DOCTORAL DEGREE PROGRAMS
In Pharmacology and Pharmaceutics

The Department of Pharmacological and Pharmaceutical Sciences

College of Pharmacy
University of Houston
Houston, TX 77204-5307
713-743-1222

Policies and Procedures

Adopted 8/12/98
Modified Spring 2004
Modified June 2006
Modified August 2010
Modified September 2011
Modified November 2011
Modified July 2012
I. Admission to the Ph.D. Program

All applications for admission to the Ph.D. programs in Pharmacology and Pharmaceutics are made to the Department of Pharmacological and Pharmaceutical Sciences Graduate Education Committee, which is composed of four faculty members from the Department of Pharmacological and Pharmaceutical Sciences (the Department). The Director of Graduate Education (DoGE) is one of those four members and chairs the Committee.

Students with a B.S. degree in Biochemistry, Biology, Chemistry, Pharmacy or related sciences are encouraged to apply for admission into the Ph.D. program in Pharmacology. Students with a B.S. in Pharmacy, Chemistry or Biological sciences are encouraged to apply for admission into the Ph.D. program in Pharmaceutics. The minimum requirements for admission into the Ph.D. programs include a 3.0 GPA in science and math courses and ranking in the top 20% of their graduating class. Graduate Record Examination (GRE) scores should be above the 70th percentile for the verbal, quantitative and analytical writing sections of the general aptitude exam. Three letters of recommendation are required from individuals who are familiar with the applicant's previous academic performance and potential for success in graduate school and a career in biomedical science. International students must submit English test scores from any of the following: IELTS (6.5 minimum); internet-based TOEFL exam (80 minimum); or SPEAK (50 minimum). Prerequisites for admission into the Pharmacology program include human physiology and biochemistry. Students with no record of taking these courses as undergraduates must take one-semester courses in these areas before entering or in addition to the rest of the curriculum.

The total number of students admitted to each program varies from year to year and meeting the minimum requirements is not a guarantee of acceptance into a program. The department's Graduate Education Committee will evaluate all completed applications beginning January 1 of each year. Initial evaluations will be completed by February 1 for admission in the fall. All students submitting completed applications will be informed of the committee's decision in writing.

II. Course Requirements for the Doctor of Philosophy Degree

A. Number of hours required and minimum grades. The student must complete a minimum of 80 Cr. Hr. for the Ph.D. degree, including 40 Cr. Hr. of research and a minimum of 40 Cr. Hr. of graduate or doctoral degree courses approved by the departmental faculty. A maximum of 11 Cr. Hr. of special problems research (6X98), exclusive of specific lecture/laboratory special problem courses, may be counted toward the 40 Cr. Hr. minimum research hours required. The remaining 29 research hours must be at the doctoral level (8X98 or 8X99). Although not counting towards your degree, 6X98 hours in excess of 11 may be taken to meet the full time enrollment requirements for employment, immigration and continuous enrollment. Full time enrollment is 9 hours in the spring and fall, and 6 hours in the summer.

In accordance with the University of Houston guidelines, the department may approve a maximum of 9 Cr. Hr. of transfer credits from another institution. Once you transfer, you must complete a full year of coursework at UH before being allowed to graduate and receive a degree.

A cumulative grade point average of at least 3.00 (A = 4.00) must be maintained in all graduate level courses required for the Ph.D. degree in order to obtain an advanced degree from the College of Pharmacy. Graduate level courses are defined as all courses required for the Ph.D. degree as defined either by the department and/or dissertation committee.

Students who receive a grade of ‘C’ or lower in more than 8 Cr. Hr. of courses will be dismissed.
from the program. In addition, a student with an ‘I’ as the most recent grade in a graduate level course will not be eligible for graduation.

A student receiving an ‘F’ in a course with 3 or more Cr. Hr. will be dismissed from the program with no appeal. A student receiving a ‘D’ in a course with 3 or more Cr. Hr. will be dismissed unless the GEC determines that other aspects of the student’s career (e.g. high GPA, publications) warrant the student’s continuation. If the student is permitted to continue, he/she must repeat the course and achieve at least a ‘B’ grade. Failure to get a ‘B’ on the second try will result in immediate dismissal from the program. A student receiving two Unsatisfactory (U) grades in any course will be dismissed from the program.

B. Ph.D. in Pharmacology

i). Required Courses

1. PCOL 6370 Advanced Pharmacology I. 3 Cr. This course covers the basic principles of drug action including in-depth assessments of drugs that influence the central and peripheral nervous systems and effector tissues. Specific emphases are the sites and mechanisms of drug action and current research procedures used for investigation of site and mechanism.

2. PCOL 6371 Advanced Pharmacology II. 3 Cr. An in-depth study of the site and mechanisms of actions of drugs which affect the kidneys, cardiovascular and endocrine systems, as well as current research procedures used to study those actions. Pathophysiological states which justify the use of these agents also are discussed.

3. PHCA 6308 Biostatistics and Experimental Design 3 Cr. Discuss and give practical experience in the statistical methods and experimental designs used in the pharmacological and biological sciences. The course consists of lectures, discussion, and outside assignments. Topics include populations and population descriptions, study design and formulation of hypothesis, determination of minimum sample size, parametric versus non-parametric statistics, t-tests, correlation, linear regression, one, two, and multivariate ANOVA, and use of computers for statistical analysis.

4. PCOL 7333 Principles of Molecular Pharmacology. 3 Cr. Topics include DNA (structure, function and replication), RNA (structure, function, and translation), control of gene expression, recombinant DNA molecules and methods (cloning and PCR), construction of cDNA libraries and use of on-line library services, transgenic models of disease and gene therapy (methodology and theory).

5. PCOL 6180, 6181, 7180, 7181 Pharmacology Seminar. 1 Cr. (each).

6. PCOL 6141, 6142, 7141, 7142 Pharmacological Literature Review. A critical review of the pharmacological literature, this course includes an analysis and appraisal of selected publications.

7. PCOL 7370 Scientific Writing. 3 Cr. Planning, preparation and evaluation of effective research manuscripts (articles) and grant proposals in the pharmaceutical sciences.

8. PCOL 6462 Cardiovascular and Renal Pharmacology. 4 Cr. A detailed examination of the mechanisms of action of drugs which influence cardiovascular and renal function. Topics include interrelationship between fluid balance and blood pressure, natriuretic factors, contractile mechanisms in
myocardium, and vascular smooth muscle.

9. PCOL 7362 Neuropharmacology. 3 Cr. Prerequisite: consent of instructor. Physiology and pharmacology of synaptic mechanisms in the central and peripheral nervous system with emphasis on mechanisms of drug and neurotransmitter action.

10. PCOL 7350 Cellular Pharmacology. 3. Cr. Drug-receptor theory and analysis, membrane receptors and transporters; their structure, function and regulation as it relates to drug action.

11. BIOL 6197 Responsible Conduct of Research. 1 Cr.

12. Elective. 3 Cr.

ii. Pharmacology Degree Plan (sample)

Year 1, Fall Semester (9 Cr) Odd years
PCOL 6370 Advanced Pharmacology I
PCOL 7333 Principles of Molecular Pharmacology
PCOL 6180 Pharmacology Seminar
PCOL 6141 Pharmacological Literature Review
PCOL 6198 Special Problems in Pharmacology – lab rotation

Year 1, Spring Semester (9 Cr) Even years
PCOL 6371 Advanced Pharmacology II
PCOL 6181 Pharmacology Seminar
PCOL 6142 Pharmacol. Lit. Rev.
PCOL 6398 Special Problems in Pharmacology – lab rotation
PCOL 7362 Neuropharmacology

Year 1, Summer Semester (6 Cr) – major advisor must be selected by end of this semester!
PCOL 6298 Special Problems in Pharmacology
PCOL 6498 Special Problems in Pharmacology

Year 2, Fall Semester (9 Cr) Even years
PHCA 6308 Biostatistics and Experimental Design
PCOL 6180 Pharmacology Seminar
PCOL 6141 Pharmacological Literature Review
PCOL 6498 Special Problems in Pharmacology
PCOL 7350 Cell Pharmacology

Year 2, Spring Semester (9 Cr) Odd years
PCOL 7181 Pharmacology Seminar
PCOL 7142 Pharmacology Literature Review
PCOL 7370 Scientific writing
PCOL 7362 Neuropharmacology
PCOL 6198 Spec Probl Pharmacol

Year 2, Spring Semester (9 Cr) Even years
PCOL 6462 Cardiovascular/Renal
PCOL 6198 Spec Probl Pharmacol
**Year 2, Summer Semester (6 Cr) Even and Odd years**
PCOL 8298 Doctoral Research (If you have completed qualifying exam, otherwise Special Problems)
PCOL 8498 Doctoral Research (If you have completed qualifying exam, otherwise Special Problems)

**Year 3, Fall Semester (9 Cr) Odd years**
PCOL 7180 Pharmacology Seminar
PCOL 7141 Pharmacology Literature Review
PCOL 8498 Doctoral Research (If you have completed qualifying exam, otherwise Special Problems)
PCOL 7350 Cellular Pharmacology

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<th>Year 3, Spring Semester (9 Cr) Odd years</th>
<th>Year 3, Spring Semester (9 Cr) Even years</th>
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<tr>
<td>7181 Pharmacology Seminar</td>
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<td>PCOL 8398 Doctoral Research</td>
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<tr>
<td>PCOL 6462 Cardiovascular/Renal Pharmacol</td>
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**Year 3, Summer Semester (6 Cr) PCOL 8298 Doctoral Research PCOL 8498 Doctoral Research**

**Year 4, Fall Semester (9 Cr)**
PCOL 7180 Pharmacology Seminar
PCOL 7141 Pharmacology Literature Review
PCOL 8398 Doctoral Research
PCOL 8498 Doctoral Research

**Year 4, Spring Semester (9 Cr)**
PCOL 7180 Pharmacology Seminar
PCOL 7141 Pharmacology Literature Review
PCOL 8399 Doctoral Dissertation
PCOL 8498 Doctoral Research

**Year 4, Summer Semester (6 Cr)**
PCOL 8299 Doctoral Dissertation
PCOL 8498 Doctoral Research

**Year 5, Fall Semester (9 Cr)**
PCOL 8398 Doctoral Research
PCOL 8699 Doctoral Dissertation

**Year 5, Spring Semester (9 Cr)**
PCOL 8399 Doctoral Dissertation
C. Ph.D. in Pharmaceutics

i). Required Courses

1. PCEU 6341 Regulatory Affairs. 3 Cr. Aspects of regulatory affairs in clinical pharmacokinetic evaluation and FDA approvals of new drugs and generic products. Topics include clinical trial regulation, good laboratory practice, good manufacturing practice, quality control and assurance, new drug application and abbreviated new drug application, and evaluation of contract analytical labs.

2. PCEU 6342 Advanced Pharmaceutics I. 3 Cr. Topics include proteolytic equilibria and buffer solutions, distribution coefficients, stability kinetics, complexation, enzyme kinetics, micromeritics, dissolution, interfacial phenomena, rheology, kinetics of drug transport through biological membranes, polymers and biomedical applications, solubility and solubilization, and thermodynamics.

3. PCEU 6345 Advanced Pharmaceutics II. 3 Cr. Preformulation and pharmaceutical excipients, solids, solid dosage forms, dispersed systems, microcapsules and microencapsulation, nanoparticles, coatings, microemulsions and multiple emulsions, dermopharmaceutics, controlled release dosage forms, liposomes, drug targeting delivery, biotechnology-derived products, and delivery for gene therapy are topics for discussion.

4. PCEU 6180, 6181, 7180, 7181 Pharmaceutics Seminar. 1 Cr. each.

5. PCEU 6142, 6143, 7142, 7143 Pharmaceutics Literature Review. 1 Cr. Review and critical discussion of the recent literature in pharmaceutics. Discussions of papers dealing with innovative approaches to research problems and on analysis of data used to support experimental conclusions.

6. PCEU 6341 Advanced Pharmacokinetics. 3 Cr (include a 6198 special problems course for a total of 4 hr). The kinetic processes of drug absorption, distribution, metabolism and excretion and the application of these concepts to the interpretation of data; effects of diseases on drug responses and pharmacokinetics; the clinical pharmacokinetics of drug doses and specified drugs in relation to the rational administration of these agents; influence of dosage form and disease on therapeutic and toxic responses. Mathematical derivations of the mass balanced relationships involving rate processes and the physiological importance of those processes in a biological system are correlated.

7. PHCA 6308 Biostatistics and Experimental Design 3 Cr. Discuss and give practical experience in the statistical methods and experimental designs used in the pharmacological and biological sciences. The course consists of lectures, discussion, and outside assignments. Topics include populations and population descriptions, study design and formulation of hypothesis, determination of minimum sample size, parametric versus non-parametric statistics, t-tests, correlation, linear regression, one, two, and multivariate ANOVA, and use of computers for statistical analysis.

8. PCOL 7370 Scientific Writing. 3 Cr. Planning, preparation and evaluation of effective research manuscripts (articles) and grant proposals in the pharmaceutical sciences.

9. PCEU 7340 Advanced Drug Delivery. 3 Cr. This course examines current practices, novel drug delivery systems under investigation and future directions of drug delivery systems and technology.
10. PCEU 7350 Fundamental Laboratory Methods. 3 Cr. Fundamentals of small animal surgery techniques; column, gel, thin layer and high performance liquid chromatographic techniques; fundamental considerations of analytical assay design development and validation; cell culture methodology including use of primary cultures and established cell lines.

11. BIOL 6197 Responsible Conduct of Research. 1 Cr.

12. Elective. 3 Cr.

ii). Pharmaceutics Degree Plan (sample)

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<th>Year 1, Fall Semester, Even Yrs. (9 Cr)</th>
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<tr>
<td>PCEU 6198 Spec Problems Adv. Pharmacokinetics</td>
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<td>PCEU 6341 Advanced Pharmacokinetics</td>
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<td>PCHA 6308 Biostatistics &amp; Experimental Design</td>
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<td>PCEU 6142 Ph a r m a c e u t i c s Literature Review</td>
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<td>PCEU 7340 Advanced Drug Delivery</td>
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<td>PCEU 6341 Regulatory Affairs</td>
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<td>PCEU 6143 Pharmaceutics Literature Review</td>
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<tr>
<td>PCEU 7350 Fundamental Laboratory Methods</td>
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<td>PCEU 6342 Advanced Pharmaceutics I</td>
<td>PCHA 6308 Biostatistics &amp; Experimental Design</td>
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<td>PCEU 6498 Spec Problems in Pharmaceutics</td>
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<td>PCEU 6142 Pharmaceutics Lit Rev</td>
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<td>PCEU 6180 Pharmaceutics Seminar</td>
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Ph.D.Program revisions: 1/99, 8/00, 8/01, 5/03, 2/04, 6/06, 8/10, 9/11, 7/12
Grievance policy revised: 2/06
Year 3, Fall Semester, Even Yrs. (9 Cr)       Odd Yrs. (9 Cr)
PCEU 7180 Pharmaceutics Seminar
PCEU 7143 Pharmaceutics Literature Review
PCEU 7340 Advanced Drug Delivery
PCEU 8398 Doctoral Research

Year 3, Spring Semester (9 Cr)
PCEU 7181 Pharmaceutics Seminar
PCEU 7143 Pharmaceutics Literature Review
PCEU 8798 Doctoral Research

Year 3, Summer Semester (6 Cr)
PCEU8698 Doctoral Research

Year 4, Fall Semester, Odd Yrs. (9 Cr)       Even Yrs. (9 Cr)
PCEU 7180 Pharmaceutics Seminar
PCEU 7143 Pharmaceutics Literature Review
PCEU 8798 Doctoral Research
PCEU 7340 Advanced Drug Delivery

Year 4, Spring Semester (9 Cr)
PCEU 7181 Pharmaceutics Seminar
PCEU 7143 Pharmaceutics Literature Review
PCEU 8798 Doctoral Research

Year 4, Summer Semester (6 Cr)
PCEU 8698 Doctoral Research

Year 5, Fall Semester (9 Cr)
PCEU 8698 Doctoral Research
PCEU 8399 Doctoral Dissertation

Year 5, Spring Semester (9 Cr)
PCEU 8398 Doctoral Research
PCEU 8699 Doctoral Dissertation
III. Other Requirements and Procedures

A. Interim Advisor Program

New students will be assigned two interim advisors by the Graduate Education Committee (one graduate student and the Director of Graduate Education). Assignments are by agreement between the student advisor and the committee, and commence on the first day of orientation. These interim advisors serve the student as a source of information, guidance, moral support and assessment.

Responsibilities of the Director of Graduate Education in this regard include: meeting regularly with the student (at least monthly) to discuss course work and identify problem areas where the student might need extra assistance, ensuring that the student has met with each faculty member to discuss research interests so the student can make an informed decision about research rotations; discussing the student's various T.A. responsibilities and how this impacts the student's course work; and evaluating the student at the end of each semester, including discussion of areas "of improvement" and "for improvement". Once the student selects a permanent advisor, the permanent advisor will directly oversee student progress.

Responsibilities of the student advisor are to assist in the orientation of the student to the department, college and university, provide encouragement to the student, and generally ease the student's transition into the graduate program at UH. The student advisor’s responsibilities are completed at the end of the first year. However, continuation of the advisorship on an informal basis would be encouraged. If necessary, an advisor or the new student may request changes in the assignment. This request must be made in writing to the Graduate Education Committee.

Any student who wishes to switch from Pharmaceutics to Pharmacology or vice versa, may do so during the first year only under very limited circumstances. See Changing Between PCEU and PCOL (posted on PPS Student Blackboard site).

B. Monitoring of Graduate Student Progress

The academic and research progress of each student is monitored initially by the Director of Graduate Education and subsequently by the dissertation advisor. In addition, each graduate student must meet with their advisor and their dissertation committee at least twice a year, (preferably during September and March) following the establishment of that committee. A summary of the committee's deliberations and recommendations should be prepared by the student's advisor and presented to the student and to each of the committee members. A copy of this report also should be placed in the student's file.

C. Laboratory Rotations

First-year students rotate through research laboratories in order: (1) to learn techniques and practice of research; (2) to become acquainted with potential major advisors and committee members; (3) to be critically evaluated by laboratory heads. It is possible to do poorly in rotations and be dismissed from the program.

1. Each laboratory rotation for a first-year student should be approximately ten (10) weeks in duration.

2. Students are required to rotate through at least two (2) different labs of their choice with an additional, optional, rotation allowed if the student is still undecided for a maximum of three (3)
Rotations in different labs are required for TAs and scholarship students. However, RAs can remain in one laboratory, but must submit two ‘rotation’ reports. After three rotations, if the student is still undecided then the Chair of the department will have the option to make the final decision for the student. In this circumstance, the Graduate Education Committee may also dismiss the student from the program if the student’s research abilities are deemed marginal. If a rotation project is not completed by the grading deadline for a term, a grade of ‘I’ will be assigned, and then changed to ‘S’ or ‘U’ when the project is complete.

3. Students are required to provide a brief written report of their research performed at the end of each rotation to their faculty and to the Graduate Education Committee. Use the Student’s Research Rotation Report form (posted on PPS Student Blackboard site).

4. Faculty members will submit critical reports of student’s research abilities to the Graduate Education Committee for evaluation and final decision on the student’s progression.

5. Final grades for all Special Problems courses i.e. rotation/research credit will be assigned by the Chair of GEC at the end of the first year in consultation with the faculty of all labs through whom the student rotated. If the student does not receive at least one satisfactory grade (S), he/she will lose financial support from the department. Also, if a student receives two unsatisfactory (U) grades, he/she will be dismissed from the program.

6. After a minimum of two rotations, the student can select the lab by mutual agreement between the student and the mentor. An agreement form must be completed and signed by the student and the mentor (Appointment of Major Advisor form, posted on PPS Student Blackboard site). Please note that if major advisor does not have a doctorate earned with a dissertation (e.g. Pharm.D.), a co-advisor with an earned doctorate must be appointed.

D. Research Advisor

Following the completion of the two (or three) research rotations, the student will select a permanent advisor. This must be a mutually agreeable decision between the student and the advisor, both of whom must sign the Appointment of Major Advisor Form (posted on PPS Student Blackboard site). The permanent advisor is then responsible for monitoring all aspects of the student's academic and research progress. After selection of the permanent advisor, if the student is unable to work satisfactorily with the advisor, the student may attempt to find another advisor as long as the student is not on academic probation. In all instances, the Graduate Education Committee will review the written evaluations of the student by the advisor; review the reports of the student's committee meetings and attempt to assist the student in either resolving the problem or identifying another advisor. However, documentation of repeated notifications to the student to correct deficiencies in performance without evidence of appropriate action by the student to correct these deficiencies may result in the student's dismissal from the graduate program.

The proximity of the Texas Medical Center and its various institutions may provide opportunities for students to have a research advisor outside of the department. To insure that non-departmental faculty research advisors completely fulfill their duties and responsibilities to the department and the graduate student according to departmental policies: (1) the student must petition the Graduate Education Committee for his/her choice of external advisor; (2) the external advisor must also be approved by the Department as an Adjunct Faculty. Moreover, external research advisors must follow the policies established by the department and must meet regularly, not less than every 6 months, with the students dissertation committee.
to chart the student research progress and outline future objectives and goals.

E. Dissertation Committee

Within 6 months of the selection of a permanent advisor, the student and advisor should assemble the doctoral dissertation committee. The committee shall consist of a minimum of five members: three members from the department (including the major advisor) (and at least two members external to Department and/or the University of Houston). Committee members must meet the criteria stated in the Appointment of Dissertation Committee form (posted on PPS Student Blackboard site). The completed and signed form must be forwarded to the Director of Education Committee.

At the discretion of the permanent advisor, designation of the external members of the committee may be delayed until one year after the selection of the permanent advisor. For example, if progress towards identification of the dissertation project is not sufficient, it may be difficult to identify appropriate external committee members. In this event the Graduate Education Committee should be notified of this decision by memo, which will be placed in the student's file. This memo should provide a target date when it is anticipated that the external committee members can be designated.

F. Requirements for Doctoral Candidacy

Before admittance into doctoral degree candidacy, the student must progress through a two-step qualifying process that should be completed in entirety within the student's sixth long semester in the graduate program. The student must (1) prepare a proposal defining his/her dissertation project, and conduct an oral defense of it; and (2) take a written examination that addresses the student’s knowledge in the area of his/her dissertation research. This procedure enables the dissertation committee to evaluate the student’s progress, determine areas of weakness (that may indicate a need to take an elective course in this particular area), and discuss the project direction before it is too late to make changes. Also, since the proposal will be written on the student’s dissertation topic, many students may be able to submit this as a predoctoral fellowship proposal.

The student may not register for Doctoral Research or Doctoral Dissertation credit hours until after the semester the student completes the oral defense requirement for doctoral candidacy. Until this is done, the student will receive credit for research activities by registering for Special Problems (PCOL 6X98 or PCEU 6X98) hours. Failure to pass both Qualifying Exams by the end of the student’s sixth long semester may result in dismissal from the program due to a lack of progress towards the completion of the degree.

i. Dissertation Proposal and Defense

Students are required to prepare and defend a research proposal. The dissertation proposal should be prepared in the format of an NIH R01 grant proposal. The published instructions for Research Plan be followed in this process with the exception that the entire proposal outside of the form pages should be typed double-spaced to facilitate reading and correction. The student should write the proposal in consultation with his/her advisor and the Doctoral Dissertation Committee. The student must submit a reasonably well-polished and proofed copy of the Dissertation Proposal to the advisor and Doctoral Dissertation Committee at least 14 days prior to scheduling the proposal defense. If the advisor and committee members agree that the proposal is sufficiently complete and ready, then the student may schedule the proposal defense.

The Doctoral Proposal Defense will take place in a private meeting between the student and the Doctoral Dissertation Committee. The defense will begin with a brief (approx. 30 min) presentation by the student, which summarizes preliminary data and the research proposed as the dissertation project. The committee will examine the student following this presentation. This assessment will focus on the
research project proposed by the student but will not be restricted to the project. The committee may also examine the student on relevant information related to the research project such as the literature in the area of the research project and any relevant information from prior course work, which the student has completed. At the conclusion of the defense the committee will make their recommendation, from among the following:

(1) Acceptance of the proposal without modification. In this case the student will proceed with the proposed study as outlined in the proposal. The proposal is then submitted within three days after the defense to the Graduate Education Committee by the advisor for placement in the student's file along with the Approval of Proposal by Dissertation Committee form (posted on PPS Student Blackboard site) signed by all of the committee members.

(2) Acceptance of the proposal with modification. In this case the dissertation committee will make specific recommendations for modification of the proposal that must be incorporated into a revised draft of the proposal. The revised draft of the proposal along with the Approval of Proposal by Dissertation Committee form signed by all of the committee members is submitted to the Graduate Education Committee for placement in the student's file. This should be accomplished within two weeks of the defense.

(3) Rejection of the Proposal. Rejection of the proposal may result from a judgment of the committee that the proposal is inadequately developed and needs more work. In this case the student will be instructed to re-submit the proposal to the dissertation committee. Rejection of the proposal may also result from an inability of the student to adequately defend the proposal. In this case, the committee's determination would be that the student is not knowledgeable enough about the proposed area of study. The students would be instructed as to what areas required improvement and another defense would be scheduled no later than six months after the initial defense.

The student’s advisor prepares a memorandum summarizing the proposal defense and the committee recommendations and a copy is provided to the student and each committee member. In addition a copy is placed in the student's file. A student has 2 opportunities to successfully defend a Dissertation Proposal. Passage with modification constitutes one attempt. If a student fails to successfully defend their proposal on the second attempt, the student will automatically be placed in a contingency M.S. program (Supporting Documents) and the dissertation committee will recommend the appropriate course of the research project in order to complete the M.S. thesis work. If the student has already received an M.S. degree from the Department, the student will be dismissed from the Ph.D. program.

ii). Written Qualifying Examination
This examination will include integrative questions based upon the concepts acquired in the core courses of the student’s discipline, with an emphasis on their applicability to the student’s project. The questions are to be written so that the student can demonstrate the ability to synthesize concepts learned from several courses and apply them to new problems. Each member of the student’s committee contributes to the written examination and should assign the student readings or describe certain areas for intense study beforehand to prepare the student for the forthcoming exam. Each question will be graded by at least two different faculty members (not necessarily committee members, rather the most appropriate faculty member within the Department). Graders return the questions to the student’s advisor within 10 days. The student must demonstrate competency by receiving a grade of at least 75% for entire test, but no
less than 70% of the mean of two graders for any individual question. If the student fails to pass the exam on the first try, she/he will be allowed to take a second exam (no later than the end of the next semester). If it is only a single question that the student fails to achieve a grade of at least 70%, the student may be allowed to retest a single question; it is up to the dissertation committee to determine how the single question will be re-tested. If the student fails on the second try, she/he will not be allowed to progress into Doctoral candidacy, but will be allowed to work for a contingency Master’s degree instead (Supporting Documents). When complete, the student will submit the form Completion of Written Qualifying form (posted on PPS Student Blackboard site), signed by the advisor and all of the committee members.

iii). Dissertation Research and Dissertation Credit Hour Requirements.
Each graduate student in the doctoral program in Pharmacology or Pharmaceutics is required to Complete at least 29 hours of either Doctoral Research (PCOL or PCEU 8X98) or Doctoral Dissertation (PCOL or PCEU 8X99). Students may not register for these courses until they have been granted Doctoral Candidacy status by successfully defending the dissertation proposal and passing the written qualifying examination. For this reason it is very important that the dissertation committee be formed, the project identified, and the proposal be prepared and defended in a timely fashion.

G. Seminar Requirement
A candidate in the Ph.D. program is required to present a 50-minute research seminar based on his/her dissertation research beginning in the fourth year, as a requirement for a Ph.D. in Pharmacological and Pharmaceutical Sciences. The student’s committee members (at least the local members) are encouraged to attend the seminars. Each research seminar in the fourth and fifth years should be critiqued by survey of the audience, using an instrument developed by the GEC.

IV. Finishing the Degree

A. Applying to Graduate
The student must follow all dates published by the University of Houston in the Academic Calendar to apply for graduation. This must be done online early in the semester in which they intend to defend and pay a graduation-processing fee. The deadline for submission of the intent to graduate is posted on the UH academic calendar.

B. Dissertation Defense Announcement
The student must ensure that an announcement of the dissertation defense is posted on both campuses of the College of Pharmacy at least 7 days prior to the date of the defense. A copy of the defense announcement also should be sent to the Chair of the Graduate Education Committee, Dean's office, and all PPS faculty. The announcement should contain the students name, dissertation title, advisor's name, location, date, and time of the defense.

C. The Dissertation Defense
Students must successfully defend their dissertation before the dissertation committee. This oral Examination emphasizes the student's dissertation and includes a comprehensive oral examination covering general knowledge in the field of specialty. The student must submit a reasonably well-polished and well-proofed copy of the dissertation to the committee at least 14 days prior to scheduling a defense. The committee will have 14 days to preview the dissertation. If the committee members agree that the quality of the work is sufficiently complete and polished, then the student may schedule the
The defense must have an open public portion and a committee-only portion. The public portion should be presented as a seminar with ample time provided for discussion of the findings. Graduate students in Pharmaceutics and Pharmacology are expected to attend each departmental dissertation defense presentation.

After the defense, the committee may approve the dissertation unconditionally, or recommend revisions (major or minor). If revisions are recommended, these must be completed to the satisfaction of the committee (or of the major advisor if they so delegate) before the signature page can be signed by the committee and then by the dean and the College of Pharmacy (Dissertation title page template, posted on PPS Student Blackboard site). This signed page is then presented to the Director of Graduate Education, who will send approval of the degree to the University.

**V. Guidelines for Preparing the Ph.D. Dissertation**

**A. Deadlines, Number of Copies and ETD**

After the dissertation has been revised to the satisfaction of the committee, three copies of the approval form are to be signed by the major advisor, the committee and the dean of the college. The Director of Graduate Education will certify completion of the degree upon seeing these signed approval pages, and retain one for the student file. The deadline is five days before the first day of classes of the subsequent semester in order for the student to be awarded the degree in that semester. The student will upload a revised and approved .pdf copy of the dissertation to MD Anderson Library Electronic Theses and Dissertations (ETD) the above deadline, for a degree to be awarded in that semester. (Note: DO NOT include the signature page in the upload. For other instructions, see the relevant document posted on the BlackBoard site.).

**B. Title of Dissertation**

Your dissertation will be a valuable resource for others only if it can be located easily. Modern retrieval systems use the words in the title and sometimes a few other descriptive words to locate your dissertation. Avoid oblique references, and be sure to use word substitutes for formulas, symbols, superscripts, subscripts, Greek letters, and so on. The dissertation must be typed in an easily readable 12-point font, double-spaced. Times, Times New Roman or Arial fonts are recommended.

**C. Preparing the Abstract**

The abstract is expected to give a succinct account of the dissertation so that a reader can decide if he/she wants to read the complete work. The maximum length is 350 words. Mathematical formulas, diagrams, and other illustrative materials are not recommended for the abstract. The abstract should contain: 1. Statement of the problem; 2. Procedure or methods; 3. Results; 4. Conclusions. The abstract Must be typed double-spaced on one side of the page only.
D. Page Numbering
Each page in the dissertation, except the title page, should be assigned a number. The following plan of page numbering is required:

1. For the preliminaries, use small Roman numerals (i, ii, iii, iv, etc.). The numbering begins with ii on the signature page; the title page counts as page i, but the number does not appear. The Roman numerals should be placed at center bottom.

2. For the remainder of the work - including text, illustrations, appendices, and bibliography-- use Arabic numerals (1, 2, 3, 4, etc.). Each page must be numbered. Use of letter suffixes such as 10a, 10b should be avoided. The numbering begins with 1 and runs consecutively to the end of the dissertation. All page numbers should be centered at the bottom. If the description of an illustration is too long to be placed on the same page, it should be placed on the previous page—not on an unnumbered page.

3. If the dissertation is composed of more than one volume, each volume should contain a title page duplicating the title page of the first volume. Further, each volume should be identified as Volume I, II, etc. The numbering may follow consecutively from one volume to another, or begin with Arabic 1 at each new title page.

E. Margins
1. Left - 1 1/2"
2. Right - 1"
3. Top - 1 1/2"
4. Bottom - 1 1/2"

F. Order
The copies of the dissertation must include the following items in the order listed:
1. Blank sheet of paper at the beginning of each copy submitted
2. Copyright Page - Optional
3. Title Page - Must show the month and year of graduation
4. Signature Page - The copies must have the original signatures of the committee, the student, and the dean of the college
5. Acknowledgments - (Preface or Forward); Optional
6. Abstract Title Page - Must show the month and year of graduation
7. Table of Contents
8. Text
9. References
10. Blank sheet of paper at the end of each copy submitted for binding

G. Text
It is recommended that the text be arranged in the following format:
1. Introduction and Statement of the Problem
2. Literature Survey
3. Materials and Methods
4. Results
5. Discussion
6. Summary and Conclusions
H. Reference List

For citations in the text, give the author's name and the year of publication (e.g. Clarke, 1980; Lokhandwala and Barrett, 1983; McCalden et al., 1982). In the list of references, entries should be arranged alphabetically by author and not numbered. All authors' names should be given. The list of references should contain, in sequence, the following information: authors' names and initials, complete title of the cited article, title of the journal in which the article appeared, volume number of the journal, inclusive pagination and year of publication. Alternately, citations in the text may be numbered. The list of references is then arranged in numerical order as they appear in the text. The first reference used is number one, and each additional reference follows in numerical sequence.

Any article or book containing data from the dissertation or dissertation project that is published after the defense of the dissertation should include a note indicating that the material is, or is based upon, a dissertation submitted in partial fulfillment of the requirements for the designated degree at the University of Houston.