chemistry lab, etc.) throughout the next five year period.

- see appendix F 3 for number of grants applied for.

11. Form, by May, 1998 an external advisory board for the program to help keep the curriculum current, develop partnerships and funding support for the program, acquire internship and employment opportunities for students, and, in general attain a comparative advantage for the program.

Not done.

12. Propose a new minor that will supplement and strengthen the biology major in consultation with the Physics and Biological Sciences Departments by December, 1997.

The Physical Science minor has one year of Physics and two years of Chemistry but does not require Quantitative Analysis. Not requiring Quantitative Analysis is troubling to the Chemistry Department. Quantitative Analysis is the course where many techniques used by anyone doing Chemistry or procedures related to Chemistry are learned. Many of these students will attempt to get jobs where these techniques are needed or need to interpret data obtained using the procedures learned in Quantitative Analysis.

E. Information Shared with Constituencies

1. Discuss how the assessment information has been shared with important constituencies, including students, staff, advisory boards, etc. In particular, indicate systematic efforts—e.g., regularly scheduled orientation meetings, departmental newsletters, etc.

Information is shared with the Department faculty, the College and the University through the Annual Report. Information is shared with students informally in classes, during exit interviews and through the Chemistry Club.

II. Strategic Purposes and Performance

A. Centrality

1. Describe the centrality of the program to the mission and strategic plan of the University of Wisconsin-Whitewater.

The major and minor programs in the liberal arts curriculum of the department are an integral part of the University's mission to provide "...a broad range of undergraduate programs and degrees in Letters and Sciences." The major, minor, and broad field science emphases in the secondary education curriculum of the department are integral parts of the teacher education mission. All of the department's stated program objectives contribute to that part of the unit mission "...to develop scientific, professional, and technological expertise toward the development of the human condition."

The Chemistry program is closely linked to the University strategic plan in that it provides: a curriculum serving career-oriented students, experiential opportunities integrating theory and practice, hands-on laboratories with current technology, quality teaching methodologies revised to maintain currency, support for scholarly activity by the faculty and staff, meaningful undergraduate research, and a commitment to seek qualified candidates for faculty and staff positions with cognizance of societal diversity characteristics.

2. Explain the relationship of the program to other programs at the University.

Several closely related professional and preprofessional programs exist which are heavily dependent upon the chemistry program for essential scientific background preparation. These

include biological sciences, physics, occupational safety, pre-engineering, pre-medicine, pre-dentistry, pre-veterinary medicine, pre-pharmacy, pre-chiropractic, and pre-optometry. Approximately seventy-five percent of the regular curricular offerings in the chemistry program are required courses in these professional and health science programs. An additional sixteen percent of these courses are so important to the career success of students enrolled in these programs that virtually all of these students consider them to be essential to the completion of their preprofessional preparation that they routinely enroll in these courses as electives. The new Physical Science minor has more required Chemistry courses than courses from any other department even though it is housed in the Physics department. The new Science-Business major is supported by the Department.

For students interested in a teaching career the Chemistry Department offers a Bachelor of Science in Education (BSE) with a Chemistry major and broadfield science major (BSE) with a Chemistry emphasis. In addition, Chemistry is an important component in other broadfield science emphasis areas.

Although the relationship is less close than those cited above, the chemistry program provides vital fundamental disciplinary background preparation for all students in the geology program. The chemistry program also contributes significantly to the breadth and strength of the Unit's overall General Studies effort by providing options at two levels for laboratory science study. The chemistry department is also integrally involved in the General Studies effort with the continued offering of the three credit, non-laboratory science, Science and Technology in Society course.

B. Goals and Objectives

1. Describe the current (non-assessment) goals and objectives of the program, plus any stated mission for the program itself. See 2 below and appendix G.
2. Summarize the progress in fulfilling any stated goals and objectives for the program beyond the assessment program. Explain failure to fulfill specific goals and objectives.

The goals of the Chemistry department and a brief statement on how they have been achieved are seen in the 2000 Annual Report (appendix G).

The overriding goal and objective of the Chemistry department is to provide quality instruction to students completing courses in this department. This includes students completing majors or minors in chemistry and also pre-professional students in medicine, pharmacy, chiropractic, dentistry, engineering, as well as Occupational Safety or Biology students who require a grounding in chemistry. Chemistry is unique among the disciplines within our University in the number of courses that are required by areas outside of Chemistry. All of the courses in the Chemistry curriculum, except for Physical Chemistry, are populated primarily by students who are not Chemistry majors. While our majors are very important to us, our primary concern is, and will continue to be, our entire student mix.

Our goals and objectives can be separated into the categories of teaching, research and service and the recruitment and nurturing of the faculty to carry out these functions. These categories will be discussed in section III below.

3. Describe how the program contributes to meeting specific state and societal needs.

A Department of Chemistry is included as an integral component of a campus “Minimum Module” (or core discipline) as presented by the University of Wisconsin system. Considering the total dependence upon chemistry of all life in general and that of humankind in particular, no other conclusion is possible.

It would be difficult to overemphasize the role of chemistry in modern society. Synthetic fibers and plastics, detergents and cosmetics, pharmaceuticals, food additives and preservatives, fertilizers, pesticides, high performance petroleum products, consumer electronics, paints and finishes are all highly visible examples of chemical impact on every day life.

Ironically, however, of lesser visibility to many is the real impact of chemistry. For every living organism, life is chemistry. Food digestion, metabolic processes, genetic processes, and all other life functions are chemical systems. We are unavoidably linked to chemistry. We **are** chemistry.

Much has been presented recently which describes biology as the basis for a new technological revolution (genetic engineering for example) that will have far-reaching social consequences. The evidence of this is apparent to scientist and non-scientist alike. Let it not be forgotten that the basis for much of “biology” is chemistry. (The Department of Biological Sciences recognizes this by requiring ten credits for all their majors and 16 credits for the Cell/Physiology emphasis.)

The need for chemical education is not limited to those few who will be professionally involved with chemistry per se. This is clearly a major theme in a 1996 report from the National Science Foundation in its review of undergraduate education entitled “*Shaping the Future; new expectation for Undergraduate Education in Science, Mathematics, Engineering and Technology*” where, in the executive summary, it is stated:

“America’s undergraduates - **all** of them - must attain a higher level of competence in science, mathematics, engineering and technology. America’s institutions of higher education must expect **all** students to learn more science, mathematics, engineering and technology, must no longer see study in these fields solely as narrow preparation for one specialized career, but must accept them as important to every student. America’s faculty must actively engage those students preparing to become K-12 teachers; technicians; ... and knowledgeable citizens.”

At Whitewater we have always attempted to do this with our major effort directed not only to students carrying majors in chemistry but, in a broader sense, with our general education course "Chemistry for the Consumer". More recently our commitment toward non-science majors has been demonstrated through substantial involvement in the course, Science and Technology in Society.

A National Research Council Committee issued a report of a study on the status and future impact of chemistry upon society as a whole. This study has been described as representing an unusually broad and deep consensus. A very small sample of the conclusions of the study are quoted here for purposes of illustrating the areas of chemical impact upon society as we move into the next century.

(1) Better health: "All life - processes - birth, growth, reproduction, aging, mutation, death - are manifestations of chemical change. Chemistry is now poised to clarify such complex processes at the molecular level."

(2) Biotechnology: "With its ability to deal with molecular complexity, chemistry can play its role in investigation and clarifying the molecular origins of the biological process." "Organic molecules of biological complexity can be structurally identified and precisely replicated; this opens the way to tailored biological function." "... progress in genetic engineering has been built upon basic chemical principles that determine the chemical structures and functional relationships between molecules and super molecules (proteins, DNA) within biological systems. Full realization of the potentialities of the projected new biotechnologies will increasingly depend upon molecular - level understandings."

(3) Materials: "Chemists will have a central position on the most dramatic frontier of materials science, the design of molecular - scale memory and electrical circuit devices."

In summary, to "Describe how the program contributes to meeting specific state and societal needs", the department is providing sound and rigorous professional, preprofessional, teacher training, and general studies programs which can insure that its students are, indeed, prepared to meet all of the cited expectations and take full advantage of all the opportunities presented by our ever changing society.

4. Explain any changes in goals and objectives that have occurred since the previous audit and review, indicating how the program has responded to the recommendations listed in the previous audit and review report. Refer to the Appendix C as necessary.

(See I. D. 2 above for how the Department has responded to the previous audit and review.)

The program objectives for the most part, are to provide the education and training in the basic fundamentals of the discipline. These have not sustained significant alteration. The continued emphasis on research and scholarly activity has continued as evidenced in the number of publications.

C. Trend Data

1. Respond to the following trend data for the program:

a. Number of students enrolled each fall for each of the past five years. (Data provided from the University's fact book.)

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CHEMISTRY MAJORS | 21 | 34 | 44 | 44 | 42 | 48 |
| CHEMICAL EDUCATION MAJORS | 3 | 4 | 4 | 5 | 3 | 8 |
| MINORS | 65 | 71 | 84 | 88 | 70 | 63 |

The number of majors (Chemistry + Chemistry Education) has increased from 24 to 56. The number of minors decreased last year probably due to the new Physical Science minor. There are 15 of these. Chemistry courses are at 100% subscription in the majority of the courses with many courses having a waiting list. The increase in majors and high number of minors has allowed for the offering of the upper division courses such as Advanced Organic, Advanced Inorganic, and Instrumental Analysis. See Appendix D1 for complete data.

b. Number of degrees granted each year for the past five years. (Data provided from the University's fact book.) 28 degrees have been earned over the last five years. This is somewhat more than what were earned in the previous five.

| 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|------|------|------|------|------|------|
| 6 | 1 | 3 | 2 | 10 | 6 |

c. Average number of total credits completed by those earning degrees for each year for each of the past five years if the program is an undergraduate major. (Data provided from the University's fact book.) Undergraduate majors with a consistent pattern of students graduating with more than 120 credits should provide an explanation of the program elements that require credit accumulation in excess of that number.

| | | | | |
|------|------|------|------|------|
| 1996 | 1997 | 1998 | 1999 | 2000 |
| 140 | 172 | 143 | 144 | 134 |

In 1997 we only had one student graduate. This student with 172 credits obtained her second degree in Chemistry. As can be seen in the plot of the Chemistry major (appendix I) it is easily possible to get a degree with the minimum of credits. Many of our majors do not start college intending on being Chemistry majors. Other students are transfers. Both of these situations lead to an excess of credits, especially considering the vertical integration of the major.

- d. Student placement information. (Data to be provided by the department/program.) Appendix D 2 lists the students and their job or graduate school location. While some who graduated in the spring may still be searching, almost 100% of the graduates get jobs or go to graduate school in some area of chemistry. During this period 57% have chosen industry, 29% graduate school, and 14% teaching. While many may brag about their students high GPA's (and we have many very good students), one student that we did not know would graduate because of a borderline average, immediately got a job after graduation.

(Attach trend data from the University's Fact Book as Appendix D.)

D. Demand for Graduates

1. Identify career opportunities available for graduates of the program. Placement statistics to be considered may include

- a. Acceptance into graduate programs and employment:
 _As is seen above (II. C. d.) We have no trouble placing graduates.
- b. Employment projections by the Bureau of Labor Statistics and/or state agencies; and/or
 From <http://stats.bls.gov/oco/ocos049.htm#outlook> "Employment of chemists is expected to grow about as fast as the average for all occupations through 2008. ... The chemical industry, the major employer of chemists, should face continued demand for goods such as new and better pharmaceuticals and personal care products, as well as more specialty chemicals designed to address specific problems or applications. To meet these demands, chemical firms will continue to devote money to research and development—through in-house teams or outside contractors—spurring employment growth of chemists. "
- c. Other indicators of employment trends.

The November 13, 2000 issue of *Chemical and Engineering News* has an article of the employment outlook for 2001. The lead to the article states "Chemical employers are recruiting 'aggressively' in a job market where demand is expected to exceed supply." One statement in the article says "Hiring for both B.S. and Ph.D. chemists is targeted to increase 50% in 2001 over 2000."

These optimistic projections were made before the current slow down, so it is not known how this will effect the chemical profession. (One of our June graduates was recently laid off.)

Students in the physical sciences and mathematics in general and Chemistry in particular appear to be in high demand as teachers. (Our majors generally earn a math minor so would be qualified to teach math also.)

E. Accreditation

1. Identify the role of program accreditation for employment of graduates or program continuation.

The liberal arts degrees in chemistry are accredited by the North Central Association. In addition, the department has been investigating accreditation by the American Chemical Society.

Accreditation of this department by the American Chemical Society would substantially strengthen the program in terms of its curriculum and faculty teaching load distribution and, in that respect, will strengthen the quality of our graduates. An accredited program represents quality to prospective students and will place our department among a select list of undergraduate chemistry departments which have national recognition. It should be noted that, with the exception of UW-Stout (which does not have a chemistry major), we are the only UW "cluster" campus which is not accredited by the American Chemical Society. Other nearby private institutions such as Beloit College, Carroll College, and Carthage College are accredited. A higher caliber of students and prospective employers will often make their decisions based upon whether or not a department has accreditation. While absolute numbers cannot be provided, some chemistry departments have estimated as much as a 20% increase in the number of majors after accreditation. Dean Ross has strongly urged our department to seek accreditation and has said he would give us his full support.

About six years ago the department asked the ACS what would be necessary to obtain approval. A number of concerns were expressed. (See letter in appendix E which includes the complete pre-accreditation self review.) The Department with the support of Dean Ross has essentially answered all the concerns expressed. A new application was submitted this year. The Committee reviewing the application was impressed on the progress that the Department has made. Their only expressed concern was the lack of sabbatical leaves. The American Chemical Society has requested an invitation for an on site visit. This should be forthcoming.

2. If accreditation is not required for graduates' employment or program continuation, but provides a competitive edge for the program, provide a brief explanation of the advantages of holding this accreditation. See above.

(Attach the most recent accreditation report as Appendix E if relevant.)

F. Location Advantage

1. Explain any advantage the program has due to the location of the University of Wisconsin-Whitewater and its access to opportunities and resources in the region.

The University is in an ideal location for faculty to travel to either UW-Madison or Milwaukee (UW-M or Marquette) to attend seminars or to use instruments unavailable in our department. UW-Madison has been particularly gracious in assisting our department in analyses requiring sophisticated instrumentation.

The Department has on occasion offered its services to local businesses and industry in terms of consulting. However, the current array of clientele are not amenable to extensive collaborative partnerships, as for example, in contracted research. The department continues to investigate possible partnerships as new businesses and industry come on the scene and is exploring student internship possibilities.

G. Comparative Advantage

1. Identify any unique features that set the program apart from other competing programs and/or elements that contribute to the program having a competitive edge. Factors to discuss may include:
 - a. The program's content or special emphases;
 - b. Its focus on a specific population;
 - c. The expertise of the faculty and staff in specific areas;
 - d. The availability of practicum or internship experiences; and/or
 - e. The lack of duplication of the program at other institutions in the University of Wisconsin System.

If compared to other campuses in the vicinity (Beloit, Carthage, and the UW campuses in Madison, Milwaukee, Oshkosh, and Parkside), our program does not have a competitive edge. A comparison to Madison and Milwaukee is inaccurate as their programs are on a higher tier and deal with larger student sections. In that respect, however, we do offer a very low faculty to student ratio. In fact, many students will rarely deal with a faculty member in the lower level courses at Madison or Milwaukee. The concern of the Chemistry department faculty for the student is commendable. Faculty have often received Blue Key and Greek recognition. While we are outranked by UW-Oshkosh and Beloit College in terms

of some instrumentation and facilities, we are comparable to UW-Parkside and Carthage College. The Chemistry department at UWW prides itself in the amount of hands-on experience students receive with the instrumentation. Gaining accreditation for our department would put us closer in line, and perhaps above, some of these institutions.

H. Community Impact

1. Discuss the impact that the program has on the community and/or region.
Factors to discuss may include:

- a. The involvement of students and/or faculty in the region;
- b. The utilization of the program by consumers (i.e., performances and/or services); and/or
- c. Support by regional constituencies.

Two faculty have regularly served as judges for the Fort Atkinson Science Fair. One faculty member has demonstrated a particular interest in bringing science contact to students in the elementary and middle school age group. In addition to participation in school science fair activities he has also made science presentations to schools in the Whitewater area and beyond as well as similar presentations to various youth organizations. The apparent success of these presentations is documented by his requested repeat performances. One faculty member took part in the Fairhaven lecture series. A faculty member for the last two years has led a Saturday Program for Young Scholars. Children from grades 4-6 investigated the exciting world of chemistry through fun-to-do- hands-on laboratory activities. Young scholars enhance their learning skills through observation and participation, as well as learn the importance of science by using several methods common to their everyday lives. Other Chemistry faculty assisted her in these classes. This faculty member has also gone to area schools to present chemical demonstrations.

I. Strategic Planning

1. Discuss potential revisions to the curriculum (e.g., the development of new academic emphases, new courses, etc.) that you foresee over the next review period in view of projected trends in employment and the development of new technologies, etc.

With the forthcoming (hopefully) approval by the ACS it will be necessary to submit an ACS approved track (see appendix E). The necessary additional courses have been added to the curriculum and successfully taught.

III. Resource Availability and Development

A. Faculty and Staff Characteristics

1. Discuss the characteristics of the faculty and staff responsible for the program. Factors to be discussed include levels of professional preparation; appropriateness of expertise to the needs of the program; unit cohesiveness in enhancing program quality; and success in meeting affirmative action goals.

The Department of Chemistry is composed of four tenured faculty, two tenure-track faculty and one and a half-time teaching academic staff. All have terminal degrees.

The specialty area competencies represented by the department faculty/staff constitute close to a complete spectrum of chemical expertise which includes analytical chemistry, biochemistry, organic chemistry, and physical chemistry. Our only weakness is the lack of an inorganic chemist. The Inorganic Chemistry course is taught by Dr. Han who routinely publishes in Inorganic Chemistry. As seen in part 3 below (p. 24), we would like the half time position to become a full time tenure track Inorganic position. In terms of disciplinary balance, the department is in an excellent position to meet its stated professional, preprofessional, and service objectives. This disciplinary balance, however, is tempered by the fact there is a "minimum mass" of personnel to meet the overall load demands of a lecture/laboratory program which is expected to fulfill the breadth of student curricular needs. The staffing "strain" is a direct result of the laboratory nature of the program where close safety supervision and technique supervision are critical.

The department faculty constitute a group of highly student oriented instructors. Formal unit recognition has been received *via* the Roseman award given to Edward Drexler. Students in Analytical Chemistry have consistently scored at or above national norms on national standardized examinations written by the American Chemical Society. While not detracting from obstacles faced by areas outside of the physical sciences, a combination of circumstances exist, without parallel, for university chemistry faculty in general, and those in this unit in particular, to maintain a contemporary program. The time intensive nature of the laboratory responsibilities that are a fundamental ingredient of the entire curricular program cannot be underestimated. Chemistry is a rapidly changing science which requires an extraordinary amount of faculty effort to maintain the facilities, to implement new technology, and to incorporate advances into the lecture and laboratory.

Department faculty are significantly involved in service activities both to the University and to the community. In addition to advising Chemistry majors (both L & S and Education) faculty are responsible for advising in pre-professional programs such as chiropractic and pharmacy and Science Business majors. External activities have included judging at science fairs, consultation with pre-secondary school teachers, consultation with representatives from industry, and chemical demonstrations for schools and organizations such as the Girl Scouts. University service has included representation on the L & S Curriculum Committee, General Education Review Committee, Graduate Council, Faculty Budget Committee, L & S Individually Designed Major Committee (Chair), L&S Microcomputer Advisory Committee, Institutional Animal Care and Use Committee, Women in Science Advisory Board, Food Service Advisory Committee, African-American Educators, University Promotions Committee, and the University Curriculum Committee.

The faculty have been actively engaged in professional development through faculty and student research, presentations at meetings of the American Chemical Society, presentations at undergraduate research symposia, and publications in refereed journals. This scholarly activity is invariably carried out with students. During this time period eighteen (18) refereed publications and over 100 presentations at local, regional, national, and international meetings have been given (see Appendix F2 for a complete list of publications and presentations). Faculty have attended over 50 conferences and seminars concerning new instrumentation and techniques (see appendix F4 for a list of workshops seminars and conferences).

This department has met affirmative action goals in its hiring practices.

2. Indicate the courses in the curriculum for which each faculty and staff member is responsible.

| Course | Lecture or Laboratory | Instructor(s) |
|-----------------------------------|-----------------------|--|
| Science and Technology in Society | Lecture | Edward Drexler and Kathryn Asala |
| Consumer Chemistry (100) | Lecture | Edward Drexler coordinates, although this course is team taught and most faculty have taught |
| | Laboratory | Hassimi Traore coordinates and all have taught |
| Introductory Chemistry (102) | Lecture | Baocheng Han, Philip Johns, Kathryn Asala, and Hassimi Traore |
| | Laboratory | Baocheng Han coordinates and all have taught |
| Introductory Chemistry (104) | Lecture | Edward Drexler and Hassimi Traore |
| | Laboratory | Edward Drexler, Hassimi Traore, Kathryn Asala |
| Organic Chemistry (251 & 252) | Lecture | Steven Anderson and Hephzibah Kumpaty |
| Organic Chemistry Lab (261 & 262) | Laboratory | Steven Anderson, Hephzibah Kumpaty, and Philip Johns |
| Quantitative Analysis (352) | Lecture | Baocheng Han |
| | Laboratory | Baocheng Han |
| Physical Chemistry (370 & 371) | Lecture | Hassimi Traore |
| Physical Chemistry (470 & 471) | Laboratory | Hassimi Traore |
| Advanced Organic (455) | Lecture | Steven Anderson and Hephzibah Kumpaty |
| Biochemistry (456) | Lecture | Philip Johns |

| | | |
|------------------------------|---------------|--|
| Advanced Inorganic Chemistry | Lecture & Lab | Baocheng Han |
| Instrumental Analysis (480) | Lecture & Lab | Baocheng Han |
| Independent Study (498) | Laboratory | Baocheng Han, Steven Anderson, Hephzibah Kumpaty, and Hassimi Traore |

3. Identify anticipated staffing changes or areas of need, and the projected impact of these changes and needs on the program.

(See appendix H for the complete staffing plan)

a. The department is losing Dr. Edward Drexler in the spring to retirement. He is a Roseman winner and irreplaceable. We have been given approval to search for his position. The primary instructional responsibility of this individual will be to teach 104 therefore, the expertise will be Analytical Chemistry. A person with this expertise should also be interested in Environmental Chemistry, in part to facilitate a link to the new Environmental Studies major. We also want this individual to be involved in educational research and outreach.

b. The second area of concern is Inorganic Chemistry. This is the one area of Chemistry where we have no one with a degree. We are proposing that the half time position be converted to full time.

c. The third area of concern is Biochemistry. While the Chair is a Biochemist and teaches that course, administrative concerns and a departmental need for additional Organic expertise has prevented him from being actively engaged in Biochemical research. The Department therefore would like to hire a Biochemist who would collaborate with the Biological Sciences Department.

Overall the Department is minimally staffed. This has been made abundantly clear when one observes the lack of sabbatical leaves. Under normal circumstances it is incumbent upon the department to cover a faculty member's load by combining sections, not offering the courses, or having other faculty teach overloads. The Chemistry department can not combine sections more than it has already done. The lecture of Chemistry 102 has 140 students. The laboratory sections are at the maximum allowed for safety. Since the majority of the Chemistry curriculum is service courses, failure to offer a course would not only affect Chemistry but other curricula as well. Biological Sciences has often asked that additional sections be offered. One of the primary reasons that ACS accreditation was not forthcoming was the very large contact loads that the Department had. We have finally gotten the loads to below 15 contact hours (the ACS would like 12 contact hours), so overloads are not an option.

The staffing of sabbaticals from within a department is the *official* University policy. Dean Ross has indicated that in special cases he would fund and has funded replacement faculty to allow for sabbatical leaves. He has said that the Chemistry Department should afford themselves of this.

(Attach a table of faculty and staff as Appendix F.)

B. Teaching and Learning Enhancement

1. Summarize faculty and staff activities in the areas of teaching and learning enhancement since the previous audit and review. Factors to discuss may include:
 - a. Participation in on-campus and off-campus teaching enhancement activities;
The department has been very active in these activities attending over 50. See Appendix F4 for a complete list of workshops attended.
 - b. Involvement in academic advising and efforts to maintain or improve advising performance;

P. Johns and H. Traore have been the Chemistry Department's Master Advisor. They attend Master Advisor's meetings to learn about any changes in the curriculum, which are communicated to the faculty. They also talked to prospective students during on campus days and conducted tours of the Department. P. Johns attended an advising workshop in August 2000 presented by Deb Heiber.

All faculty are involved in advising, not only Chemistry majors and Chemistry Education majors, but also, pre pharmacy and pre chiropractic majors. The faculty has for many years required that student advisees visit with their advisor.

S. Anderson placed his prechiropractic advising information on the pre-professional web site maintained by Ken Menningen. The information includes hot links to chiropractic colleges and other web sites with chiropractic information.

S. Anderson has arranged for admission counselors from three chiropractic schools to come and visit with students every year.

H. Kumpaty arranged for an advisor from the School of Pharmacy in Madison to come and visit with students. This was done every year.

H. Kumpaty attended an advising workshop in October 2000 presented by Deb Heiber.

B. Han attended the academic advising Workshop, August, 1998 (UWW).

S. Anderson and H. Traore attended an L & S Master Advisors Workshop (8/12-14/96)

- c. Work with undergraduate students on research projects;
The faculty have been very active in working with undergraduates on research. See also Appendix F-2 for the publications which resulted from this research.

| 2001-2002 | Instructor | Students | Project |
|------------------|-------------------|---|---|
| | Steven Anderson | Nicholas Liebrecht and Cara Walloch | Projects in photochemistry and mass spectrometry |
| | Baocheng Han | Kim Kutz and Angela Schwarten | studying the synthesis and characterization of dirhodium and diruthenium complexes. |
| | Hephzibah Kumpaty | Christina Otto and Akua Oduro | Organic synthesis using a microwave and part of the reductive amination |
| | Hassimi Traore | Daisy Enoch, Nikki Ngugen and Derrick Rowe | project related to cannabinoid research |
| 2000-2001 | Instructor | Students | Project |
| | Steven Anderson | Nicholas Liebrecht and Katherine Fadroski | Projects in photochemistry and mass spectrometry |
| | Baocheng Han | Kim Kutz and Angela Schwarten | studying the synthesis and characterization of dirhodium and diruthenium complexes. |
| | Hephzibah Kumpaty | Amelia M. Gonazalez and Akua K.Oduro | Organic synthesis using a microwave and part of the reductive amination |
| | Hassimi Traore | with Christa Laatsch, Mark Dantuma, David Gronquist and Roberto Vondrak | project related to cannabinoid research |
| 1999-2000 | Instructor | Students | Project |
| | Steven Anderson | Michelle Tjugum and Angela Masino | organic mass spectrometry and sulfonium salt photoinitiators |
| | Baocheng Han | Dori Lewis and Kim Kutz | studied the synthesis and characterization of dirhodium and diruthenium complexes |
| | Hephzibah Kumpaty | Eric W. Rehr, Jennifer A. Reige, Amelia M. Gonazalez | Organic synthesis using a microwave and part of the reductive amination |
| | Hassimi Traore | with Scott Blasiman, Mike Saunders and Jeremy Hilgendorf | project related to cannabinoid research |
| 1998-1999 | Instructor | Students | Project |
| | Steven Anderson | Megan Ruenz and Aude Ada Nguema | Photoinitiators for Cationic Polymerization and New Probes of Solvent Effects |
| | Baocheng Han | Dori Lewis | Synthesis and characterization of dimetal complexes |
| | Hephzibah | Mike Rutlin and | Microscale organic synthesis |

| | | | |
|------------------|-------------------|--|---|
| | Kumpaty | Matt Christiansen | using a microwave in undergraduate organic laboratory and the synthesis of 4, 5-substituted bipyridines via microwave assisted palladium catalyzed cross-coupling reactions |
| | Hassimi Traore | Scott Blasiman, Tom Loomis, Scott Fisher, and Amanda Pruefer | |
| 1997-1998 | Instructor | Students | Project |
| | Steven Anderson | Megan Ruenz and Daniel Anderson | |
| | Baocheng Han | Nazgi Nyakirangani | |
| | Hassimi Traore | Dori Lewis | project entitled "An Improved Apparatus For Determining Vapor Liquid Equilibrium" as part of the UW-W Honors Program. |
| | Hassimi Traore | Jeremy Stangel | |
| 1996-1997 | Instructor | Students | Project |
| | Steven Anderson | Megan Ruenz and Daniel Anderson | |
| | Baocheng Han | Nazgi Nyakirangani | |
| | Hassimi Traore | Jeremy Stangel | |

d. Initiatives in student-learning based outcomes;

e. New course development; and/or

The Department developed Advanced Inorganic Chemistry which was successfully taught and is now part of the regular departmental offerings.

f. Involvement with interdisciplinary course development and/or delivery.

The Department is very involved in the delivery of Science and Technology in Society. This very needed course was a part of the Core. The lack of higher administrative support of the Core made it necessary to trim the offerings. Unfortunately STS was cut from the Core. We are continuing to offer this course as a General Studies (GM) elective.

Through the efforts of Dr. Anderson the Department is involved in the development and delivery of the new Integrated Science Business major. He is the new Program Coordinator for the major.

(Include in the table of faculty and staff in Appendix F.)

C. Research and Other Scholarly/Creative Activities

1. Summarize the research and other scholarly/creative activities of the faculty and staff since the previous audit and review. Delineate participation in professional meetings, exhibits, performances, presentations and publications as means of presenting original basic and applied research initiatives.

18 refereed publications and over 100 presentations were given.

For participation with students see section B. c. above. Otherwise see Appendix F2 for a list of Publications and Presentations at meetings and F3 for grants.

(Include in the table of faculty and staff in Appendix F.)

D. External Funding

1. Summarize the efforts and successes of the program to generate funding through grants, contracts and/or gifts. Indicate sources, requested dollar amounts, and current status of such requests.

The department has been very active in applying for and has been successful in receiving grants. Over 25 proposals have been written; one resulted in the \$82,000 NSF-CCLI grant. Numerous (over 100) other proposals to fund student research were also written and funded.

See Appendix F3 for a list of all the grants.

(Include in the table of faculty and staff in Appendix F.)

E. Professional and Public Service

1. Summarize the professional and public service activities of the faculty and staff since the previous audit and review. Discuss such activities as:
 - a. Service involvement in professional organizations at state, regional, national, or international levels;

The faculty are members of scientific organizations such and the ACS, and AAAS. Two members have reviewed NSF proposals. One member is on the ACS examination writing committee. Members have attended and given papers at regional, national, and international meetings.
 - b. Editing or reviewing for professional publications within the discipline;

One member has been a manuscript reviewer for the Journal of Chemical Education. Members have also reviewed Chemistry texts.
 - c. Non-compensated consulting or intervention activities related to the discipline; and

Department members have been available to consult concerning chemistry. There have been many consultations with school teachers and with industry.
 - d. Roles and memberships in university, college and departmental committees.

This last year faculty were members on 25 university committees and 12 college committees. The Department tends to function as a committee of the whole. Faculty served on such committees and Faculty Senate, the University Curriculum Committee and Audit and Review Committee. In recognition of his service, one member received the L&S Service Award.

The large amount of service by the department to the College, University, profession, and community is compiled in Appendix F5.

(Include in the table of faculty and staff in Appendix F.)

F. Resources for Students in the Program

1. Discuss the number of students in the program in relation to the resources available to the program. Factors which may be analyzed include:
 - a. The number of students per faculty member; and

| | | | | |
|------|------|------|------|------|
| 1996 | 1997 | 1998 | 1999 | 2000 |
| 405 | 335 | 240 | 311 | 275 |

Not included in these numbers is the Department's effort in the STS course. Also, the significant involvement in student research (Independent Study - 498) is not included.

SCH/FTE during this five year period falls from 405 to 275. This is due to the conscious effort to decrease the very large contact load of 17 contact hours for each faculty in 1995 (the largest in the College). This was done with the recommendation of the Audit and Review Committee. The SCH/FTE is not as low as reported above since none of the STS sections are included. Some semesters the Department taught as many as 10 sections of this important course. Since the contact hour load has decreased to below 15, the Department can apply for ACS approval.

SCH/FTE for the sciences in general and Chemistry in particular is a meaningless number. Our laboratory sections can safely accommodate only 15 to 20 students. In some of the higher level courses such as Physical Chemistry, availability of expensive specialized equipment limits section sizes even further. Our courses are generally fully subscribed often with waiting lists.

- b. The amount budgeted to student help, capital, supplies/services, etc.

Student help comes only from work study. We have been fortunate to get funds from this source however, students with work study monies have become less willing to work in the Chemistry stockroom. The Department will need to pay students through regular pay. The Dean has graciously agreed to assist the Department if this adversely affects our budget.

Our equipment situation can be described as being in good shape, although some of the major equipment is starting to age. Over the time period in question the

Department received \$80,000 to upgrade the Physical Chemistry Laboratory, the 25 + year old Atomic Absorption Spectrometer was replaced, and many smaller pieces of equipment and computers were replaced. Also through an NSF grant written by Hassimi Traore and SGI computer laboratory was installed for molecular modeling. Steven Anderson and Hephzibah Kumpany will be writing an NSF-CCLI grant to secure a new high field NMR spectrometer. This proposal is due in June 2002.

Services and Supplies budgets have been adequate.

G. Facilities, Equipment, and Library Holdings

1. Discuss the adequacy of the facilities, equipment and library holdings available for the purposes of supporting a high quality program. Identify any deficiencies and describe plans to remedy them.

With our library being part of a University wide consortium, all ACS journals are available either in hard copy or on line. The Library is converting to online to save shelf space and most access the journals this way. *Chemical Abstracts* is available through STN and the yearly allowance of about \$200 for searches has been adequate to date. We have access to the Beilstein Crossfire database via computer link to UW- Madison. In sum, our resources are quite sufficient for general purposes.

Appendices

The following appendices must be included as attachments to the self-study:

Appendix A: Program APR(s) (Purple)

Appendix B: List Linking Courses to Assessment Objectives (Orange)

Appendix C: Audit and Review Evaluation Report from Last Review (Ivory)

Appendix D: Trend Data included from the University's Fact Book (Pink)

D1 Data

D2 Graduation and Placement

Appendix E: Accreditation Report (if relevant) (White)

Appendix F: Table of Faculty and Staff (Blue)

F1 Faculty and Staff Characteristics

F2 Publications

F3 Grant Proposals

F4 Workshops

F5 Service

Appendix G. Goals from the Annual Report (Yellow)

Appendix H. Staffing Plan (Green)

Appendix I. Plot of major Grey)

Copies needed

- 1 complete package to the department
- 1 complete package to the Dean's Office
- 9 complete packages for Undergraduate Programs (13 for Graduate Programs) to:

Richard Telfer, Associate Vice Chancellor

Hyer Hall - Room 420

No later than October 15, 2000