AY 2009-10 Assessment for:

Interdepartmental: Pharmacy, M.S.

Responsibility and Implementation Process

Responsibility for all graduate programs in the College of Pharmacy is based on a balance between the autonomy of individual faculty members in supervising their graduate students and the responsibility of the entire College graduate faculty for ensuring the quality of our graduate programs. There is a single M.S. degree in pharmacy, with sub-specialties in each of the areas represented by the current Division structure of the College:

- Medicinal Chemistry
- Pharmaceutics
- Pharmacology & Toxicology
- Pharmacotherapy
- Pharmacy Administration
- Pharmacy Practice

Oversight responsibility for the M.S. programs rests globally with the Associate Dean for Research and Graduate Studies, who reports directly to the Dean of the College. The Associate Dean works directly with the Graduate Coordinator for daily management of the programs. Within each Division, Graduate Advisors assist students with coursework and progression toward the anticipated degree. Division Heads manage each of the programs cited above, and the Administrative Sub-Committee (Division Graduate Advisors, chaired by the Associate Dean) provides governance and quality assurance. The Graduate Faculty relies on each Division to ensure that its graduate students have the requisite academic background for the discipline and demonstrate mastery through satisfactory completion of required courses. The Graduate Faculty also relies on the thesis committee members to ensure quality in graduate research, thesis formulation, and thesis defense.

Program Educational Objectives (PEOs)

The program educational objectives for the M.S. programs in pharmacy are designed to prepare graduates to enter research-oriented or advanced practice careers and/or progress on to Ph.D. study. M.S. graduates will be prepared to demonstrate:

- An appropriate level of knowledge of their discipline and sub-discipline (including understanding of the current state of the discipline, modern experimental techniques characteristic of the discipline, and research challenges in the area).
- An ability to conduct research in the discipline (formulation of the research problem/hypothesis, experimental design and execution, data analysis, and interpretation).
- The ability to discriminate quality scholarship in the discipline and the ability to communicate their scholarship (both written and verbal communication of results).
- An understanding of appropriate sources of funding for the discipline.
- The ability to communicate with colleagues in related disciplines.
- A high level of professional ethics in their disciplinary community and a strong desire to improve the health and welfare of society through their research contributions.
- Ability to provide a leadership role for careers in industry, government, and/or academics.
- An ethic for life-long learning in their discipline.

The following table relates the program outcomes and assessment methods:

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Disciplinary Expertise</th>
<th>Conducting and Reporting Independent Research</th>
<th>Oral Communication Skills</th>
<th>Scholarly Writing Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion of Core Curriculum</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>Thesis Proposal</td>
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<tr>
<td>Thesis</td>
<td>X</td>
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<tr>
<td>Thesis Defense</td>
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<td>X</td>
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<td>X</td>
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</tbody>
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Note: We would like to acknowledge that our assessment plan for the M.S. degree in Pharmacy is somewhat limited because historically, the emphasis in the College of Pharmacy for graduate students has largely been on the Ph.D. degree.

Some students do choose to complete a M.S. Residency program, and the Divisions of Pharmacotherapy, Pharmacy Administration, and Pharmacy Practice may encourage the completion of a M.S. degree prior to completing a Ph.D. degree. However, in the Divisions of Medicinal Chemistry, Pharmacology and Toxicology, and Pharmaceutics, students are not admitted into a M.S. program but may be transferred to a terminal M.S. program if the student is not progressing satisfactorily in the Ph.D. program.

For the vast majority of students admitted into the College for graduate study, the general expectation among graduate faculty is that students ultimately pursue Ph.D. degrees, and we believe this perspective is reflected in the two assessment plans for our graduate programs.
Program Outcome: Disciplinary Expertise

M.S. graduates in Pharmacy will demonstrate knowledge and expertise in their discipline (generally) and sub-discipline (specifically) in terms of underlying scientific principles and research methods.

Method: Completion of Core Curriculum

Each Division has identified a specific core curriculum for all graduate students in that Division, as well as additional required coursework based on the student's sub-discipline.

Performance on the core curriculum will be measured using an average of scores on in-class exams in required coursework. The in-class exams in these courses test students' knowledge, skills, and abilities on topics related to their sub-discipline. The composite list of these required courses is as follows:

- CH386J Advanced Organic Chemistry
- CH395G Biochemistry
- CH395J Molecular Biology
- PHR396M Medicinal Chemistry: General Principles, Pharmacological Classification, and Mechanism of Action
- PHR 380F Biomedical Pharmacology I
- PHR 380N Biomedical Pharmacology II
- PHR 390N Biochemical & Molecular Toxicology
- PHR 384K Fundamental Toxicology
- NEU 382T Principles of Neuroscience I
- PHR 383D Neuropharmacology
- PHR 383Q Statistics
- PHR 390K Research Methodology
- EDP 482K Research Design and Inferential Statistics
- EDP 382K Correlations
- EDP 382K Multivariate
- PHR w390J Data Analysis

We expect at least 90% of students to earn an average grade of B or better on the in-class exams in their required coursework.
Result: Results of Completion of Core Curriculum - 2010:

The following table presents the percentage of students who earned a grade of B or better on in-class exams for each of the required courses offered to date in 2010:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Semester</th>
<th>% of Students Earning ≥B on Exams</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH 395J</td>
<td>Molecular Biology</td>
<td>Spring</td>
<td>82</td>
</tr>
<tr>
<td>PHR 380N</td>
<td>Biomedical Pharmacology II</td>
<td>Spring</td>
<td>100</td>
</tr>
<tr>
<td>PHR 383D</td>
<td>Neuropharmacology</td>
<td>Spring</td>
<td>(not offered)</td>
</tr>
<tr>
<td>PHR 383Q</td>
<td>Statistics</td>
<td>Spring</td>
<td>100</td>
</tr>
<tr>
<td>PHR 390K</td>
<td>Research Methodology</td>
<td>Spring</td>
<td>100</td>
</tr>
<tr>
<td>PHR w390J</td>
<td>Data Analysis</td>
<td>Summer</td>
<td>100</td>
</tr>
</tbody>
</table>

Action Summary: Action Composite:

August, 2010

Completion of Core Curriculum

Data for one course offered this summer (PHR w390J) have been added to the results table for 2010.

Based on the results presented above for 2009 and so far in 2010, the percentage of students who have earned a grade of B or better on in-class exams in required courses exceeded our standard of performance of 90% in all but six courses.

Although we believe this is a positive outcome for most of the required courses, we acknowledge that for the five courses in 2009 (CH 386J, CH 395J, PHR 396M, PHR 380F, and EDP 482K) the percentage of students who earned a grade of B or better on in-class exams did not meet our standard of performance. In 2010, the percentage of students who earned a grade of B or better on in-class exams in CH 395J also did not meet our standard of performance. At the next Division Graduate Advisers meeting in early September, we will be revisiting the performance in these courses and discuss concrete next steps to help us improve this outcome (e.g., examine each student’s performance more closely, approach course instructors, etc.).
Program Outcome: Conducting and Reporting Independent Research

M.S. graduates in Pharmacy will demonstrate the ability to conduct research, including the statement of the problem, hypothesis formulation, experimental design, experimental execution and data collection, data analysis, and defensible conclusion.

Method: Thesis Proposal

Each M.S. student is required to submit a written original, comprehensive thesis proposal.

Performance on the thesis proposal will be measured using a general analytic rubric including criteria such as:

- knowledge of key relevant peer-reviewed literature
- ability to identify and write clear, specific research aims
- ability to develop an experimental design based on research aims and within the expertise of the student
- ability to identify appropriate methodology
- ability to foresee research limitations and provide alternative aims

We expect at least 90% of students to achieve a passing score on the rubric.

Result: Results of Thesis Proposal - 2010:

To date in 2010, 100% of students (1 of 1) either met or exceeded expectations on their thesis proposals on each of the following criteria:

- literature review
- research questions
- experimental design
- methodology
- potential limitations

Thus, the student achieved a passing score on the rubric.
Method: Thesis

Each M.S. candidate is required to submit a written thesis document to a Thesis Committee.

Performance on the thesis will be measured using a general analytic rubric including criteria such as:

- knowledge of key relevant peer-reviewed literature
- ability to identify and write clear, specific research aims
- ability to develop an experimental design based on research aims and within the expertise of the student
- ability to identify appropriate methodology
- ability to foresee research limitations and provide alternative aims
- ability to explain study results clearly
- ability to write a defensible conclusion

We expect at least 90% of candidates to achieve a passing score on the rubric.

Result: Results of Thesis - 2010:

To date in 2010, 100% of candidates (9 of 9) either met or exceeded expectations on his/her thesis on each of the following criteria:

- literature review
- research questions
- experimental design
- methodology
- limitations
- results
- conclusion

Thus, all nine candidates achieved a passing score on the rubric.

Method: Thesis Defense

Each M.S. candidate is required to defend the thesis in front of a Thesis Committee.

Performance during the defense will be measured using a general analytic rubric including criteria such as:
We expect at least 90% of candidates to achieve a passing score on the rubric by presenting their research and answering questions posed by the Thesis Committee.

**Result: Results of Thesis Defense - 2010:**

To date in 2010, 100% of candidates (9 of 9) either met or exceeded expectations during his/her thesis defense on each of the following criteria:

- content knowledge
- presentation skills
- professional composure
- creativity
- independent thinking

Thus, all nine candidates achieved a passing score on the rubric and successfully defended his/her thesis.

**Action Summary: Action Composite:**

August, 2010

**Thesis Proposal**

The results for 2010 have been updated with one student, and the percentage of students who have achieved a passing score on the rubric for the thesis proposal exceeded our standard of performance of 90%.

Although we believe this is a positive outcome, we still have plans to consult with appropriate administrators, graduate advisers, and graduate faculty to continue refining the rubric as well as streamlining the process for collecting and submitting the data.

**Thesis**
The results for 2010 have been updated with six additional candidates, and the percentage of candidates who have achieved a passing score on the rubric for the thesis exceeded our standard of performance of 90%.

Although we believe this is a positive outcome, we still have plans to consult with appropriate administrators, graduate advisers, and graduate faculty to continue refining the rubric as well as streamlining the process for collecting and submitting the data.

**Thesis Defense**

The results for 2010 have been updated with six additional candidates, and the percentage of candidates who have achieved a passing score on the rubric for the thesis defense exceeded our standard of performance of 90%.

Although we believe this is a positive outcome, we still have plans to consult with appropriate administrators, graduate advisers, and graduate faculty to continue refining the rubric as well as streamlining the process for collecting and submitting the data.
Program Outcome: Oral Communication Skills

M.S. graduates in Pharmacy will be able to orally communicate their research results in an effective manner.

Method: Thesis Defense

Each M.S. candidate is required to defend the thesis in front of a Thesis Committee.

Performance during the defense for this program outcome will be measured using a general analytic rubric including the following criteria:

- presentation skills
- professional composure

We expect at least 90% of candidates to achieve a passing score on the rubric by presenting their research and answering questions posed by the Thesis Committee.

Result: Results of Thesis Defense - 2010:

To date in 2010, 100% of candidates (9 of 9) either met or exceeded expectations during his/her thesis defense on each of the following criteria:

- content knowledge
- presentation skills
- professional composure
- creativity
- independent thinking

Thus, all nine candidates achieved a passing score on the rubric and successfully defended his/her thesis.
Action Summary: Action Composite:

August, 2010

Thesis Defense

The results for 2010 have been updated with six additional candidates, and the percentage of candidates who have achieved a passing score on the rubric for the thesis defense exceeded our standard of performance of 90%.

Although we believe this is a positive outcome, we still have plans to consult with appropriate administrators, graduate advisers, and graduate faculty to continue refining the rubric as well as streamlining the process for collecting and submitting the data.
Program Outcome: Scholarly Writing Skills

M.S. graduates in Pharmacy will be able to express scholarly ideas in writing.

Method: Thesis Proposal

Each M.S. student is required to submit a written original, comprehensive thesis proposal. Performance on the thesis proposal will be measured using a general analytic rubric including criteria such as:

- knowledge of key relevant peer-reviewed literature
- ability to identify and write clear, specific research aims
- ability to develop an experimental design based on research aims and within the expertise of the student
- ability to identify appropriate methodology
- ability to foresee research limitations and provide alternative aims

We expect at least 90% of students to achieve a passing score on the rubric.

Result: Results of Thesis Proposal - 2010:

To date in 2010, 100% of students (1 of 1) either met or exceeded expectations on their thesis proposals on each of the following criteria:

- literature review
- research questions
- experimental design
- methodology
- potential limitations

Thus, the student achieved a passing score on the rubric.
Method: Thesis

Each M.S. candidate is required to submit a written thesis document to a Thesis Committee.

Performance on the thesis will be measured using a general analytic rubric including criteria such as:

- knowledge of key relevant peer-reviewed literature
- ability to identify and write clear, specific research aims
- ability to develop an experimental design based on research aims and within the expertise of the student
- ability to identify appropriate methodology
- ability to foresee research limitations and provide alternative aims
- ability to explain study results clearly
- ability to write a defensible conclusion

We expect at least 90% of candidates to achieve a passing score on the rubric.

Result: Results of Thesis - 2010:

To date in 2010, 100% of candidates (9 of 9) either met or exceeded expectations on his/her thesis on each of the following criteria:

- literature review
- research questions
- experimental design
- methodology
- limitations
- results
- conclusion

Thus, all nine candidates achieved a passing score on the rubric.
Action Summary: Action Composite:

August, 2010

Thesis Proposal

The results for 2010 have been updated with one additional student, and the percentage of students who have achieved a passing score on the rubric for the thesis proposal exceeded our standard of performance of 90%.

Although we believe this is a positive outcome, we still have plans to consult with appropriate administrators, graduate advisers, and graduate faculty to continue refining the rubric as well as streamlining the process for collecting and submitting the data.

Thesis

The results for 2010 have been updated with six additional candidates, and the percentage of candidates who have achieved a passing score on the rubric for the thesis exceeded our standard of performance of 90%.

Although we believe this is a positive outcome, we still have plans to consult with appropriate administrators, graduate advisers, and graduate faculty to continue refining the rubric as well as streamlining the process for collecting and submitting the data.

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