COMPLIANCE WITH GRADUATE PROGRAM OBJECTIVES

Program Name: Master of Science in Chemistry  
College: Fairmount College of Liberal Arts and Sciences, Wichita State University  
Campus Box: 51  
Dated: December, 2007

MISSION STATEMENT

The mission of the Department of Chemistry pertaining to the M.S. degree, a strong research-oriented degree that has been offered since 1930, involves the training of students in the art and logic of research and imparting an advanced understanding of the discipline of chemistry. The constituents are the students in the M.S. program. This mission is accomplished by offering a wide range of up-to-date and rigorous courses encompassing six areas of chemistry and requiring a thesis based on original research so that these students will be prepared for research in industry or in government laboratories, for teaching in high schools and community colleges, as well as for placement in a Ph.D. program.

COMPLIANCE WITH SPECIFIC PROGRAM OBJECTIVES

The graduate affairs committee has been tasked with the evaluation of specific program objectives on a yearly basis. If a specific program objective has not been met, the graduate affairs committee is further tasked with the determination of a course of action that, if approved by the chair and faculty after consultation and modification, will be implemented to alleviate the situation. The GAC will meet in November to consider the assessment report and recommend changes in the program to better meet our program objectives.

Many program objectives are addressed using data from the 2006 calendar year. The remainder are addressed using data from the 2006-2007 academic year. Objectives are abstracted from the current Graduate Program Assessment document.
COMPLIANCE WITH GRADUATE PROGRAM OBJECTIVES

Graduate Students

I “(We will) strive to enroll a total number of M.S. students such that there is an average of 1 student per faculty member. At present, the department has 11 faculty members active in research; the objective is therefore approximately 11 graduate students working towards the M.S. degree”.

According to official University sources, 9 chemistry M.S. graduate students were enrolled with the department in the Fall 2006 semester and 9 such students were enrolled in the Spring 2007 semester. As such, it would appear that the Chemistry Department has not met this goal during the 2006-2007 academic year.

II “(We will) strive to graduate 1 student per year, and admit approximately the same number of new students in order to maintain the total number of students at the level mentioned in I (above)”.

According to official University sources, 1 M.S. degree in chemistry was conferred during the 2006-2007 academic year. As such, it would appear that the Chemistry Department has met this goal during the 2006-2007 academic year.

III “New students should be exceptionally qualified in order to ensure that at least 90 percent of them will successfully graduate with the degree”.

The quality of students who are admitted is addressed through their GPA which must be 3.00 or above, their background of preparation in the field, and two letters of recommendation. For international students, the TOEFL must be taken and a score of at least 550 (paper-based test) must be achieved. In addition, those students who will be teaching assistants in undergraduate laboratory classes must exhibit proficiency in spoken English by obtaining a score of at least 50 on the Test of Spoken English (TSE)/SPEAK.

A quantitative measure of the proficiency of the incoming graduate students in undergraduate chemistry is made also through evaluation of performance in the mandatory qualifying exams given to incoming graduate students. Five qualifier exams are given (Organic, Inorganic, Analytical, Physical, and Biochemistry) to assess competence in undergraduate
COMPLIANCE WITH GRADUATE PROGRAM OBJECTIVES

chemistry. The student must pass 4 of the 5 qualifier exams in a maximum of 3 sittings during the first year in the program or the student will be expelled from the program. The qualifier exams are, therefore, used as a tool to verify that competence in undergraduate chemistry, as detailed in the prior undergraduate transcript is reflective of the student’s true preparedness for graduate coursework and research.

Over the 2006-2007 period, the performance of 3 M.S. students was judged to be acceptable in that they passed all required qualifiers. In contrast, 0 M.S. students were judged unacceptable using this metric. The M.S. Program appears to have met this performance objective over the 2006 – 2007 academic year.

IV “(We will) strive to achieve an 85% placement rate for our students in their field within the first year after graduation. Positions available to these students include teaching at two- and four-year colleges, postdoctoral research at universities and government laboratories, and permanent positions at government and industrial laboratories”.

The 1 MS student who graduated in 2006 - 2007 was placed as follows …

Yang, Qingliang  M.S. 12-2006  Research Scientist
Albany Molecular Sciences
Albany, New York

Because 1 of the 1 students were placed appropriately, it would appear that the Chemistry Department has met this goal during the 2006 – 2007 academic year.
Faculty/Graduate Student Productivity

V “(We will strive to produce) an average of 1-2 peer-reviewed publications per year per faculty member with graduate students as co-authors”

Perusal of 2005 Faculty Activity Reports identified around 28 peer reviewed publications attributable to Chemistry Department Faculty members and their graduate students, cross referenced to avoid duplication (below). As such, it would appear that the Chemistry Department has met this goal during the 2005 calendar year.

VI “(We will strive to produce) an average of 1-2 presentations at meetings, etc., per year per faculty member (with graduate students as co-authors)”

Perusal of 2005 Faculty Activity Reports identified around 59 presentations attributable to Chemistry Department Faculty members and their graduate students, cross referenced to avoid duplication. As such, it would appear that the Chemistry Department has met this goal during the 2005 calendar year.

VII “(We will strive to obtain) external funding by faculty members in the form of grants and contracts from federal agencies and private foundations”.

The Chemistry Department believes that the current level of external funding (~$5,000,000.00) meets this requirement. Item VII is especially important in that it speaks to other spillover items, for example…

(i) Commitment to funding graduate student GRA stipends
(ii) Commitment to providing supplies, disposables, chemicals, small equipment, purchase of external research services, etc… for graduate students
(iii) Commitment to the purchase and maintenance of large equipment through direct allocation of funds and through generation of research overhead that can be applied to this end.
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2006 Faculty Publications


(4). Hill, Jonathan P.; Schumacher, Amy Lea; D’Souza, Francis; Labuta, Jan; Redshaw, Carl; Elsegood, Mark R. J.; Aoyagi, Masaru; Nakanishi, Takashi; Ariga, Katsuhiko. ‘Chromogenic Indicator for Anion Reporting Based on an N-Substituted Oxoporphyrinogen.’ Inorganic Chemistry, 2006, 45.


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(37). **Zandler, M. E.; D'Souza, F.** “The Remarkable Ability of B3LYP/3-21G(*) Calculations to Describe Geometry, Spectral and Electrochemical Properties of Molecular and Supramolecular Porphyrin-Fullerene Conjugates” *Comptes Rendus Chimie* 2006, 9, 960-981 (Review article summarizing computational results)

(38). Deviprasad, G. R.; Smith, P. M.; **Zandler, M. E.; Rogers, L. M.; D'Souza, F.** “Fluorophores(s) Appended Fullerene Dyads and Triads for Probing Photoinduced Energy Transfer: Syntheses, Electronic Structure, and Fluorescence Studies” *Photosynthesis Research* 2006, 87, 105-114


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CHEMISTRY DEPARTMENT–2006 funding from Faculty/ORA

Bann, J. ACS/PRF Generation of a Protein Based Flourescent Reactive Oxygen Species Sensor 4/01/05 – 8/31/07 $35,000

Bann, J. NIH/Washinton U MRCE for Biodefense and Emerging Infectious Diseases 3/01/05 – 2/28/07 $100,000

Bann, J. COBRE Structure and Mechanism of CS1 Pilus Assembly. 6/01/05 – 7/31/07 $100,000

Burns, D. NIH/Iowa PRCE Selective Membrane Receptors for Antibiotic Use 2/01/05 – 8/30/06 $60,000

Burns, D. Spirit Aerosystems Stevenson, W. Molecular Recognition 8/01/05 – 8/30/07 $102,200

Burns, D. Spirit Aerosystems Stevenson, W. Phthalonitrile Resin 8/01/05 – 8/30/07 $124,100

D’Souza, F. NSF Supramolecular Nano Structures for Light Driven Energy and Electron Transfer 6/01/05 – 5/31/08 $330,000

D’Souza, F. ACS/PRF Studies on Supramolecular Porphyrin, Fullerene and Functionalized Carbon Nanotubes 5/01/04 – 8/31/06 $88,000
## COMPLIANCE WITH GRADUATE PROGRAM OBJECTIVES

<table>
<thead>
<tr>
<th>Name</th>
<th>Funding Body</th>
<th>Project Description</th>
<th>Start Date</th>
<th>End Date</th>
<th>Amount</th>
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<td>D’Souza, F.</td>
<td>West Foundation</td>
<td>Design and Studies of Tumor Specific Porphyrins for Photodynamic Therapy of Cancer</td>
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<td>9/30/06</td>
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<td>6/30/07</td>
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<td>Purchase of a Single Crystal X-Ray Diffractometer</td>
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<td>8/31/07</td>
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<td>8/15/06</td>
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<td>Methods for the Evaluation of the Fitness of Fiber Reinforced Composite Surfaces for Subsequent Adhesive Bonding</td>
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<td>9/14/07</td>
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<td>Composition, Reactivity and Cure Kinetics of Prepreg</td>
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<td>3/31/07</td>
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<td>B52 Integral Fuel Tank Polymer Failure Cause EA 02-B52-027B, Phase III</td>
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<td>3/31/07</td>
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<td>VanStipdonk, M.</td>
<td>NSF</td>
<td>Advancing MS for Peptide/Protein Sequencing</td>
<td>3/01/03</td>
<td>2/29/08</td>
<td>$462,000</td>
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Wimalasena, K.  NSF EPSCoR/KTEC
Purchase of a Rapid Scan Spectrophotometer with Stopped Flow Capabilities
8/01/05 – 3/01/06  $180,670

Wimalasena, K.  West Foundation
Vitamin C (Ascorbic Acid) Derived Anti-tumor Agents
10/01/06 – 9/30/07  $14,823

TOTAL  …………….~$5,000,000

Infrastructure that Supports the Program

VIII “Modern chemical research requires access to specialized instrumentation. The department must possess state-of-the-art instrumentation necessary for its faculty and graduate students to carry out their research efforts”.

Our commitment to the acquisition and maintenance of specialized research instrumentation may be judged partly in terms of our successful efforts to obtain external funding for instrumentation.

Currently funded successful external equipment proposals instigated by Chemistry faculty, PI only, CoI’s omitted

Wimalasena, K.  NSF EPSCoR/KTEC
Purchase of a Rapid Scan Spectrophotometer with Stopped Flow Capabilities
6/01/05 – 5/30/06  $180,670

Eichhorn, D.  NSF EPSCoR Purchase of a Single Crystal X-Ray Diffractometer
6/01/05 – 5/31/06  $285,645

Stevenson, W  Purchase of research grade near IR spectrometer – from the grant “Methods for the Evaluation of the Fitness of Fiber Reinforced Composite Surfaces for Subsequent Adhesive Bonding”
9/15/04 – 9/14/07  $70,000

Total  $536,315
COMPLIANCE WITH GRADUATE PROGRAM OBJECTIVES

IX “This instrumentation must be continually maintained such that extensive periods of downtime do not retard research efforts. Support must be provided for the training of students to use the instruments and for assisting students in their use”

This objective has been met by employing a full time PhD level instrument manager dedicated to the support and maintenance of major departmental instrumentation, and to the training of graduate students in the use of said equipment.

X “The department should provide financial support to individual faculty researchers for purchase of materials in order to supplement external funding and to provide for continuity in periods between external grants. Such support ensures that a graduate student’s thesis research can continue unencumbered”.

The department supplies each faculty member with a research allocation to be used to purchase chemicals, small equipment, supplies, etc. The department subsidizes research also by providing free liquid nitrogen, dry ice, compressed gases, office supplies for research, etc.

C. EDUCATIONAL STUDENT OUTCOMES

XI “Students will obtain an advanced level of knowledge over a range of disciplines within chemistry, with exposure to four of the six divisions (analytical, inorganic, organic, physical, polymer and biochemistry)”.

Students are required to complete courses in four of the six divisions (analytical, inorganic, organic, physical, polymer and biochemistry) prior to graduation. Students are made aware of this educational requirement through the MS program document. Compliance is monitored through scrutiny and acceptance/rejection of the plan of study document.

1 M.S. student graduated in 2006-2007. Of these students 1 completed all course requirements, while 0 did not. The Chemistry Department would appear to have met this goal over the 2006-2007 academic year.
COMPLIANCE WITH GRADUATE PROGRAM OBJECTIVES

XII “The student will demonstrate the ability to complete independent research, and critically analyze experimental results”

Demonstration of these outcomes is represented in the student’s grade for the Chem 890 Research class required of all MS students. During the 2006-2007 academic year, a cumulative total of 34 hours of Chem 890 were graded as satisfactory. In contrast, 0 hours were graded as unsatisfactory or incomplete. The Chemistry Department would appear to have met this goal over the 2006-2007 academic year.

XIII “Students will demonstrate their ability to critically evaluate their own work and that of others, including literature reports”

and

XIV “Students will demonstrate their ability to present the results of their research orally”.

If the student is enrolled in the terminal thesis option Masters program, the student’s research will be presented informally in seminar class (Chem 700) then formally during the thesis defense before a committee consisting of 4 members of the graduate faculty from the chemistry department, including the student’s research advisor, and one member of the graduate faculty from outside the chemistry department. In addition, competence in research is certified through scrutiny and approval/rejection of the thesis document itself by the research committee. A student who does not meet the standards laid down by the committee at any stage of the proceedings will need to schedule to repeat the endeavor before the committee.

During the 2006-2007 academic year 1 M.S students was graded acceptable in Chem 700. 0 students were graded unacceptable in Chem 700. The Chemistry Department would appear to have met this goal over the 2006-2007 academic year.

In addition, competence in research is certified via oral defense of the students work. If the student is enrolled in the non-thesis Masters program en route to the Ph.D. degree in the Chemistry department, this defense of the student’s research will be conducted during the second enrollment in Seminar class (Chem 700) before a committee consisting of 4 members of the graduate faculty from the chemistry department, including the student’s research advisor, and
COMPLIANCE WITH GRADUATE PROGRAM OBJECTIVES

one member of the graduate faculty from outside the chemistry department. The committee must pass the student in this grading instrument before the M.S. degree will be awarded.

During the 2006-2007 academic year 1 M.S. student was graded acceptable in their oral defense. 0 M.S. students were graded as unacceptable in their oral defense. The Chemistry Department would appear to have met this goal over the 2006-2007 academic year.

During the 2006-2007 academic year, 1 M.S. student was graded acceptable in their preparation of the written thesis. 0 M.S. students were graded as unacceptable in their preparation of the written thesis. The Chemistry Department would appear to have met this goal over the 2006-2007 academic year.

XV “Students will gain familiarity with the breadth of chemistry research being conducted outside of Wichita State University”.

This outcome is assessed by the assignment of a passing grade in Chem 701, the chemistry colloquium, in which students are required to attend weekly seminars by invited speakers from other universities and industrial and governmental labs. M.S. students must enroll in Chem 701 every semester of attendance in the program.

During the 2006-2007 academic year, 10 M.S. students were graded acceptable in Chem 701 – 5 in the Fall 2006 semester and 5 in the Spring 2007 semester. In total, 0 students were graded unacceptable in Chem 701. The Chemistry Department would appear to have met this goal over the 2006-2007 academic year.

XVI “Students will demonstrate their familiarity with the advanced instrumentation required for modern chemical research”.

Before a student is allowed to utilize advanced instrumentation in the chemistry department, said student must be certified as competent by the instrumentation manager, after a short course given to the student followed by an evaluation of the acquired skills by the instrumentation manager, before a user account will be created in their name for said instrument. A student who does not meet minimum requirements of competency must repeat the process.
COMPLIANCE WITH GRADUATE PROGRAM OBJECTIVES

XVII “Each student will demonstrate the ability to conceive and defend an independent research project, which is a vital skill for an independent investigator in the academic or industrial environment”.

Competence in research, is certified via oral defense of the students work. If the student is enrolled in the non thesis Masters program en route to the Ph.D. degree in the Chemistry department, this defense of the student’s research will be conducted during the second enrollment in Seminar class (Chem 700) before a committee consisting of 4 members of the graduate faculty from the chemistry department, including the student’s research advisor, and one member of the graduate faculty from outside the chemistry department. The committee must pass the student in this grading instrument before the M.S. degree will be awarded. During the 2006-2007 academic year, 1 student was graded acceptable in Chem 700. 0 students were graded unacceptable in Chem 700. The Chemistry Department would appear to have met this goal over the 2006-2007 academic year.

If the student is enrolled in the terminal thesis option Masters program, the student’s research will be presented informally in seminar class (Chem 700) then formally during the thesis defense before a committee consisting of 4 members of the graduate faculty from the chemistry department, including the student’s research advisor, and one member of the graduate faculty from outside the chemistry department. A student who does not meet the standards laid down by the committee will need to schedule to repeat the endeavor before the committee. During the 2006-2007 academic year, 1 student was graded acceptable in their oral defense. 0 students were graded as unacceptable in their oral defense. The Chemistry Department would appear to have met this goal over the 2006-2007 academic year.

Submitted by Dr. William Groutas on behalf of the Graduate Affairs Committee of the Department of Chemistry.