MS: Toxicology

Program: Toxicology
(Environmental Genetics and Molecular Toxicology)

Department: Environmental Health

College: Medicine

Year: Draft April 2014

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I. 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.

Toxicology is the study of the adverse effects of environmental exposures on living organisms and systems. Our PhD program in Environmental Genetics and Molecular Toxicology (“Toxicology”) is unique in that a fundamental goal is to train graduates in how gene expression/regulation influences an individual’s response to environmental exposures. Students have opportunities to rotate in multiple laboratories prior to deciding on a specific dissertation research project and learn both in the classroom and in seminars from experts who are working professionals in the fields of toxicology and genetics. Students benefit not only from diverse faculty expertise, but also from being part of the larger Department of Environmental Health, with additional expertise and collaborative/learning opportunities in disciplines such as industrial hygiene, biostatistics, epidemiology, occupational medicine, and public health.

Students will learn principles of toxicology, including dose-response, biotransformation, mechanisms of toxicity, and genetic/epigenetic mechanisms of gene regulation as these topics related to environmentally-induced morbidities and mortalities. Graduates of our program have readily found employment as study directors or toxicologists in the pharmaceutical and chemical industries; as professors at liberal arts and major research institutions; as scientists performing risk assessments for the US and foreign governments; as scientists working for not-for-profit institutions; and numerous other challenging positions.

Learning outcomes for our MS graduates are broadly defined as follows:

1. Apply basic concepts of toxicology to develop and test hypotheses, design valid experiments, interpret data, and address novel problems.
2. Evaluate, discuss and apply current literature in the fields of environmental genetics and molecular toxicology.
3. Present critiques that enhance fellow students’ and other presenters’ written and oral presentation skills.
4. Develop and present evidence of effective written and oral presentation skills.
II. 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 completing this grid.
<table>
<thead>
<tr>
<th>Key</th>
<th>TOX8039 Student seminar</th>
<th>TOX7082 Survey of Toxicology</th>
<th>ENV7001</th>
<th>ENV7002</th>
<th>ENV7091</th>
<th>Thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OUTCOMES</strong></td>
<td>E,D,A</td>
<td>E,D,A</td>
<td>E,D</td>
<td>E,D</td>
<td>E,D</td>
<td>A</td>
</tr>
<tr>
<td>1. Apply basic concepts of toxicology to develop and test hypotheses, design valid experiments, interpret data, and address novel problems.</td>
<td>E,D,A</td>
<td>E,D,A</td>
<td>E,D</td>
<td>E,D</td>
<td>E,D</td>
<td>A</td>
</tr>
<tr>
<td>2. Evaluate, discuss and apply current concepts and literature in the fields of environmental genetics and molecular toxicology.</td>
<td>E,D,A</td>
<td>E,D,A</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>3. Present critiques that enhance fellow students’ and other presenters’ written and oral presentation skills.</td>
<td>E,D,A</td>
<td>E,D,A</td>
<td>E,D</td>
<td>E,D</td>
<td>E,D,A</td>
<td></td>
</tr>
<tr>
<td>4. Develop and present evidence of effective written and oral presentation skills.</td>
<td>E,D,A</td>
<td>E,D,A</td>
<td>E,D</td>
<td>E,D</td>
<td>E,D</td>
<td>A</td>
</tr>
</tbody>
</table>
III. 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. You may find it helpful to include the "Assessment Measures Alignment Matrix" from Activity 5.
<table>
<thead>
<tr>
<th>Program Outcome</th>
<th>Assessment Tools</th>
<th>Course/ Experience</th>
<th>Time Line</th>
<th>Responsible Person</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Apply basic concepts of toxicology to develop and test hypotheses, design valid experiments, interpret data, and address novel problems.</strong></td>
<td>Exams</td>
<td>GNTD7001, GNTD7002 TOX7082** BE7022</td>
<td>Fall, First year* Spring first year Fall, first year</td>
<td>All teaching faculty in the program</td>
</tr>
<tr>
<td></td>
<td>Oral presentations</td>
<td>TOX8039</td>
<td>Spring, all years</td>
<td>Thesis advisor, committee Thesis committee</td>
</tr>
<tr>
<td></td>
<td>Demonstration of skills in laboratory</td>
<td>TOX7091 Thesis</td>
<td>Fall, Spring all semesters Last semester</td>
<td></td>
</tr>
<tr>
<td><strong>Evaluate, discuss and apply current concepts and literature in the fields of environmental genetics and molecular toxicology.</strong></td>
<td>Exams</td>
<td>TOX7082</td>
<td>Spring, first year</td>
<td>All teaching faculty in the program</td>
</tr>
<tr>
<td></td>
<td>Oral presentation</td>
<td>TOX8039</td>
<td>Spring, all years in program</td>
<td></td>
</tr>
<tr>
<td><strong>Present critiques that enhance fellow students’ and other presenters’ written and oral presentation skills.</strong></td>
<td>Oral, written critiques</td>
<td>TOX7082 ENV7001 ENV7002</td>
<td>Spring, first year Fall, all years in program Spring, all years in program</td>
<td>All teaching faculty in the program</td>
</tr>
<tr>
<td><strong>Develop and present evidence of effective written and oral presentation skills.</strong></td>
<td>Oral presentations</td>
<td>TOX8039</td>
<td>Spring, all years in program</td>
<td>All teaching faculty in the program</td>
</tr>
</tbody>
</table>

*Depending on the strength of the student’s background, these courses may be taken separately, one in Fall of the first year, one in the Fall of the second year

**For more advanced students, TOX8051 may be substituted**
IV. 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.

The MS in Toxicology assessment committee will consist of the Division’s Curriculum Committee. These faculty will meet at the end of Fall and Spring semesters to review course evaluations and student outcomes. Student outcomes will include student performance in required courses (both those administered by the toxicology program and those outside of the program, including Intro to Biostatistics, Biochemistry, and Cell Biology), qualifying exams, dissertation defenses, and student publications. The assessment committee will review the assessment plan annually at the Spring Semester meeting.

No significant administrative support is available for the assessment process. Our Graduate Studies Program Coordinator can assist with distributing and course evaluations and reporting back to the Graduate Studies Director.
IV. 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.

TBD

V. 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 faculty of the Environmental Genetics and Molecular Toxicology Division meet 2X/year, and a report on the status of each graduate student in the program will be presented by the Graduate Studies Director for the Division. The committee includes a Student Representative. The Student Representative will be excused for the discussion of other students’ progress, but will be present and consulted for information gathered from the Division’s students re their perception of the curriculum (e.g. what is lacking from the curriculum, their perception of appropriateness of course load each semester).

If it is found that the majority of students in any given “class” had the same problem with a course, series of courses, or course load, the Division’s Graduate Studies Director will appoint a small committee to work with the Student Representative to attempt to come to a solution that resolves the students’ concerns. The learning outcomes and pedagogical strategies will be modified as needed to meet the new strategy.