Degree Requirements
Pharmacology and Toxicology Graduate Group (PTX)
Approved by Graduate Council: June 11, 2008

Master’s Degree Requirements:

1) Admissions Requirements:

a) Prerequisites
Applicants for admission must meet the University of California minimum GPA requirement for admission. In addition, applicants are expected to have the equivalent of the following courses:

- General Chemistry: 15 units of general chemistry, including at least 4 units of quantitative analysis. (UCD General Chemistry 2A, 2B, 2C or equivalent)
- Physics: A total of 12 units, including 3 units of general physics laboratory. (UCD General Physics 7A, 7B and 7C or equivalent)
- Biology: At least 5 units of a general biology course (e.g., Principles of Biology). (UCD Introductory Biology 1A or equivalent)
- Mathematics: 9 units of higher mathematics, including differential and integral calculus. (UCD 21A, 21B, 21C Calculus or equivalent)
- Biochemistry: 12 units of general biochemistry, including biochemistry laboratory. (UCD Biological Sciences 101 (Genes and Gene Expression), 102 (Structure and function of biomolecules), 103 (Bioenergetics and metabolism) and 120L Biochemistry laboratory or equivalent)
- Physiology: 5 units of systemic or mammalian physiology. (UCD NPB 101 Systemic Physiology or equivalent)

b) Deficiencies
Course work deficiencies should be made up by the end of the first academic year following initial enrollment by earning a letter grade of ‘B’ or better.

2) MS Degrees:

The PTX program offers two MS degree plans. The difference between Plans I and II is that students in Plan I are required to write and orally present a thesis proposal, complete a research project and prepare a thesis. Those students under Plan II are required to complete additional coursework as compared to Plan I and to fulfill a capstone requirement consisting of preparation of a detailed literature review (See Section 11). All students are required to pass a written comprehensive examination (See Section 11, Comprehensive Examination, Thesis and Capstone Requirements below for description of comprehensive written exam.) The minimum credit units required to fulfill the degree for each plan are as follows:

**MS Plan I:** 30 credit units in professional, graduate or upper division courses. At least 21 of the 30 units must be from graduate courses in the major field of study.

**MS Plan II:** 36 credit units in professional, graduate or upper division courses. At least 21 of the 36 units must be from graduate courses in the major field of study.

Candidates for either plan must have been in residence for at least three academic quarters. Students in Plan I must present the results of their research in the Winter and Spring Quarters (first year) along with the doctoral students.
3) **Course Requirements:**

a) **Core courses: (Total 17 units)**

   All students are required to complete the PTX series courses without substitution. There are three required PTX courses and one required statistics course. Higher level statistics courses may be utilized to fulfill the statistics requirement.

   - PTX 201 Principles of Pharmacology and Toxicology 5 units
   - PTX 202 Principles of Pharmacology and Toxicology 4 units
   - PTX 203 Principles of Pharmacology and Toxicology 4 units

   **Required statistics**
   - STA100 Applied Statistics for Biological Sciences 4 units

b) **Elective courses selected from the following areas:**

   i) **Advanced Pharmacology/Toxicology (Total 8 units)**

   Examples of courses which can be taken to fulfill this requirement include:

   - ETX 203 Environmental Toxicants 4 units
   - ETX 214 Mechanisms of Toxic Action 3 units
   - ETX 220 Analysis of Toxicants 3 units
   - ETX220L Analysis of Toxicants Laboratory 2 units
   - ETX228 Gas Chromatography/Mass Spectrometry of Toxic Chemicals 3 units
   - ETX234 Neurophysiological Basis of Neurotoxicology 3 units
   - ETX240 Ecotoxicology 3 units
   - ETX250 Reproductive Toxicology 3 units
   - ETX260 Immunotoxicology 3 units
   - ETX270 Toxicology of Pesticides 3 units
   - ETX278 Molecular Techniques 3 units
   - PTX 277 Apoptosis and Disease 2 units
   - VMB 253 Toxicant and Drug Metabolism 2 units
   - VMB 254 Respiratory Toxicology 2 units
   - VMB 266 Mass Spectrometry in Biological Sciences 3 units

   ii) **Breadth requirements (Total 5-11 units)**

   All students are required to take at least 5 units of advanced graduate level coursework in morphology, biochemistry, cell biology, immunology, pathology, epidemiology or molecular biology to structure their program for maximum benefit in their interest area. In some instances upper division undergraduate courses may be taken to fulfill the course unit requirements. Students should consult with their Major Professor and with their Graduate Adviser for acceptable choices. A list of courses, taken by PTX GG students, is provided in Table 1, appendix. This list provides examples but is not intended to be all inclusive. Courses are evolving and students should work with their Graduate Advisers to outline a course of study tailored to their interests and needs.

   Total units of required courses
   - For Plan I: = 30 total
   - For Plan II: 6 additional units from list of electives = 36 total
4) Special Requirements:

a) Seminars
A total of 6 seminar courses are required in the first 2 years of the graduate program. Seminars in the Fall and Winter of the first year and Fall of the second year are offered as PTX 290; CRN numbers for the proper course(s) are available from the graduate administrative assistant. During quarters in which PTX seminars are not required (i.e. Winter and Spring of the second year), students should select seminars in an area of their interest. As an example, ETX 290 is offered in Winter Quarter and would be an appropriate choice for MS students enrolled in the PTX GG.

Seminars that are required include:

<table>
<thead>
<tr>
<th>First year</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall:</td>
<td>Meet the Professor(s)</td>
<td>1 unit</td>
</tr>
<tr>
<td>Winter:</td>
<td>Rotation/lab presentations (Plan I)</td>
<td>1 unit</td>
</tr>
<tr>
<td></td>
<td>Seminar of the student’s choice, e.g. ETX 290 (Plan II)</td>
<td>1 unit</td>
</tr>
<tr>
<td>Spring:</td>
<td>Seminar of the student’s choice</td>
<td>1 unit</td>
</tr>
<tr>
<td></td>
<td>Rotation/lab presentations (Plan I)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second year</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall:</td>
<td>Grant Writing</td>
<td>1 unit</td>
</tr>
<tr>
<td>Winter:</td>
<td>Seminar of the student’s choice</td>
<td>1 unit</td>
</tr>
<tr>
<td>Spring:</td>
<td>Seminar of the student’s choice</td>
<td>1 unit</td>
</tr>
</tbody>
</table>

5) Committees:

a) Executive Committee
The Executive Committee of the Pharmacology and Toxicology Graduate Group (PTX GG) is responsible for setting the overall direction of the group. Chairs of each of the standing committees are selected from the membership of the Executive Committee. The Executive Committee recommends admissions targets, reviews the progress of all graduate students annually and considers changes to the bylaws and to the guidelines under which the graduate group operates.

b) Committee on Admissions, Recruitment and Fellowships
Once the completed application and all supporting materials and application fee have been received, the application will be submitted to the Admissions Committee. The Admissions Committee consists of a Chair, appointed from the Executive Committee, 6 voting members of the graduate group, the Chairperson of the Executive Committee (ex officio) and a representative graduate student. At least two of the voting members will be official Graduate Advisers of the PTX GG. The Admissions Committee will make a recommendation to the Dean of Graduate Studies for admission/denial of each applicant. Notification of admissions decisions will be sent by Graduate Studies. The deadline for priority applications is January 15 for Fall admission of that same year. Under unusual circumstances, admissions at other times will be considered. The same group of faculty and graduate student will also serve as the Recruitment and Fellowship Committees.

c) Committee on Educational Policy
The Committee on Educational Policy (CEP) is charged with setting the standards for graduate education within the PTX GG. CEP consists of a Chair selected from the Executive Committee along with five or more voting members, two of whom are Graduate Advisers. Two representative graduate students will serve on the committee. CEP is charged with: 1) reviewing all proposed new course offerings to determine whether they meet the standards acceptable for credit toward graduate degrees offered through the group, 2) reviewing all core
courses, 3) appointing the instructor of record for the core courses, 4) nominating members to qualifying examinations, 5) preparing and administering the written qualifying examination for all students and 6) evaluating the petitions from graduate students/advisers wishing to substitute comparable courses taken at other institutions for PTX degree requirements.

d) Thesis Committee
The MS student (Plan I) in conjunction with his/her Major Professor and Graduate Adviser shall recommend a Thesis Committee consisting of the student's Major Professor (as chair) and at least two additional members to Graduate Studies. All recommended members not authorized by the Graduate Group Bylaws to serve on graduate thesis committees must be approved by the Dean of Graduate Studies. This committee will evaluate whether the thesis has been satisfactorily completed. Thesis committee nominations are submitted to the Office of Graduate Studies for formal appointment in accordance with Graduate Council policy (DDB 80. Graduate Council, B.1.). Refer to the Graduate Studies website for additional details regarding the filing of a thesis.

6) Advising Structure and Mentoring:

The Graduate Adviser is a key figure for each graduate student throughout his/her program of study, but particularly during the period prior to advancement to candidacy. Graduate Advisers are assigned to each student upon his/her indication of intent to matriculate into the program. The role and responsibilities of the Graduate Adviser are listed in detail in the Graduate Adviser's Handbook, published by Graduate Studies. In the PTX GG program the major responsibilities of the Advisers are:

a) Review and approve each graduate student's study list each quarter.
b) Review and act on petitions of graduate students regarding changes in course registration.
c) In cooperation with students and Major Professors, review the nominations of comprehensive/qualifying examination committees, requests for advancement to candidacy, and nominations of thesis/dissertation committees.
d) Serve on either the PTX Educational Policy or the Admissions Committees.
e) In general, act as a graduate student's primary source of information concerning the academic program and provide assistance with the procedural details of progress toward the degree.

The Graduate Adviser is involved in many aspects of a graduate student's progress. New students should meet as soon as possible with their Graduate Advisers to discuss academic registration, adequacy of undergraduate preparation, and lab rotations. In those cases where students choose to conduct their planned thesis/dissertation in the laboratory of their Graduate Adviser another Graduate Adviser will be assigned.

7) Advancement to Candidacy:

Plan I and Plan II MS candidates must file an advancement to candidacy form (http://www.gradstudies.ucdavis.edu/forms/) prior to taking the written comprehensive examination in June of their first year of graduate studies. Both Plan I and II MS candidates must have taken at least half of the required coursework for their respective degree requirements (15 and 18 units for Plans I and II, respectively).
8) Typical Timeline and Sequence of Events

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTX 201</td>
<td>PTX 202</td>
<td>PTX 203</td>
</tr>
<tr>
<td>PTX 290 (meet the prof)</td>
<td>PTX 290 (rotation</td>
<td>seminar</td>
</tr>
<tr>
<td>Begin preliminary research</td>
<td>presentations</td>
<td>Plan I, other seminar</td>
</tr>
<tr>
<td>Adv PTX/distribution</td>
<td>PTX 290 (rotation</td>
<td>(plan II)</td>
</tr>
<tr>
<td></td>
<td>presentations</td>
<td>Lab rotations Adv</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PTX distribution</td>
</tr>
<tr>
<td>Correct any coursework</td>
<td></td>
<td>Continue research</td>
</tr>
<tr>
<td>deficiencies from the list of prerequisites</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTX 200 series</td>
<td>PTX 290 (seminar)</td>
<td>PTX 200 series</td>
</tr>
<tr>
<td>13 units</td>
<td>Advanced PTX</td>
<td>13 units</td>
</tr>
<tr>
<td>6 units</td>
<td>Distribution</td>
<td>&gt;8 units</td>
</tr>
<tr>
<td>&gt;5 units</td>
<td>Biostats</td>
<td>4 units</td>
</tr>
<tr>
<td></td>
<td>Continue research/write thesis</td>
<td></td>
</tr>
</tbody>
</table>

Plan I-30 hrs coursework (research requirements italicized)
Plan II-36 hrs coursework

9) Sources of Funding:

MS Plan I and II students are not normally supported by the PTX GG. Individual faculty members within the group can choose to support students from their resources; arrangements must be made directly with the faculty member.

10) Planned Education Leave Program (PELP):

The purpose of this program is to allow students to suspend registration for good cause (e.g., health, financial reasons, extramural research opportunities) and be guaranteed reentry upon the completion of a specified period of absence. The minimum leave is 1 quarter and the maximum is 3 quarters. Upon written request and approval of the Graduate Adviser and Graduate Studies, the leave period may be shortened or lengthened for good cause. To be granted planned leave, the student must submit a PELP application (along with a fee) that is signed by the Graduate Adviser and submitted to the Dean of Graduate Studies. An approved PELP application guarantees reentry to the quarter specified in the application. The Graduate Adviser can furnish more details on this program.

11) Comprehensive Examination, Thesis and Capstone Requirements:

a) Thesis Requirements (Plan I)

Generally, an acceptable thesis presents a body of original scientific work in the area of Pharmacology/Toxicology which is published or publishable in a peer reviewed, national/international journal. Students should consult the Graduate Studies website for additional details regarding the filing of a thesis at http://www.gradstudies.ucdavis.edu/forms/chklistmas.pdf.
A master's thesis must be written describing original research conducted by the student under the direction of the Major Professor. Two additional members of the thesis committee are recommended through consultation with student, Major Professor and Graduate Advisor and are appointed by the Dean of Graduate Studies. For the thesis to be acceptable for the degree all members must sign the title page certifying that the student has completed the thesis to their satisfaction. In a case where the committee members cannot reach a unanimous decision but a majority is favorable, the majority and minority will report their separate opinions of the merit of the thesis to the Dean who will forward it to the Administrative Committee of the Graduate Council for the final decision. If the thesis is regarded by the committee as of less than acceptable quality the student will be given an appropriate period of time by the committee in which to improve the work. If, after that period of time, (usually a quarter or more), the thesis is still unacceptable to a majority of the committee, they may recommend that the student be disqualified from further graduate study.

b) Comprehensive Written Examination (Plans I and II)
All students (MS and PhD) must pass a comprehensive written exam (also referred to as Qualifying Examination Part A) that focuses on testing basic competence in the broad field of pharmacology and toxicology and based on material typically included in PTX 201, 202, and 203. This part of the exam will test the depth of a student's factual knowledge, and ability to integrate that knowledge into coherent written responses. The examination will be administered to all students (MS and PhD) in the program simultaneously within a month of completion of Spring Quarter, first year. The examination will be prepared by the CEP with assistance of instructors in the PTX 200 series. Students not receiving a passing grade on the exam will be required to remediate the deficiencies. The remediation will be determined by the faculty member who wrote the question with approval of CEP. Failure may result in a recommendation to the Dean of Graduate Studies for dismissal from the program, or in other remediation as determined by CEP. This may involve taking the written qualifying exam a year after the first attempt. Failures in any parts of this second examination will result in dismissal from the program.

c) Capstone Requirement (Plan II)
Students electing the MS Plan II will need to make an arrangement with a faculty member belonging to the PTX GG to serve as a mentor for the capstone requirement. The student, in consultation with the faculty mentor, selects a topic within the broad area of pharmacology and toxicology to prepare a comprehensive paper. This exercise is intended to further develop skills in the identification and synthesis of appropriate literature sources and organization and written presentation of an in depth literature analysis. The mentor is to guide the student in the preparation of this treatise and is to evaluate the final product regarding its acceptability in meeting the capstone requirement. A copy of the paper and a letter from the mentor is to be placed in the student’s records following completion of this requirement. Students should complete the capstone paper in Winter or Spring quarter of their second year.

**PhD Degree Requirements:**

1) **Admissions Requirements:**

a) **Prerequisites**
Applicants for admission must meet the University of California minimum GPA requirement for admission. In addition, applicants are expected to have the equivalent of the following courses:

- **General Chemistry:** 15 units of general chemistry, including at least 4 units of quantitative analysis. (UCD General Chemistry 2A, 2B, 2C or equivalent)
- **Organic Chemistry:** At least 6 units of organic chemistry. (UCD Organic Chemistry for Health and Life Sciences 118A, 118 B, 118C or UCD Organic Chemistry 128 A and 128B or equivalent)
PTX-Approved Degree Requirements

- **Physics:** A total of 12 units, including 3 units of general physics laboratory. (UCD General Physics 7A, 7B and 7C or equivalent)
- **Biology:** At least 5 units of general biology course (e.g., Principles of Biology). (UCD Introductory Biology 1A or equivalent)
- **Mathematics:** 9 units of higher mathematics, including differential and integral calculus. (UCD 21A, 21B, 21C Calculus or equivalent)
- **Biochemistry:** 12 units of general biochemistry, including biochemistry laboratory. (UCD Biological Sciences 101 (Genes and Gene Expression), 102 (Structure and function of biomolecules), 103 (Bioenergetics and metabolism) and 120L Biochemistry laboratory or equivalent)
- **Physiology:** 5 units of systemic or mammalian physiology. UCD NPB 101 (Systemic Physiology) or equivalent

**b) Deficiencies**

Course work deficiencies should be made up by the end of the first academic year following initial enrollment by earning a letter grade of 'B' or better.

**2) Dissertation Plan B:**

For Plan B, the Dissertation Committee consists of at least three members, who guide the candidate in his or her dissertation research; the Chair of the Committee is the candidate's Major Professor. At a minimum, the candidate must meet with the Dissertation Committee annually and more frequent meetings can be very helpful.

If the Dissertation Committee decides to hold a final oral examination, it will assume the role of the Dissertation and Final Examination Committee. All members of this Committee must be present at the final oral examination, which focuses primarily on questions arising out of the relationship of the dissertation to the general field of study of the dissertation. This examination shall be held after oral presentation of the dissertation to the Dissertation Committee but before final action has been taken on it. Admission to the final oral examination can be restricted at the discretion of the graduate program. If admission is restricted, it shall include all members of the Dissertation and Final Examination Committee and may include other members of the Academic Senate and/or guests of equivalent rank at other institutions.

An exit seminar is required of all students. This must be announced in advance to all members of the graduate group. Satisfaction of this requirement shall be verified by the chair of the Dissertation Committee.

Not later than three weeks before the end of the quarter in which the degree is to be conferred, the candidate shall file with the Dean of Graduate Studies one copy of the dissertation (the original if typewritten) approved by the committee in charge. An abstract of the dissertation must be filed by the same date.

**3) Course Requirements:**

The course requirements for the PhD are 36 hours of graduate level or upper division course work which includes core required courses, statistics, at least 8 units of advanced courses in pharmacology and toxicology and at least 5 units in areas supporting pharmacology and toxicology as disciplines (biochemistry, physiology, molecular biology and others). Other requirements include seminars, teaching, and lab rotations (see under special requirements for further information).

**a) Core courses (17 units)**

All students are required to complete the PTX core courses without substitution. There are three required PTX courses and one required statistics course. A higher level statistics course may be substituted for Statistics 100.
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTX 201</td>
<td>Principles of Pharmacology and Toxicology</td>
<td>5</td>
</tr>
<tr>
<td>PTX 202</td>
<td>Principles of Pharmacology and Toxicology</td>
<td>4</td>
</tr>
<tr>
<td>PTX 203</td>
<td>Principles of Pharmacology and Toxicology</td>
<td>4</td>
</tr>
</tbody>
</table>

Required Statistics

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA100</td>
<td>Applied Statistics for Biological Sciences</td>
<td>4</td>
</tr>
</tbody>
</table>

b) Elective courses selected from the following areas:

i) Advanced Pharmacology/Toxicology (at least 8 units)

Examples of courses which can be taken to fulfill this requirement include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETX 203</td>
<td>Environmental Toxicants</td>
<td>4</td>
</tr>
<tr>
<td>ETX 214</td>
<td>Mechanisms of Toxic Action</td>
<td>3</td>
</tr>
<tr>
<td>ETX 220</td>
<td>Analysis of Toxicants</td>
<td>3</td>
</tr>
<tr>
<td>ETX 220L</td>
<td>Analysis of Toxicants Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>ETX 228</td>
<td>Gas Chromatography/Mass Spectrometry of Toxic Chem.</td>
<td>3</td>
</tr>
<tr>
<td>ETX 234</td>
<td>Neurophysiological Basis of Neurotoxicology</td>
<td>3</td>
</tr>
<tr>
<td>ETX 240</td>
<td>Ecotoxicology</td>
<td>3</td>
</tr>
<tr>
<td>ETX 250</td>
<td>Reproductive Toxicology</td>
<td>3</td>
</tr>
<tr>
<td>ETX 260</td>
<td>Immunotoxicology</td>
<td>3</td>
</tr>
<tr>
<td>ETX 270</td>
<td>Toxicology of Pesticides</td>
<td>3</td>
</tr>
<tr>
<td>ETX 278</td>
<td>Molecular Techniques</td>
<td>3</td>
</tr>
<tr>
<td>PTX 277</td>
<td>Apoptosis and Disease</td>
<td>2</td>
</tr>
<tr>
<td>VMB 253</td>
<td>Toxicant and Drug Metabolism</td>
<td>2</td>
</tr>
<tr>
<td>VMB 254</td>
<td>Respiratory Toxicology</td>
<td>2</td>
</tr>
<tr>
<td>VMB 266</td>
<td>Mass Spectrometry in Biological Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

ii) Breadth Requirements (at least 5 units)

All students are required to take at least 5 units of advanced graduate level coursework in morphology, biochemistry, cell biology, immunology, pathology, epidemiology or molecular biology to structure their program for maximum benefit in their interest area. In some instances upper division undergraduate courses may be taken to fulfill the course unit requirements. Students should consult with their Major Professor and with their Graduate Adviser for acceptable choices. A list of courses taken by PTX GG students is provided in Table 1, appendix. This list provides examples but is not intended to be all inclusive. Courses are evolving and students should work with their Graduate Advisers to outline a course of study tailored to their interests and needs.

**Total units of required courses**: 36 units

4) Special Requirements:

a) Seminars

A total of 6 seminar courses are required in the first 2 years of the graduate program. Seminars in the Fall and Winter of the first year and Fall and Spring of the second year are offered as PTX 290; CRN numbers for the proper course are available from the graduate administrative assistant. Seminars that are required include:

First year

<table>
<thead>
<tr>
<th>Term</th>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Meet the professor(s)</td>
<td>1</td>
</tr>
<tr>
<td>Winter</td>
<td>Rotation/lab presentations</td>
<td>1</td>
</tr>
<tr>
<td>Spring</td>
<td>Seminar of the student’s choice</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Rotation/lab presentations</td>
<td></td>
</tr>
</tbody>
</table>
Second year

Fall: Grant Writing 1 unit
Winter: Seminar of the student's choice 1 unit
Spring: Preparation for oral qualifying examination 1 unit

b) Lab Rotations
Doctoral students will conduct four 5-week rotation projects during the Fall and Winter Quarters (3-6 credit units each quarter) and then choose a lab for their dissertation research starting in the Spring. Students are strongly encouraged to complete all 4 rotations in different laboratories since this provides an overview of research being conducted in different laboratories and helps ensure a good fit between student and Major Professor. In some cases, students will establish a satisfactory arrangement with a Major Professor prior to the Spring Quarter and may choose to opt out of the rotation schedule to begin their research work for a degree. In unusual cases the students, with consent of the Graduate Adviser, may elect to do one more quarter of rotation when a suitable Major Professor has not been identified in the first two quarters of rotation. At the end of each quarter, students write short summaries of their projects and present the results to each other at a mini-symposium (PTX 290 Winter and Spring Quarters). The Committee on Educational Policy organizes the mini-symposium. Students are encouraged to make arrangements for their rotations early; if needed, students should seek assistance in selecting laboratories for rotations from their Graduate Adviser.

Faculty who have students complete rotations in their laboratory are also requested to prepare and submit to the graduate group administrator a short summary of the student's performance during the period of the laboratory rotation.

c) Teaching Experience
Graduate students in the PTX Ph.D. program are required to gain teaching experience in pharmacology or toxicology. The existing regulation is as follows:

In order to satisfy the (teaching) requirement, the student is expected to:

i) Serve as a teaching assistant for a minimum of one academic quarter in a course preferably taught by a member of the PTX GG. This participation must include a significant teaching and/or laboratory component, and exam generation and grading.

ii) Formally register for 1-3 units (depending upon the department) of 297T/396 or the equivalent during the quarter in which the student participates as a teaching assistant.

iii) Receive a satisfactory grade in the 297T/396 course. In addition to the grade, the instructor-in-charge will meet with the student to discuss strengths and weaknesses with the goal of improving the student's teaching experience.

d) Summary of course/special requirements and typical course of study

Figure 2 (below) shows a typical program of study for a doctoral student in the PTX GG for the first 2 years.
5) Committees:

a) Executive Committee
The Executive Committee of the Pharmacology and Toxicology Graduate Group (PTX GG) is responsible for setting the overall direction of the group. Chairs of each of the standing Committees are selected from the membership of the Executive Committee. The Executive Committee recommends admissions targets, reviews the progress of all graduate students annually and considers changes to the bylaws and to the guidelines under which the graduate group operates.

b) Committee on Admissions, Recruitment and Fellowships
Once the completed application and all supporting materials, and the application fee have been received, the application will be submitted to the Admissions Committee. The Admissions Committee consists of a Chair, appointed from the Executive Committee, 6 voting members of the graduate group, the Chairperson of the Executive Committee (ex officio) and a representative graduate student. At least two of the voting members will be official Graduate Advisers of the PTX GG. The Admissions Committee will make a recommendation to the Dean of Graduate Studies for admission/denial of each applicant. Notification of admissions decisions will be sent by Graduate Studies. The deadline for applications is January 15 for fall admission of that same year. Under unusual circumstances, admissions at other times will be considered.

The same group of faculty and graduate student will also serve as the Recruitment and Fellowship Committees. The Committee, along with the Chair of the graduate group, will be responsible for recruiting students. Those applicants deemed exceptional will be selected for fellowship support. The deadline for priority applications is January 15 for fall admission of that same year. Applications will be considered until May 1. Under unusual circumstances, such as graduate students moving with a newly recruited faculty member, admissions at other times will be considered.
c) Committee on Educational Policy
The Committee on Educational Policy (CEP) is charged with setting the standards for graduate education within the PTX GG. CEP consists of a Chair selected from the Executive Committee along with five or more voting members, two of whom are Graduate Advisers. Two representative graduate students will serve on the committee. CEP is charged with: 1) reviewing all proposed new course offerings to determine whether they meet the standards acceptable for credit toward graduate degrees offered through the group, 2) reviewing all core courses, 3) appointing the instructor of record for the core courses, 4) nominating members to qualifying examinations, 5) preparing and administering the written qualifying examination for all students, and 6) evaluating the petitions from graduate students/advisers wishing to substitute comparable courses taken at other institutions for PTX degree requirements.

d) Comprehensive Examination Committee
All students must pass a comprehensive written exam (also referred to as Qualifying Examination Part A) that focuses on testing basic competence in the broad field of pharmacology and toxicology and will be based on material presented in PTX 201, 202, and 203. This part of the exam will test the depth of a student’s factual knowledge, and ability to integrate that knowledge into coherent written responses. The examination will be administered to all students (MS and PhD) in the program simultaneously within a month of completion of Spring Quarter, first year. The examination will be prepared by the CEP with assistance of instructors in the PTX 200 series. Students not receiving a passing grade on the exam will be required to remediate the deficiencies. The remediation will be determined by the faculty member who wrote the question with approval of CEP. Failure on several parts of the exam may result in dismissal from the program or in other remediation as determined by CEP. This may involve taking the written qualifying exam a year after the first attempt. Failures in any parts of this second examination will result in dismissal from the program.

e) Oral Examination Committee
PhD students are generally expected to take the Oral Qualifying Examination (also referred to as Qualifying Examination Part B) at the end of their second year or in the beginning of their third year. The qualifying examination must be passed no later than the end of the third year. The student is required to prepare a written research proposal and submit it to the qualifying exam committee 1-2 weeks prior to the qualifying examination. The area of examination and the composition of the committee are requested in the Application for Qualifying Examination. The student must meet the following criteria set by Graduate Studies:

To be eligible for examination, the student must have satisfied all group requirements, have removed all deficiencies, and must have at least a 'B' average in all work undertaken during their enrollment in the graduate program. Students must be registered during the quarter in which they take their Qualifying Examinations.

Oral qualifying examination committees are to consist of 5 members; 2 of the members of the examination committee should be chosen so that they would serve on the dissertation committee.

i. Committee Composition: The student, in consultation with the Major Professor will nominate 3 examiners who are knowledgeable in the student’s research area. The CEP will generally honor this request, unless there appears to be a conflict of interest. The remaining 2 faculty will be nominated from the graduate group by the CEP so that examination committees represent a broad range of faculty expertise. Departmental chairs are ineligible to serve as examining committee chairs for any student housed in their department and it is strongly recommended that the chair of the examining committee be housed in a department different from the student’s home department. The student should complete the form titled “Request for Oral Qualifying Examination
Committee”, nominating 3 selected committee members and submit the form to the Committee on Educational Policy after obtaining the approval of the student’s Major Professor and Graduate Adviser. Once the CEP has nominated the remaining 2 members and all members have agreed to participate, the Pharm/Tox administrative assistant will submit necessary forms to the Dean of Graduate Studies. The Dean of Graduate Studies appoints the final committee. (Note: the Graduate Council granted the Pharmacology / Toxicology graduate program an exemption from the requirement to have a committee member “external” to the graduate group, due to the size of the group, its breadth, and the fact that the CEP already nomintates 2 faculty members to represent a “broad range of faculty expertise”.)

ii. Exam Scheduling: Setting the date, time and place of the examination is an internal matter that does not require Graduate Studies approval. Upon the Dean's approval of the committee, the student, with the assistance of the Chair of the student’s committee, schedules the examination when the participating faculty and student are available. It is recommended that a reminder memo indicating date, time, and place be sent to each committee member.

iii. The Examination: The general purpose of the dissertation oral examination is to test the student’s ability to design and execute scientific research. Ph.D. students are expected to demonstrate detailed understanding of their chosen field and an understanding of independent problem solving and a proficiency in the scientific method.

The Graduate Group has defined the nature of the PhD Oral Qualifying Examination in PTX as follows:

The Committee examines the student's critical reasoning ability and understanding of proposed methods and their limitations. Also stressed in the oral examination are the student's creativity, problem solving skills and powers of synthesis. The student should specify a field of emphasis (approved by the Major Professor) in which he/she will be examined in greater depth.

f) Dissertation Committee
The PhD student in conjunction with their Major Professor and Graduate Adviser shall recommend a Dissertation Committee consisting of the student’s Major Professor (as Chair), and at least two additional members to Graduate Studies. All recommended members not authorized by the Graduate Group Bylaws to serve on graduate dissertation committees must be approved by the Dean of Graduate Studies. This committee will evaluate whether the dissertation has been satisfactorily completed. Dissertation committee nominations are submitted to the Office of Graduate Studies for formal appointment in accordance with Graduate Council policy (DDB 80. Graduate Council, B.1.). Refer to the Graduate Studies website for additional details regarding the filing of a dissertation.

6) Advising Structure and Mentoring:

The Graduate Adviser is a key figure for all graduate students throughout their programs of study, but particularly during the period prior to advancement to candidacy. Graduate Advisers are assigned to each student upon their indication of intent to matriculate into the program. The role and responsibilities of the Graduate Adviser are listed in detail in the *Graduate Adviser's Handbook*, published by Graduate Studies. In the PTX GG program the major responsibilities of the advisers are:

a) Review and approve each graduate student's study list each quarter.

b) Review and act on petitions of graduate students regarding changes in course registration.

c) In cooperation with students and Major Professors, review the nominations of
comprehensive/qualifying examination committees, requests for advancement to candidacy, and nominations of thesis/dissertation committees.

d) Serve on either the Pharmacology/Toxicology Educational Policy or the Admissions Committees.

e) In general, act as a graduate student's primary source of information concerning the academic program and provide assistance with the procedural details of progress toward the degree.

The Graduate Adviser is involved in many aspects of a graduate student's progress. New students should meet as soon as possible with their Graduate Advisers to discuss academic registration, adequacy of undergraduate preparation, and lab rotations. In those cases where students choose to conduct their planned thesis/dissertation in the laboratory of their Graduate Adviser another Graduate Adviser will be assigned.

7) Advancement to Candidacy:

Students are expected to take their oral qualifying examination at the end of their second year or in the beginning of their third year of graduate study. The Qualifying Exam Committee votes to recommend pass, fail or not-pass to the Dean of Graduate Studies. In case of not-pass, the student is advised of his/her deficits, solutions to make up the deficits, and a timeline for completion. Upon the completion of the second attempt at the Qualifying Exam, the Qualifying Exam Committee votes a pass or fail vote to the Dean of Graduate Studies. Split votes are recorded accordingly and the committee chair summarizes the deliberations and transmits the information to Graduate Studies for Consideration by Graduate Council.

Application for candidacy is made with the Application for Candidacy for the Degree of Doctor of Philosophy (Plan B) form. Students are strongly encouraged to file for candidacy upon completion of the qualifying examination or as soon thereafter as possible. A $65 Candidacy Fee must be paid before presenting the completed form to the Dean of Graduate Studies. The Graduate Adviser, in consultation with the student and Major Professor, nominates a three-person Dissertation Committee. The Major Professor is usually chairperson of the Dissertation Committee. The application, which must be signed by the Dissertation Committee Chairperson (Major Professor) and the Graduate Adviser, is forwarded to Graduate Studies for approval.

As partial fulfillment of the PhD requirements, the candidate must submit an acceptable dissertation based upon original, independent research. The student’s research is guided by a Dissertation Committee of three scientists, led by the Major Professor, and appointed by the Dean of Graduate Studies. The Chair of the Dissertation Committee must be a member of the Graduate Group.

The student is required to prepare a written proposal of the dissertation research and present it to the Dissertation Committee within three months of passing the qualifying examination. Although the format of the research proposal is up to the discretion of the Major Professor, it is recommended that it include a one page abstract, the specific aims of the project, the experimental design and methods to be used, a report of any preliminary data that may have been obtained, a discussion of the significance of the study and selected references. The formats and instructions used by major granting agencies concerned with the topic of the proposal, such as the National Institutes of Health or the National Science Foundation, are useful models.

It is the responsibility of the Major Professor to see to it that at a minimum annual progress reports are prepared by the student and given to the Dissertation Committee and that Graduate Studies is informed of the student's progress. Students are encouraged to schedule committee meetings more frequently depending upon their progress.

The dissertation proposal is intended to provide the student with a framework from which to plan his/her research activities and should not be viewed as an inflexible plan that prevents the student from pursuing more interesting avenues of research should these arise.
8) **Normative Time and Time to Degree:**

The normative time to the PhD degree is 4.5 to 5 years. In some cases this normative time is shortened for those students entering with a MS degree and transferable credits from another university. Graduate Council has approved specific policies regarding time to degree which state:

> ‘Students will have 4 calendar years after the date they pass their qualifying examination to submit their dissertation. At this time, if a student has not submitted his/her dissertation to Graduate Studies, this student will receive a notice from Graduate Studies that s/he is placed on probation, and has 1 year from that date to submit the dissertation. If not submitted within 1 year, the student will no longer be allowed to enroll the following quarter and will be dismissed.’

International students are entitled to reduced Non-Resident Tuition for a period of 3 years from the date of their Qualifying Examination and it is in the student's and program's best interest to stay within this time period.

9) **Sources of Funding:**

All PhD students are normally supported during their tenure as graduate students in the PTX GG program. The first 2 quarters of graduate study are supported primarily by block grant funding from the Graduate Dean's office. Students are expected during their rotations to make arrangements with a laboratory of their choice for continued funding for their stipend, fees and non-resident tuition, where applicable. Students should work with their Major Professor and with their Adviser in the event of a funding shortfall. A limited number of TA ships are available and many faculty will assist students in their laboratory to obtain extramural sources of support such as EPA STAR grants, NIH predoctoral fellowships and various on campus sources of fellowship support.

10) **PELP and Filing Fee Status, Change of Degree, Change of Program and Departure of Major Professor:**

During the course of a graduate student's progress toward a degree, any one of several events may occur, including the following: (1) necessity to take a break in registration, (2) change of degree objective, (3) change of major, and (4) departure of Major Professor.

a) **Break in registration**

A student may discontinue registration because of withdrawal or leave. Leave may be one of two types: (1) planned educational leave or (2) indeterminate leave.

i) **Planned Education Leave Program (PELP)**

The purpose of this program is to allow students to suspend registration for good cause (e.g., health, financial reasons, extramural research opportunities) and be guaranteed reentry upon the completion of a specified period of absence. The minimum leave is 1 quarter and the maximum is 3 quarters. Upon written request and approval of the Graduate Adviser and Graduate Studies, the leave period may be shortened or lengthened for good cause. To be granted planned leave, the student must submit a PELP application (along with a fee) that is signed by the Graduate Adviser and submitted to the Dean of Graduate Studies. An approved PELP application guarantees reentry to the quarter specified in the application. The Graduate Adviser can furnish more details on this program.
ii) Indeterminate Leave and Admission

Students who are not approved for a planned educational leave are not guaranteed reentry into the program. In order to be considered, it is necessary that the student file an Application for Readmission with Graduate Studies. A fee is charged for the Application. The PTX Admissions Committee considers all readmission applications along with regular applications for admission; a Readmission Application does not guarantee readmission to the program.

b) Change of Degree Objective

Students are specifically admitted for study towards one of three degrees, a Masters by thesis/examination (Plan I), a Masters by course work/examination/literature review (Plan II) or a research oriented PhD. Students are expected to complete the degree for which they were admitted. Some PhD students may elect to complete a Masters degree during the course of their doctoral studies. All of the requirements for separate MS and PhD programs will apply. A student in good academic standing may make a request for a change in degree objective by completing the Graduate Studies form Petition for Change of Degree Objective and submitting it to their Graduate Adviser.

i) Masters Degrees

Transfers between Masters degrees require discussion with and approval of the student's Graduate Adviser. The Graduate Adviser will consult with the Major Professor involved in a transfer from Plan I to Plan II. A written commitment of a member of the Graduate Group to be the student's Major Professor is required for transfers from Plan II to Plan I. The Graduate Adviser will notify the Admissions Committee and the Group chairperson of the decision.

ii) MS to PhD

The Masters degree is not necessarily a terminal degree in the Graduate Group. Students may reapply for admission to the PhD program during their first year of study or after completion of the MS. Transfer from a Masters to a PhD program requires approval of the Graduate Group Admissions Committee. Students requesting such a transfer must obtain three letters of recommendation including one in which a member of the group agrees to be the Major Professor, a new statement of purpose and a recommendation from the student's Graduate Adviser.

iii) PhD to MS

The student's Graduate Adviser may approve transfers from the PhD program to either of the Masters degrees after consultation with the student's Major Professor. The Graduate Adviser will notify the Admissions Committee and the Group Chairperson of the decision.

c) Change of Major

A student who wishes to change from PTX to another major (i.e., another graduate program on the Davis campus) obtains a Petition for Change of Major from Graduate Studies. The student's Graduate Adviser must sign the petition (and notify the Group Chairperson) before either Graduate Studies or the new graduate program will honor the petition.

d) Departure of Major Professor

When the Major Professor for a student whose degree objective is either MS Plan I or PhD resigns or retires from the graduate group, the following procedures are followed:
i) If the student is well along in the thesis/dissertation research, as certified by the Thesis/Dissertation Committee, it is appropriate for the student to complete the preparation of the thesis/dissertation, either on the Davis campus or in absentia. The approved thesis/dissertation will be submitted to Graduate Studies in accordance with their regulations. NOTE: Master's degree candidates must have been in residence at UC Davis at least three regular academic quarters. Doctoral candidates must have been in residence at least six academic quarters.

ii) If the student is not well along in the development of the thesis/dissertation research project, then one or the other of the following alternatives must be selected:

The student selects a new Major Professor from the membership of the PTX GG.

OR

The student elects to withdraw from the UC Davis PTX program. The negotiations involved in the decisions indicated above will concern the Graduate Adviser, the Thesis/Dissertation Committee (if appointed) and the Major Professor. The procedures given above are guidelines, not regulations.

Although not recommended by the Group, it is possible for the departing Major Professor to retain membership on the Thesis/Dissertation committee. This requires a request and letter of explanation from the Graduate Adviser to the Dean of Graduate Studies. The Thesis/Dissertation Committee must be chaired by a current UC Davis faculty member.
## Table 1
Examples of Elective Courses which Satisfy the PTX GG requirement for ‘distribution’

<table>
<thead>
<tr>
<th>Course ID</th>
<th>Course title</th>
<th>Units/Quarter</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIC 215</td>
<td>Recombinant DNA</td>
<td>3 (I)</td>
<td>Privalski</td>
</tr>
<tr>
<td>MCB 256</td>
<td>Cell &amp; Molec Biol Cancer</td>
<td>2 (I)</td>
<td>Armstrong</td>
</tr>
<tr>
<td>PMI 283 -</td>
<td>Comp Av Anat Path</td>
<td>3 (I)</td>
<td>Lowenstein</td>
</tr>
<tr>
<td>MCB 162</td>
<td>Human genetics</td>
<td>3 (I)</td>
<td>Chedin</td>
</tr>
<tr>
<td>APC 286</td>
<td>Basics of microscopy and cellular imaging</td>
<td>2 (III)</td>
<td>Van Winkle</td>
</tr>
<tr>
<td>MCB 241</td>
<td>Membrane Biology</td>
<td>3 (III)</td>
<td>Longo, Voss</td>
</tr>
<tr>
<td>MCP 200L</td>
<td>Animal Cell Culture</td>
<td>4 (II)</td>
<td>Wilson, Wu</td>
</tr>
<tr>
<td>NSC 201</td>
<td>Neuroanatomy</td>
<td>3 (I)</td>
<td>Amaral, Jones, Usrey</td>
</tr>
<tr>
<td>NSC 221</td>
<td>Cellular Neuroscience</td>
<td>4 (I)</td>
<td>Trimmer, Yamoah</td>
</tr>
<tr>
<td>MIC 263</td>
<td>Principles of Protein Nucleic Acid Interact</td>
<td>3</td>
<td>Staff</td>
</tr>
<tr>
<td>PMI 285</td>
<td>Cell Basis of Disease</td>
<td>3 (II)</td>
<td>Mohr, Wu</td>
</tr>
<tr>
<td>ANS 131</td>
<td>Reproduction and early development in aquatic animals</td>
<td>4 (III)</td>
<td>Doroshov</td>
</tr>
<tr>
<td>IMM 201</td>
<td>Intro Immunology</td>
<td>4 (I)</td>
<td>Miller</td>
</tr>
<tr>
<td>PGG 220</td>
<td>General and comparative physiology of reproduction</td>
<td>3 (III)</td>
<td>Anderson, Conley, Lasley</td>
</tr>
<tr>
<td>MCB 251</td>
<td>Biology of fertilization</td>
<td>3 (I)</td>
<td>Myles</td>
</tr>
<tr>
<td>WFC 121</td>
<td>Physiology of Fishes</td>
<td>4 (II)</td>
<td>Cech</td>
</tr>
<tr>
<td>CHA 203</td>
<td>Neurobiology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGR 211</td>
<td>Principles of HPLC</td>
<td>2 (III)</td>
<td>Goyal</td>
</tr>
<tr>
<td>MCB 200B -</td>
<td>Cur Tech in Biochem</td>
<td>2 (II)</td>
<td>Kaplan</td>
</tr>
<tr>
<td>MCB 257</td>
<td>Cell Prolif Cancer Genes</td>
<td>3 (I)</td>
<td>Radke</td>
</tr>
</tbody>
</table>
Table 2

Checklist

**Graduate Program in Pharmacology and Toxicology**

**Annual Progress Checklist**

<table>
<thead>
<tr>
<th>Student's Name</th>
<th>SS#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty Advisor</td>
<td></td>
</tr>
</tbody>
</table>

Quarters you were registered:  □ Fall  □ Winter  □ Spring  200_

**Instructions:** Please indicate which program requirements you satisfied this year. Student and faculty advisor must sign the form. Return to Christal Winter in the Dept. of Environmental Toxicology.

**PTX Core:**  □ PTX 201  □ PTX 202  □ PTX 203

**PTX Seminar:**  □ PTX 290 (Meet the faculty)
                   □ PTX 290 (Seminar or Careers in PTX)
                   □ PTX 290 (How to write a research proposal)
                   □ PTX 290 (Qualifying Exam Preparation)
                   □ Other (Please specify): ____________

Did you give a seminar this year:  □ Yes  □ No  Which quarter? ____________

**Lab Rotation:**  □ First  □ Second  □ Third  □ Fourth  Whose lab? ____________

**Admission Prerequisite Requirements**

□ Biochemistry (specify which course) ____________

□ Biochem. Lab (specify which course) ____________

□ Physiology (specify which course) ____________

□ Other (specify which course) ____________

□ Waiver of Requirement ____________

(You must enclose written justification from your Advisor or Major Professor)

**Teaching Assistant Requirement** (specify which course) ____________

**Electives in Pharmacology and Toxicology** (specify which course) ____________

**Breadth Requirement** (specify which course) ____________

**This Year Were You On:**  Filing Fee Status?  □ Yes  □ No
                           PELP?  □ Yes  □ No
                           Which quarter(s)?  □ Fall  □ Winter  □ Spring

Thesis committee must meet once a year.  
Date ____________  Major Professor's Initials ____________

Student's Signature ____________  Advisor's Signature ____________  Major Professor's Signature ____________