Program
Chemistry MS
Department
Chemistry
College
Arts & Sciences
Year
2013-2014

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I. Program Overview

The M.S. program in Chemistry provides students with a solid broad-based foundation in the fundamentals of chemistry along with advanced courses in specialized areas of chemistry. The skill sets developed in this program also include the ability to communicate orally and in writing. Students graduated from this program are expected to work as researchers or technicians in academic, government, and industrial research labs or continue on to Ph.D. program in chemistry.
II. Program Outcomes

Please include in this section your program learning outcomes as they are listed in the P-1 form in eCurriculum. If you are already planning to revise those program learning outcomes, indicate in this section which ones might be changed, and what the new program learning outcomes are likely to be. In general, learning outcomes should be measurable, assessable, or observable in some way and aligned with national standards.

1. Apply a technical knowledge base with both breadth and depth to develop creative solutions to chemical problems
2. Employ effective scientific communication
3. Recognize and apply ethical behavior in the conduct of science
4. Make informed career development choices
III. Curriculum/Program Map

Please include in this section a grid that identifies connections that exist between required courses in this program and the corresponding program-level learning outcomes. In other words: how will program outcomes be met? This grid should further indicate the expected levels of learning at each level (whether emerging, strengthening, or achieved). The CET&L web site includes templates that you might find useful in completed this grid.

Curriculum Mapping Matrix: Linking Program Outcomes to Curriculum

<table>
<thead>
<tr>
<th>Key</th>
<th>core courses</th>
<th>scientific writing</th>
<th>scientific ethics</th>
<th>advanced courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emerging (E)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developing (D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achieved (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program Outcomes</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply a technical knowledge base with both breadth and depth</td>
<td></td>
<td>E</td>
<td></td>
<td>D, A</td>
</tr>
<tr>
<td>Develop creative solutions to chemical problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employ effective scientific communication</td>
<td></td>
<td>E, D, A</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Recognize and apply ethical behavior in the conduct of science</td>
<td></td>
<td></td>
<td>E, D, A</td>
<td></td>
</tr>
<tr>
<td>Make informed career development choices</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
</tbody>
</table>
IV. Methods and Measures

Please include in this section a description of the assessment methods that your program plans to use in assessing each of its program learning outcomes. These methods ideally include both direct and indirect examples of student learning, with authentic, performance-based assessment performed at all levels.

- One helpful guide for this section is the “Program Assessment Checklist” (also available on the CET&L web site), which lists and describes a variety of possible assessment measures. You might include that list and then check off any of the measures that you plan to use to assess the learning outcomes in your program.

Faculty members in the Department of Chemistry use a wide range of assessment approaches. Different approaches have been adopted as a function of class size and instructor style. These include:

- Exams
- Quizzes
- Homework (online or written)
- Oral presentations
- Group presentations
- Scientific essays or term papers
- Individualized Development Plan (IDP)

- As a next step with this Checklist, identify what knowledge/skills students must be able to demonstrate at various levels at the end of each required course and upon graduation, verify that they align with your program outcomes, and describe how that alignment will be measured and assessed.

See following pages
<table>
<thead>
<tr>
<th>Program Outcome</th>
<th>Assessment Measurements</th>
<th>Course/ Experience</th>
<th>Time Line</th>
<th>Responsible Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply a technical knowledge base with both breadth and depth to develop creative solutions to chemical problems</td>
<td>Exams and/or oral presentations, unique to each of the three core courses (7021-3), will be given to assess the &quot;E&quot; stage. Exams, term papers, and/or oral presentations, unique to each of the 8000-level courses will be given to assess the “D” and “A” stages.</td>
<td>Chem7021, 7022, 7023, 8000-level courses</td>
<td>Every semester with semester summary to guide changes for upcoming semester</td>
<td>Faculty members teaching the courses, Members of the Graduate Curriculum Committee for reviewing coursework requirements, Graduate Program Directors for overseeing</td>
</tr>
<tr>
<td>Employ effective scientific communication</td>
<td>For Chem7011, scientific essays or term papers will be used for the “E”, “D” and “A” stages. Additionally, for the “A” stage, term papers and oral presentations will be used in 8000-level courses to assess</td>
<td>Chem7011-scientific writing, 8000-level courses</td>
<td>Every semester with semester summary to guide changes for upcoming semester</td>
<td>Faculty member teaching Chem7011, Members of the Graduate Curriculum Committee for reviewing coursework requirements, Graduate Program Directors for overseeing</td>
</tr>
<tr>
<td>Recognize and apply ethical behavior in the conduct of science</td>
<td>Individual and group presentations will be used to assess the “E”, “D”, and “A” stages</td>
<td>Chem7012-scientific ethics</td>
<td>Fall semester of 1st year</td>
<td>Faculty member teaching Chem7012, Graduate Program Directors for overseeing</td>
</tr>
<tr>
<td>Make informed career development choices</td>
<td>Individualized Development Plan (IDP) will be used in meetings with Graduate Program Directors. Exams and/or oral presentations, unique to each of the 8000-level courses (including Chem9083) will be given to assess</td>
<td>Meetings with Graduate Program Directors, 8000-level courses, Chem9083-life after graduate school (elective course)</td>
<td>Every semester with semester summary to guide changes for upcoming semester</td>
<td>Graduate Program Directors, Faculty members teaching the courses, Members of the Graduate Curriculum Committee for reviewing coursework requirements</td>
</tr>
</tbody>
</table>
V. Assessment Infrastructure

Please include in this section a description of the process by which your program intends to assess its learning outcomes.

- Describe which program faculty will be charged with overseeing the execution of the assessment plan as well as the ways in which they will carry out that charge, including a description of the planned timeline for assessment.
- Identify what kinds of administrative support will be available for those faculty

Please note that assessment plans should be capable of producing reports annually based on their review of the relevant data from their programs. The work of your faculty might also be coordinated and aligned with similar assessment efforts at the college and institutional levels.

Assessment of individual students occurs first during the grading of the three core courses (Chem 7021, 7022, and 7023) during their first semester in the M.S. program. Subsequently, assessment occurs each semester after students take 8000-level courses.

Core courses: after mid term, the instructors of each core course will be asked to provide preliminary assessment (through mid-term exams and/or oral presentations) to the graduate program directors. Students with deficiency in knowledge will be advised to take remedial courses or seek additional help from the instructors. At the end of each Fall semester the instructors for the three core courses, which are currently co-taught by two instructors each, will meet with the graduate program directors to discuss the grading scales for each course. At this time, discussion will occur regarding the quality of student performance in the courses as well as the instructors’ perception of the success of the courses themselves and any feedback they have received from the students. Notes regarding these discussions will be compared to the student evaluations of these courses and a report on the core courses, including any recommendations for changes, will be prepared by the graduate program directors to present to the Graduate Curriculum Committee and the faculty.
VI. Findings

Here you will describe and explain in this section any multi-year patterns and trends that your assessment efforts have identified, including a description of any relevant relationships to national standards.

Most of our M.S. students have been successfully employed by government research labs and private sectors, or continued on to a Ph.D. program in chemistry.

VII. Use of Findings

In this final section, you will describe how your program intends to make use of the program-level assessment data it has gathered.

• How will this information be presented to and discussed among the faculty?
• How might this data or these discussions result in review and possible revision of course or program learning outcomes and pedagogical strategies?

The graduate program directors will gather data associated with program-level assessments, and share them with the Graduate Curriculum Committee. If no immediate changes are recommended by this Committee, the committee chair will report trends in these data to the chemistry faculty at its annual retreat which usually occurs just prior to the beginning of the Fall Semester. The faculty will consider the data and discuss whether any changes to the program are needed. If the Graduate Curriculum Committee has specific suggestions for changes to any aspect of the program, these suggestions will be brought to the faculty at the next scheduled monthly faculty meeting for discussion.