UNIVERSITY OF
South Carolina

College of Pharmacy

2019-2020

Ph.D. in Pharmaceutical Sciences

Drug Discovery & Biomedical Sciences

GRADUATE STUDENT HANDBOOK

Doug Pittman, Ph.D.
Graduate Program Director
Drug Discovery & Biomedical Sciences

Preface

Welcome to the University of South Carolina College of Pharmacy! The faculty sincerely hopes that the pursuit of your advanced degree will be productive, rewarding, and enjoyable. The policies and procedures outlined in this handbook are intended to provide a concise compilation of departmental requirements, which complement and reflect the Graduate School regulations outlined in the Graduate Studies Bulletin of the University of South Carolina. All graduate students are encouraged to understand the degree requirements in the Graduate Studies Bulletin (online) as well as read and become familiar with the policies outlined below. The graduate program in Pharmaceutical and Biomedical Sciences is administered by the Graduate Director, and is aided by Ms. Diane Wise, who has responsibility for all paperwork related to the Graduate Program. Questions concerning admission, policies or procedures should be addressed to the Graduate Director or to Ms. Wise at (803) 777-6053 or wise@cop.sc.edu.

Graduate Program Philosophy

The M.S. and Ph.D. degree programs are structured to accommodate diverse research interest. The student, in consultation with an advisor and advisory committee, will develop a program of student which reflects his/her research area of interest. Candidates for the M.S. or Ph.D. degree are expected to conduct original research and to make a contribution to the literature in their area of expertise. Therefore, all M.S. and Ph.D. candidates must submit a thesis or dissertation as appropriate, as well as manuscripts prepared for submission for publication. In general, each M.S. graduate student will be expected to publish at least one paper and each Ph.D. student is expected to publish at least three research papers during his/her tenure in the degree program. Presentations by all students at appropriate scientific meetings are encouraged.

Graduates are expected to be pharmaceutical scientists. Therefore, students are exposed to interdisciplinary training and education while seeking an advanced degree in pharmaceutical sciences. Topics stressed in this process include synthesis and design of new medicinal agents; examination of their biochemical, pharmacological, and toxicological actions; their bio-availability, excretion and dosage formulation considerations. Exposure of students to interdisciplinary training begins in the first year of enrollment with common core courses that cover topics in medicinal chemistry, pharmaceutics, and pharmacology. Upon completion of the courses, the student, in consultation with the major advisor and advisory committee, takes additional courses that will contribute to their training and research specialization. Further interdisciplinary training is obtained by completing required didactic courses with team-taught recitation sections, and by participation in the departmental seminar program.

Candidates with an advanced degree(s) in pharmaceutical sciences will be prepared for a variety of career choices. These choices include teaching and research at academic institutions, research in the pharmaceutical industry, pharmaceutical sales, regulatory governmental agencies such the Food and Drug Administration and toxicology laboratories, drug information consultation, and drug and law enforcement.

General University Academic Requirements and Procedures

Admission Regulations

The graduate admissions committee in the Department of Drug Discovery and Biomedical Sciences reviews all applicants to the M.S. and Ph.D. programs. Candidates may apply for admission at any time during the year; however, notification of acceptance will normally be made only in March/April for matriculation the following fall semester The following are the basic requirements: (1) a bachelor's degree or its equivalent from an accredited college or university, comparable in standard to that awarded at USC; (2) satisfactory scores on the Graduate Record Examinations (GRE); (3) intellectual promise, including evaluation of grade point averages (GPA) that indicates an ability to do acceptable graduate work; (4) strong personal qualifications, including good moral character. Credentials for admission must include a complete record of all previous college or university work. An undergraduate degree in pharmacy or in the supporting sciences, such as chemistry or biology, are recommended. Information regarding programs, policies, and the admission process can be obtained at www.gradschool.sc.edu/. The college also awards a number of instructional and/or research assistantships to graduate students in Drug Discovery and Biomedical Sciences. See Financial Support section below for further details.

All students must be admitted by the Dean of the Graduate School, following the recommendation of the appropriate school or college. Admission is for the specific purpose stated by the Graduate School and the student must reapply in order to pursue further study or change the degree sought. Non-degree students must also be admitted to the Graduate School. Note that students are allowed to obtain a degree in accordance with the regulations in place at the time they are admitted to degree candidacy. A student may also utilize regulations established after admission to degree candidacy. However, all regulations chosen must be outlined in only one specific graduate bulletin.

Admission to the M.S. and Ph.D. degree programs is available to students with a degree in biology, chemistry, or pharmacy from an accredited college or university. Students should have satisfactorily completed the following undergraduate courses: one year each of general and organic chemistry, one year of physics, and calculus.

INTERNATIONAL STUDENTS

In accordance with the graduate bulletin, students whose native language is not English must take a diagnostic test to assess their capabilities in English shortly after arrival on campus. English speaking capability will be assessed in a mandatory workshop held by the USC Graduate School in August or January of each year. Those students found to be deficient in writing, reading or speaking English are provided opportunities for further study.

NEW STUDENT ORIENTATION

Upon arrival on campus, each student will meet with the Graduate Program Director for the purpose of:

- Initial orientation and receipt of Graduate Student Handbook
- Course advisement for registration-The Graduate Director will serve as temporary advisor for class registration during the first semester. The student's research advisor will be responsible for course advising in subsequent semesters.
- Assignment of teaching assistantship duties, if applicable
- Assignment of building keys

Course Regulations

COURSE LOADS

A student with a course load of nine or more credit hours during the fall and spring semesters is classified as full-time. Students with teaching or research assistantships are classified as full-time with 6 or more credit hours during the fall and spring semesters. All students are required to enroll for at least one credit hour during any semester in which thesis or dissertation progress is made or when resources of the University are utilized.

AUDITING A COURSE

A student must attend at least 75 percent of all classes in a course to receive audit credit. Under no circumstances will a student be allowed to repeat an audited course for credit.

DROPPING A COURSE

Graduate courses may normally be dropped with a non-penalty grade of "W" prior to the end of the sixth week of the regular semester. Courses dropped after six weeks have been completed will result in a grade of "WF", which is considered as an "F" for purposes of grade point average and continuation in graduate school. In cases where there is documented justification of the need to drop a course after the six weeks period, the graduate director should be informed of circumstances involved. Approval of the request will result in a grade of "W" in accordance with Graduate School procedures.

Grading System

The grading system utilized by the University of South Carolina is based on a 4 point system. The letter grades A, B, C, D, and F are used to designate excellent, good, fair, poor, and failing. A grade of D+ or lower cannot be applied to degree programs.

I=Incomplete – Is assigned when a student is prevented from completing some portion of work in a course. The instructor must submit a grade change form to the Office of the Registrar explaining the reasons for the incomplete and provision made to complete the course. The grade of 'I' is not utilized in computing a student's grade point average, but will be permanently changed to an "F" after a 12 month period.

NR=No record – The grade is not appropriate for the course or has not been submitted. The grade of NR must be appropriately replaced before the last week of the fall or spring semester immediately following the semester that the 'NR' was recorded, or an "F" will be assigned.

S or U= Satisfactory or unsatisfactory, respectively, and may only be utilized in accordance with approved "pass-fail grading." Courses completed with a grade of "S may count as credits earned.

T or U = Satisfactory or unsatisfactory progress, respectively, toward completion of a thesis or dissertation. These grades are utilized for thesis or dissertation preparation courses designated as PHAR 799 (M.S.) or PHAR 899 (Ph.D.). Although they count as credits earned, these grades are not utilized in computing the student's grade point average.

Academic Standards

- Graduate courses taken for degree credit must be passed with a "C" or better.
- The student must maintain a grade point average of at least 3.0. Graduate degree-seeking students whose cumulative grade point average drops below 3.00 (B) will be placed on academic probation and allowed one calendar year in which to raise the grade point average to at least 3.00. Students who do not reach a cumulative 3.00 grade point average during the probationary period will not be permitted to enroll for further graduate course work as a degree or non-degree student. Please see the full details of academic standards at the University of South Carolina Graduate school webpage.
- A student accumulating 12 credit hours with a grade of "C+" or below in graduate courses taken at the University will not be eligible for a graduate degree. This regulation will remain in effect for 6 years for the M.S. degree program and 8 years for the Ph.D. degree program.

Grade Changes, Appeals and Petitions

A grade in a course may be changed only by the professor of record in the course, and then only within one year following the initial grade assignment. All appeals and petitions regarding other academic or curriculum matters must utilize the following procedures.

- The nature of the appeal and justification must be submitted in writing to the student's research advisor and graduate committee chairman.
- The graduate committee chairman will notify the graduate program director and call a meeting of the student's graduate committee.
- The student's graduate committee will issue an advisory opinion on the petition or appeal, and submit it in writing to the graduate program director, who will render a decision.
- In the event of an unfavorable decision, the student may request that the graduate program director call a meeting of the graduate faculty which will rule on the appeal or petition and forward it in writing to the graduate director. In the case of further denial, additional appeals may be made to the Graduate School in accordance with the Graduate Bulletin.

Dismissal from Graduate Program

Graduate student in either the M.S. or the Ph.D. programs will be subject to dismissal from the Graduate School and the Graduate Program in the College of Pharmacy for the following reason:

- A cumulative G.P.A. below 3.0 beyond the probationary period of 1 year described above.
- Accumulation of 12 hours of 'C' in courses taken at USC
- Lack of satisfactory and continued progress towards completion of the degree
- Conviction of sexual harassment in the work place

Degree Requirements and Curricula

General Requirements

Student with prior graduate course work may transfer up to nine credit hours for graduate credit. Normally, the typical length of time required to complete the M.S. degree is 2 years, and is 5 to 6 years for the Ph.D. degree. Further degree-specific requirements are found in the Ph.D. and M.S. degree requirements below.

All students (M.S. and Ph.D.), in consultation with their major advisor and advisory committee, must develop an individualized program of study be the end of their third semester. An average grade of "B" or better is required in all courses within a student's program of study and grades below "C" are considered as failure. Students must also participate in the departmental seminar program (PHAR 712) every year during the student's tenure in either degree program.

Doctor of Philosophy Degree

All students must successfully complete at least 60 hours of graduate course work. In addition to the general requirements listed above, candidates for the Ph.D. degree are required to complete four departmental seminar courses (PHAR 712A-D). A maximum of 4 hours credit can be earned for PHAR 712. All students are required to submit a dissertation based upon original research, meeting all requirements of The Graduate School, and at least one manuscript for publication prior to award of the degree. Further degree requirements are listed below.

Ph.D.–Pharmaceutical Sciences (60 Hours)

Required Courses

- PHAR 700 – Principles of Pharmacology, Medicinal Chemistry, and Pharmaceutics – 4 hours
- PHAR 701 – Current Topics in Pharmaceutical Sciences – 4 hours
- PHAR 712A - Seminar in Pharmaceutical Sciences – 1 hour[1]
- PHAR 712B - Seminar in Pharmaceutical Sciences – 1 hour[1]
- PHAR 712C - Seminar in Pharmaceutical Sciences – 1 hour[1]
- PHAR 712D - Seminar in Pharmaceutical Sciences – 1 hour[1]
- ELECTIVE – 12 hours of electives[2]
- PHAR 896 – Doctoral Directed Research – 24 hours
- PHARM 899 – Dissertation Preparation – 12 hours

[1]A maximum of 4 hours credit can be earned for PHAR 712.

[2]Electives will be chosen based on the needs of the graduate student. Areas of emphasis include Biomedicinal Chemistry, Synthetic Medicinal Chemistry, Pharmaceutics, and Pharmacology. Electives will be chosen based on the area of emphasis and must be approved by the Ph.D. advisory committee and the Graduate Program Director. Electives must be 700 level and above, or any course approved by the Graduate School for Graduate Credit.

[3]Other didactic electives may be applied toward the total hours of credit required if approved by the Ph.D. advisory committee.

Pharm.D. and Ph.D. Degree

All students must successfully complete at least 60 hours of graduate course work. In addition to the general requirements listed above, candidates for the Ph.D. degree are required to complete four departmental seminar courses (PHAR 712A-D). A maximum of 4 hours credit can be earned for PHAR 712. All students are required to submit a dissertation based upon original research, meeting all requirements of The Graduate School, and a manuscript(s) for publication prior to award of the degree. Further degree requirements are listed below.

Courses for the Pharm.D. and Ph.D. (60 Hours)

In addition to the general requirements listed for the Ph.D., students pursuing the Pharm.D. and Ph.D. concurrently will take elective courses that are approved for graduate credit and fulfill requirements for the Ph.D. program. Electives in the Pharm.D. curriculum: up to nine credit hours can count toward both degrees, with the following stipulations. The student must have completed at least 90 hours of undergraduate course work, have a minimum GPA of 3.40, and have form GS-59 on file in The Graduate School. A grade of B or higher must be earned for the course to count for graduate credit. At least half of the electives must be numbered 700 or above. Courses numbered 500-699 are acceptable only if they have been approved for graduate credit. Graduate courses taught in units other than pharmacy must be approved by the graduate faculty of pharmacy as appropriate for a Ph.D. degree in pharmaceutical sciences. Registration for each course requires approval of the student's advisor, the chair of the student's departent, the graduate director of the Ph.D. program, and the dean of The Graduate School. Form GS-59A must be processed for each graduate credit course at the time of registration to permit the registrar's office to properly enroll the student for graduate credit.

Required Courses

- PHAR 712A - Seminar in Pharmaceutical Sciences
- PHAR 712B - Seminar in Pharmaceutical Sciences
- PHAR 712C - Seminar in Pharmaceutical Sciences
- PHAR 712D - Seminar in Pharmaceutical Sciences

- PHAR 896 – Doctoral Directed Research [2]
- PHARM 899 – Dissertation Preparation

Up to three graduate-level courses taken as electives for the Pharm.D., 0-9 hours[1]
Two to five graduate-level courses not taken for the Pharm.D. degree, 7-15 hours
Doctoral Directed Research (up to 29 Hours)

[1]Electives must be approved by the Ph.D. advisory committee as appropriate for one of the following specialty areas.
[2]Other didactic electives may be applied toward the total hours of credit if approved by the Ph.D. advisory committee.

Master of Science Degree

All students must successfully complete at least 30 hours of graduate course work. In addition to the general requirements listed above, candidates for the Ph.D. degree are required to complete two departmental seminar courses (PHAR 712A-B). A maximum of 2 hours credit can be earned for PHAR 712. All students are required to submit a dissertation based upon original research, meeting all requirements of The Graduate School, and a manuscript(s) for publication prior to award of the degree. Further degree requirements for each specialty are listed below. No more than nine hours of credit for PHAR 799 will be allowed for thesis research and writing. Further degree requirements for each specialty area are listed below.

M.S.–Pharmaceutical Sciences (30 Hours)

Required Courses

- PHAR 700 – Principles of Pharmacology, Medicinal Chemistry, and Pharmaceutics – 4 hours
- PHAR 701 – Current Topics in Pharmaceutical Sciences – 4 hours
- PHAR 712A - Seminar in Pharmaceutical Sciences – 1 hour[1]
- PHAR 712B - Seminar in Pharmaceutical Sciences – 1 hour[1]
- ELECTIVE – 12 hours of electives[2]
- PHAR 799 - Thesis Preparation - 9 hours

Notes:

[1]A maximum of 2 hours credit can be earned for PHAR 712.

[2]Electives will be chosen based on the needs of the graduate student. Areas of emphasis include Biomedicinal Chemistry, Synthetic Medicinal Chemistry, Pharmaceutics, and Pharmacology. Electives will be chosen based on the area of emphasis and must be approved by the Ph.D. advisory committee and the Graduate Program Director. Electives must be 700 level and above, or any course approved by the Graduate School for Graduate Credit.

Ph.D. Degree Progression

Summary of Ph.D. Degree Progression

The below outline is a brief outline of the steps required during the progression to the Ph.D. and a time line for each step.

1. Completion of all required course work by the end of the degree program. The core curriculum should be completed by the end of the second year.

2. *Selection of a Research Advisor* should occur by **the beginning of the second year**. The student must notify the graduate director in writing of hi/her selection using the 'Research Advisor Selection Form'.

3. *Selection of Graduate Committee*. A graduate committee must be selected by **the beginning of the second year**. The student must notify the graduate director in writing of the committee's composition using the G-DCA 'Doctoral Committee Appointment Request' form.

4. *Submission and Defense of Initial Research Proposal (IRP)*. The IRP must be completed by the **end of the second year**. The topic of the proposal is the student's planned Ph.D. research project and is written in the style of an NIH proposal. The IRP must be distributed to the members of the committee at least five business days prior to the committee meeting. The student must then orally present his/her IRP to his/her Ph.D. committee.

5. *The Ph.D. Program of Study* must be completed by the end of **the second year**. Students must use Form DPOS 'Doctoral Degree Program' printed by the Graduate School. The student must sign the Program of Study, as well as the Chairman of the Student's committee, and forward the document to the Director of Graduate Studies.

6. *The Comprehensive Written/Oral Examination* must be taken no later than the **end of the 3rd year** in the student's degree program. The thesis advisor solicits 3 abstracts from the exam committee. Normally, abstracts are chosen from an appropriate source (e.g. scientific conference abstracts). Abstracts are usually of topics that the advisor would like the student to be well-versed in. The 3 abstracts are given to the student. The student picks 1 abstract on the morning of the exam and evaluates that abstract for its scientific content, and what the student believes would be a good course of action for follow-up experiments and hypotheses' that might complete that particular project. The student has 4-6 hours to complete this task, at which time the committee will convene and discuss. After a pass is issued, the student will have 48 hrs. to summarize the discussion (3 page maximum) and submit this to the chair of the Comprehensive Exam Committee.

7. It is highly recommended that the thesis committee be convened for an update and discussion of target completion date of dissertation **approximately 6 months prior to the target graduation date**. This meeting will provide a framework of understanding for the advisor and student regarding aspects of the project that need to be completed in order to graduate from the program. The meeting is called by the graduate student in consultation with the thesis advisor
8. Dissertation completion.
9. Dissertation Seminar/Defense.

Introduction

A Ph.D. Progress Sheet has been developed for use by the Graduate Program Director to facilitate monitoring the progress and status of each graduate student in the Program. The deadlines and requirements listed on the sheet are mandated by both the College of Pharmacy and the Graduate School of the University of South Carolina and must be completed before the Ph.D. degree will be awarded by the Graduate School. If these requirements are not met in a timely fashion, you will jeopardize your progress towards completing the Ph.D. degree. Summer school sessions are not counted in calculating the deadlines. Each student is expected to fill out his/her sheet with the predicted deadlines for future reference. If the student does not meet the deadlines in a reasonable manner, the Graduate Program Director will notify the student in writing, requesting details concerning how and when the deadline(s) will be satisfied. The Ph.D. program must be completed within 8 years after enrollment in the degree program. Any course taken that is more than 8 years old cannot be used towards the completion of the degree.

Admission to Ph.D. Candidacy

All students must be admitted to Candidacy in order to pursue the Ph.D. degree. Admission to candidacy is a two part process.

Part I

Part I of the Admission to Candidacy is satisfied by successful completion of the core courses PHAR 700 and PHAR 701. These courses are normally taken in the first and second semesters of the student's program within the Department of Drug Discovery and Biomedical Sciences, but may be taken as late as the third and fourth semesters, depending on the availability. The cumulative final examinations will constitute the written portion of the admission to doctoral candidacy examination. These examinations must be submitted to the Graduate Program Director and will become part of the student's file.

Part II

Part II of the Admission to Candidacy consists of four different segments:

Selection of a Research Advisor

A research advisor must be selected by **the beginning of the second year**. The student must notify the graduate director in writing of his/her selection.

Selection of Graduate Committee

A graduate committee must be selected by **the beginning of the second year**. The student must consult with the research advisor prior to determining the composition of the committee, and must also contact each prospective committee member to ensure that each member is willing to serve on the student's committee. The student must then notify the graduate director in writing of the committee's composition using the G-DCA 'Doctoral Committee Appointment Request' form.

The graduate committee for the Ph.D. student will consist of at least five members including a:

- Research advisor
- Second member in his/her specialty area
- Member in Pharmaceutical and Biomedical Sciences outside the specialty area
- Member in a related area-from a different department/college ('Outside Member')
- Member from Pharmaceutical and Biomedical Sciences on the MUSC campus

Committee members chosen from other universities (i.e. not USC or MUSC) must submit their Vita to the graduate school for approval. If a committee member cannot make the meeting, then a substitute member will be appointed.

Submission and Defense of Initial Research Proposal (IRP)

The IRP must be completed by the end of **the second year**. The topic of the proposal is the student's planned Ph.D. research project. The topic should be jointly selected by the advisor and the student. Please see the section titled "General guidelines for written proposals and oral examinations" for more details. The proposal should be written in the style of an NIH proposal following the format listed in the section titled "NIH proposal format". The IRP must be distributed to the members of the committee at least five business days prior to the committee meeting. The student must then present his/her IRP to his/her Ph.D. committee, and defend the proposal during an oral examination by the committee (below). The student must ensure that his/her committee chairman notifies the Graduate Program Director in writing after the successful defense of the IRP.

Ph.D. Program of Study

The Program of Study must be completed by the end of **the second year**. Students must use Form GS51 'Doctoral Degree Program' printed by the Graduate School. The Program of study is one of the most important documents related to the student's Ph.D. studies. This document is a contract between the student and the Department of Drug Discovery and Biomedical Sciences and ensures that the courses listed in the document, upon successful completion, will satisfy the requirements for the Ph.D. degree. No additional courses can be added to or deleted unless the student agrees. The student must sign the Program of Study, as well as the Chairman of the Student's committee, and forward the document to the Director of Graduate Studies.

Completion of the Ph.D. Candidacy Process

In order to complete the Ph.D. Candidacy Process, the student's Ph.D. The committee will convene at the request of the student. The committee will then proceed to:

- Elect a committee chairman, if one has not already been so designated, who is a member of the department, but who is not the major advisor.
- Review the student's written candidacy exams (Part 1, exams in PHAR 700). The exam is obtained by the research advisor and immediately returned to the Graduate Program Director).
- Review the Program of Study, and receive input from the major advisor regarding the rationale for the courses listed.
- Receive input from the major advisor regarding the basis for the IRP.
- Entertain the defense of the Initial Research Proposal. The defense will begin with a 30-40 minute presentation by the student of their IRP. The oral examination following the presentation will further explore the student's understanding of the proposed research, and his/her approach to the problem and potential difficulties. The examination may also include questions concerning the student's initial didactic training. Evaluation of the defense of the proposal will be based on the content of the IRP, and on answers to oral questions presented to the student by the committee.
- Recommend approval or disapproval of admission to candidacy following the defense of the IRP, the graduate committee will further discuss and review all of the student's candidacy achievements. The committee may subsequently recommend approval or disapproval of Admission to Candidacy based on the student's performance in all of the candidacy requirements.

An affirmative vote of at least 75% of the graduate committee in attendance will constitute approval. In all cases, the committee chairman is responsible for providing written notification, using the 'Admission to Ph.D. Candidacy Form, to the Graduate Program Director. A copy of the IRP will remain in the student's file. The Graduate Director will provide written notification to the Graduate School. The Dean of the Graduate School will notify the candidate of their admission to doctoral candidacy.

The committee may also at their discretion:

- Ask that a revised initial research proposal be submitted for approval without further examination.
- Ask that a revised initial research proposal be submitted for approval with a second and final examination.
- Place the student in a Masters of Science program.

  (NOTE: The student may petition to enter the doctoral program upon completion of the M.S. degree.)

Comprehensive Written/Oral Examination:

After admission to candidacy, and completion of all course work, a Comprehensive Written and Comprehensive Oral examination must be taken no later than the **end of the 3rd year** in the student's degree program.

The written comprehensive exam requirement of the Graduate School is satisfied by the submission of a written research proposal involving an area outside of the student's dissertation research interest.

The student must notify the Graduate Program Assistant and Graduate Program Director at least a week in advance of when the meeting has been scheduled. The thesis advisor solicits 3 abstracts from the exam committee. Normally, abstracts are chosen from an appropriate source (e.g. scientific conference abstracts). Abstracts are usually of topics that the advisor would like the student to be well-versed in. The 3 abstracts are given to the student. The student picks 1 abstract on the morning of the exam and evaluates that abstract for its scientific content, and what the student believes would be a good course of action for follow-up experiments and hypotheses' that might complete that particular project. The student has 4-6 hours to complete this task, at which time the committee will convene and discuss. After a pass is issued, the student will have 48 hrs. to summarize the discussion (3 page maximum) and submit this to the chair of the Comprehensive Exam Committee. An affirmative vote of at least 75% of the graduate committee in attendance is required for passage of the written comprehensive and/or oral examination

Dissertation

A Written Dissertation is required for completion of the Ph.D. degree. The student is strongly encouraged to check the Graduate School and College of Pharmacy guidelines BEFORE he/she begins to write. Note that all theses and dissertations are officially submitted online to the graduate school (http://gradschool.sc.edu/students/thesisdiss.asp?page=td). The department requirements and suggestions for formatting are in a separate document that is being revised and will be available online at the college website. The student should begin writing the appropriate parts of his/her dissertation (e.g. methodology) as soon as possible, and to follow the requirements of the Graduate School. The student should also adhere to the College of Pharmacy requirements included in Appendix A. Completed copies of the dissertation should be given to all graduate committee members at least 10 working days prior to the defense of the dissertation.

Dissertation Seminar/Defense

A Dissertation Seminar and Defense must be completed within 8 years of the start of the Ph.D. program. The dissertation seminar and defense of dissertation must be scheduled through the Graduate Program Director, following consultation with all committee members. The Graduate Director will be responsible for all publicity and/or notification of college faculty for the scheduled dissertation seminar and defense. The dissertation seminar will normally be 40-60 minutes in length with appropriate visual aids, and will be open to all College of Pharmacy students, faculty and scientific staff. Following the dissertation seminar, the student will reconvene with his graduate committee for the defense of the dissertation. An affirmative vote of at least 75% of the graduate committee in attendance will constitute a passing performance with the requisite changes in the dissertation.

Alternatively, in the event of failure to achieve an affirmative vote of at least 75% of the committee members in attendance, the committee may recommend at its discretion:

- Major revisions of the dissertation followed by a second and final defense of dissertation to be conducted within 30-90 days.
- A second and final defense of dissertation to be conducted within 30-90 days.

Failure in a second defense of the dissertation will normally result in a Master of Science degree in Pharmaceutical Sciences being awarded. In any case, the chairman of the graduate committee will notify the Graduate Program Director in writing, using the appropriate form, of the Committee's decision.

M.S. Degree Progression

An M.S. Progress Sheet has been developed for use by the Graduate Program Director to facilitate monitoring the progress and status of each graduate student in the Program (See Sample sheet below). The deadlines and requirements listed on the sheet are mandated by both the College of Pharmacy and the Graduate School of the University of South Carolina and must be completed before the M.S. degree will be awarded by the Graduate School. If these requirements are not met in a timely fashion, you will jeopardize your progress towards completing the M.S. degree. Summer school sessions are not counted in calculating the deadlines. Each student is expected to fill out his/her sheet with the predicted deadlines for future reference. If the student does not meet the deadlines in a reasonable manner, the Graduate Program Director will notify the student in writing, requesting details concerning how and when the headline(s) will be satisfied. The M.S. program must be completed within 6 years after enrollment in the degree program. Any course taken that is more than 6 years old cannot be used towards the completion of the degree.

Admission to M.S. Candidacy

All students must be admitted to Candidacy in order to pursue the M.S. degree. Admission to candidacy is a two part process as follow:

Part I

Part I of Admission to Candidacy is satisfied by the successful completion of the core courses PHAR 700 and PHAR 701. See also Part I of Ph.D. Degree Progression/Admission to Candidacy above for further details.

Part II

The second part of admission to Candidacy consists of 4 different segments as follows:

Selection of a Research Advisor

Selection of a research advisor must be completed by the end of the 2nd semester. See also Part II of 'Ph.D. Degree Progression/Selection of a Research Advisor' above for further details.

Selection of Graduate Committee

Must be completed by the end of the 2nd semester. See 'Ph.D. Degree Progression/Selection of Graduate Committee' for further details. The Graduate Committee for the M.S. student will consist of at least 3 members from the PBS faculty. A chairperson for the Committee must be selected at this time. The chairperson must be a committee member from the College of Pharmacy but cannot be the research advisor. Committee members are normally:

- The Research advisor
- A second member in his/her specialty area
- A member in Pharmaceutical and Biomedical Sciences outside the specialty area

M.S. Program of Study

A program of study must be submitted to the Graduate Program Director by the end of the 2nd Semester. See 'Ph.D. Degree Progression/Ph.D. Program of Study' for further detail.

Submission and Defense of Initial Research Proposal (IRP)

Must be completed by the end of the 3rd semester.
See 'Ph.D. Degree Progression/Submission and Defense of IRP' for further details.

Comprehensive Written Examination

After admission to candidacy, a Comprehensive Written examination must be taken with 90 days of completion of all course work. The exam should consist of questions involving previous course work, and will be administered by the chairman of the student's committee. The chairman will notify the Graduate Director in writing of the examination ten working days prior to the examination and request questions from all previous instructors. The examination will be numerically graded on the basis of 100 points. The chairman of the student's committee is

normally responsible for determining the composition of the exam. Approximately 50% of the exam should come from the student's discipline. The chairman will contact each committee member to determine the pass/fail status, and forward this determination to the Graduate Director using the 'Admission to Candidacy' form. The student will be notified in writing of successful completion or failure of the examination. In case of failure, one re-examination is allowed within 30-90 days following the initial notification of results.

Thesis

A written Thesis is required for completion of the M.S. degree. The student is strongly encouraged to check the Graduate School and College of Pharmacy guidelines BEFORE he/she begins to write. Note that all theses are officially submitted online to the graduate school (http://gradschool.sc.edu/thesisdissertation/dissertation-formatting.asp). The student is strongly encouraged to begin writing the appropriate parts of his/her thesis (e.g. methodology) as soon as possible, and to follow the requirements of the Graduate School in terms of format, style, type of paper, number of copies required, etc. Completed copies of the thesis should be given to all graduate committee members at least 10 working days prior to the defense of the thesis.

Thesis Seminar/Defense

A Thesis Seminar and Defense must be completed within 6 years of the admission to the M.S. program. The thesis seminar and thesis defense must be scheduled by the Graduate Program Director, following consultation with the chairman of the graduate committee. The Graduate Director will be responsible for all publicity and/or notification of college faculty for the scheduled thesis seminar and defense. The thesis seminar will normally be 40-50 minutes in length with appropriate visual aids, and will be presented to all Pharmaceutical and Biomedical Sciences students, faculty, and scientific staff. Following the thesis seminar, the student will reconvene with his graduate committee for the defense of the thesis. An affirmative vote of at least 66% of the graduate committee in attendance will constitute a passing performance.

Alternatively, in the event of failure to achieve an affirmative vote of at least 66% of the committee members in attendance, the committee may recommend at its discretion:

- Major revisions of the thesis followed by a second and final defense of thesis to be conducted within 30-90 days
- A second and final defense of thesis to be conducted within 30-90 days

Failure in a second defense of the thesis will normally prevent the awarding of a Master of Science degree in Pharmaceutical Sciences.

Manuscript(s) Requirement and Laboratory Notebooks

Laboratory notebooks and drafts of all papers to be published from the student's research project must be submitted to his/her major advisor before the Graduate Program Director will sign and approve the Graduation Clearance form. The candidate WILL BE BLOCKED from graduating from the degree program unless a 'signed' Graduation Clearance form has been received by the Graduate School.

Graduate Student Research Activity

Expectations

Every graduate student in Pharmaceutical and Biomedical Sciences is expected to maintain a vigorous research program. This is demonstrated through the submission of abstracts and presentation of posters and talks at national and international meetings, as well as participation in the preparation of manuscripts submitted for publication in peer-reviewed journals.

Laboratory Safety

Each graduate student is responsible for not only his/her own safety but also that of nearby co-workers. To enable a safe working environment, the Health and Safety Officer of the College of Pharmacy is responsible for monitoring and enforcing Environmental Health and Safety (EHS) Guidelines of The University of South Carolina. The guidelines require that each graduate student:

- Attend a Laboratory Safety Training course offered by EHS.
- Attend a Hazardous Waste Training course offered by EHS, as well as any annual online or live refresher training required. Read and sign the Chemical Hygiene Plan appropriate to the laboratory or laboratories in which the student will conduct research.
- Familiarize him/herself with the MSDS sheets of the chemicals used in his/her research, as well as the location of the database of MSDS sheets for the College (CLS 609) and online at the manufacturer's websites.
- Wear safety glasses in areas where experimental work in being conducted.
- Should not wear contact lenses, due to risk of corneal abrasions in the event of an accident.
- Should conduct hazardous reactions and procedures only after proper consultation with the research advisor. It is expected that the student will become thoroughly knowledgeable about the potential hazards involved by reading the appropriate literature prior to the experiment, and have contingency plans ready in case of an accident. Potentially hazardous reactions should first be attempted on a small scale and only in the presence of other laboratory personnel who are aware of the type of experimentation and inherent dangers involved.
- Should be aware of the location of explosion-proof refrigerators.
- Should not store food in any refrigerator used for research purposes.
- Wear appropriate shoes at all times in research laboratories.

- Should be familiar with the location and operation of all eye washes, safety showers, spill kits, and fire extinguishers.
- Should not leave experiments unattended. If it is necessary to leave an experiment unattended, the situation should be carefully checked beforehand to minimize the risk of:
- Familiarize him/herself with the MSDS sheets of the chemicals used in his/her research, as well as the location of the database of MSDS sheets for the College (CLS 609) and online at the manufacturer's websites.
- Wear safety glasses in areas where experimental work in being conducted.
- Should not wear contact lenses, due to risk of corneal abrasions in the event of an accident.
- Should conduct hazardous reactions and procedures only after proper consultation with the research advisor. It is expected that the student will become thoroughly knowledgeable about the potential hazards involved by reading the appropriate literature prior to the experiment, and have contingency plans ready in case of an accident. Potentially hazardous reactions should first be attempted on a small scale and only in the presence of other laboratory personnel who are aware of the type of experimentation and inherent dangers involved.
- Should be aware of the location of explosion-proof refrigerators.
- Should not store food in any refrigerator used for research purposes.
- Wear appropriate shoes at all times in research laboratories.
- Should be familiar with the location and operation of all eye washes, safety showers, spill kits, and fire extinguishers.
- Should not leave experiments unattended. If it is necessary to leave an experiment unattended, the situation should be carefully checked beforehand to minimize the risk of:
- Water leakage – adjust H_2O pressure, secure all hoses and clear all drains. Water should not be allowed to run at high velocity through condensers.
- Vapor leakage – make sure all joints are vapor tight and adequate water flow is available for condensation.
- Electrical fires – make sure all cords are intact and electrical equipment is in good working order.
- Should use radioactive isotopes only with the approval of the research advisor and under the appropriate authorization by the Radiation Safety Officer. All students working with radioactive isotopes are required to take the radiation safety training course provided by the University. All research work involving radioactive isotopes should only be performed in those areas designated for such experiments.
- Should perform experiments with mammalian cell culture, mouse or human tissues, or live animals only with the approval of the research advisor and after the appropriate training in biosafety and animal care in courses provided by the University. , Any annual online or live refresher training is also required. All research work involving a biosafety risk (e.g., BSL-1, BSL-2), must be performed in areas designated for such work.
- Should not conduct unauthorized experiments – Laboratory work outside the student's areas of research and without the proper approval of the research advisor is prohibited.
- Should properly dispose of all wastes according to department and University Environmental Health and Safety Guidelines.
- Should notify the research advisor immediately of any potential safety hazard or accident.

Departmental Seminars

Philosophy and Objectives

There are two components of the departmental seminar program that contribute to the graduate education program. The first component consists of selected outside speakers invited by the College of Pharmacy. The objective of inviting outside speakers is to provide the students and faculty with an opportunity to interact with international experts on topics of interest in pharmaceutical and biomedical sciences.

All graduate students are required to attend all departmental seminars

The second component is attendance and participation in PHAR 712, which is offered during the fall and spring semesters. These seminars are presentations prepared by the graduate students and given to the graduate students and faculty. In this course, student gain valuable experience in preparing and delivering research seminars in front of an audience of colleagues. Please see the syllabus and course objectives for PHAR 712 for details. The third component is oral presentation of the initial research proposal, the comprehensive exam, and thesis dissertation. The collective goal of the seminar program is to provide valuable experience learning science and communicating science in a seminar format.

Guidelines for Written and Oral Proposals

The below sections provide guidance on the written examinations and oral examination meetings, including the responsibilities of the students, advisors, and thesis committee chairs.

Guidelines for students in advance of all thesis committee meetings and examinations:

Beginning at least 6 weeks in advance, the student will communicate with faculty to arrange the date, time and location of the meeting. The student is required to meet with Ms. Wise, the administrative assistant to the graduate program, to inform her of the date, time and place of the meeting, and to confirm all required paperwork is completed. The student is required to bring the necessary paperwork and forms to the meeting. It is the student's responsibility to notify IT staff at least one week in advance of the actual meeting to arrange computer, video and audio connections including connections to the Charleston campus.

Guidelines for thesis committee meetings and examinations:

Meetings will typically begin with a brief introduction by the committee chair and the advisor. The student will then be asked to leave the room for a short time. At this point, the advisor will comment on the student's progression and productivity in the laboratory. If applicable, the committee will discuss coursework grades and programmatic progression. The committee may also discuss elements of how an examination will proceed. For example the committee member from outside the department may have specific questions regarding procedure. Once the student returns to the room, the meeting or examination will officially begin.

Admission to Candidacy (Initial Research Proposal) End of 2nd year:

Students are required to bring the Program of Study document correctly filled out (Please consult with Ms. Wise) and also the PhD/MS admission to candidacy form. This document will be discussed as part of the conversation at the start of the meeting. Review of all coursework is also part of the admission to candidacy. Once the examination begins, the student is encouraged to make a of 30-40 minute presentation, leaving appropriate time for questions during the presentation. The talk should follow the outline of the written proposal. At the conclusion, the student will be asked to step out of the room, and the committee will discuss the exam performance and make recommendations. As described earlier, the committee may vote to pass, require a revised written document be submitted for approval without further examination, require that a revised written document be submitted for approval with a second oral examination, or recommend that the student be placed in the Master of Science program. The committee chair will provide a brief written summary of the strengths and weaknesses of the candidate. In instances that progression in the PhD program is not recommended, the committee chair will provide in the statement the reasons for the vote of the committee not to pass.

Comprehensive exam End of 3rd year:

Students are required to bring the oral comprehensive examination form to the meeting. At the conclusion, the student will be asked to step out of the room, so that the committee can discuss the performance. As described earlier, the committee may vote to pass, require a revised written document be submitted for approval without further examination, require that a revised written document be submitted for approval with a second oral examination, or recommend that the student be placed in the Master of Science program. The committee chair will provide a brief summary of the strengths and weaknesses of the candidate. In instances that progression in the PhD program is not recommended, the committee chair will provide in the statement the concerns of the committee.

Update and discussion of target completion date of dissertation - Variable, ~6-8 months prior to completion:

This meeting is not required for progression, so it will typically be less than one hour in duration. The student will provide a brief presentation, approximately 25 minutes, to provide an update on their thesis research progress, discussion of current hurdles encountered, and immediate research plans. Updates on manuscripts published, in preparation, submitted, or in revision should be discussed. Although the final decision is at the discretion of the advisor, this meeting will provide a framework of understanding for the advisor and student regarding aspects of the project that need to be completed in order to graduate from the program.

Thesis Defense:

The student is required to bring the thesis defense examination form to the meeting.

NIH format guidelines for written proposals

Written proposals should follow the format of a F31 predotoral fellowship grant proposal to the National Institutes of Health (NIH). The following should be included: Title page, Abstract, Specific Aims, Research Strategy (with sub-sections of: Significance, Innovation, Approach), References. The length of the Specific Aims + Research Plan is to be no more than 12 pages. NIH-style proposals written by students that do not follow these guidelines will be evaluated by the committee as a proposal submitted to NIH would be, i.e., sent back without being reviewed. In 2009, the NIH revised the proposal submission and review process.

Sentences in quotations are from the NIH website announcing changes in the peer review process. These are the instructions for how these components of NIH grants should be reviewed.

http://grants.nih.gov/grants/guide/notice-files/NOT-OD-09-025.html

1. Specific Aims

NIH requires one page maximum for this section (two pages double spaced for the IRP and comprehensive exam). It should contain an introductory paragraph, should clearly state the hypotheses to be tested, and list the Aims that will be performed to test the hypothesis. It is traditional to have two to four Aims. The section should conclude with a couple of sentences

that broadly describe the potential impact or benefit to human health from performing the project.

2. Research Strategy

a. Significance

This section should explain to the reader the importance and relevance of the proposed research to understanding an aspect of human health and disease. The goal of this section is to entice the reviewer's interest in the project.

"Does the project address an important problem or a critical barrier to progress in the field? If the aims of the project are achieved, how will scientific knowledge, technical capability, and/or clinical practice be improved? How will successful completion of the aims change the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field?"

b. Innovation

In short, this section should explain how the proposed research, if performed, will provide a 'jump', not an incremental step, in our knowledge of human health and disease.

"Does the application challenge and seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions? Are the concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense? Is a refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed?"

c. Approach

Preliminary Studies/Progress Report

Grant proposals to be submitted to NIH contain a preliminary studies section for a new application, or a progress report for a competitive renewal application. These are very important sections. For the IRP, the student can consult with their advisor regarding which preliminary data to include. For the comprehensive exam, the student will not have preliminary data for their proposal because the project topic should be outside the student's research area. However, the section should contain specific discussion of recently published information that help to shape the hypotheses and would therefore be considered 'preliminary data'. This is a separate section labeled, "Studies supporting the hypothesis".

Experimental Design

Although there are no specific recommendations on length, this section constitutes the majority of the proposal. The following subsections should be included for each Aim.

Restate the Aim as it was written the Specific Aims.

Rationale: There should be a 1-2 paragraph subsection that clearly states why the specific experiments are being proposed.

Approach: This subsection should describe the types of experimental strategies that will be performed. It should not be a "list", but should be written to build on the Aim. Most investigators include a section called "Anticipated Results" or "Data Analysis and Interpretation", which follows "Approach". Whether included within "Approach" or a separate subsection, it is very important that the student make some predictions about the outcomes of the experiments being proposed. What questions will be answered when the experiments are finished? The anticipated results should be related to supporting or refuting the hypothesis.

Methods: this subsection contains experimental detail as to how the experiments will be carried out, much like a methods section in a journal article.

Potential Problems and Alternative Strategies: In this section, one tries to predict where a reviewer might criticize the work, and provide a pre-emptive response. For example, are there alternative interpretations to your anticipated results? Alternative methods can also be included if there might be problems with the primary methods proposed.

It is customary to conclude this section with a subsection titled "Potential for Impact" or "Future Directions." This can be several sentences and should be similar in thought to the last sentences in Section A. If the research proposed is successfully completed, what might be next? Lastly, is the research proposed reasonable for a 4-5 year time frame? Have you proposed 3 months or 15 years' worth of work?

"Are the overall strategy, methodology, and analyses well-reasoned and appropriate to accomplish the specific aims of the project? Are potential problems, alternative strategies, and benchmarks for success presented? If the project is in the early stages of development, will the strategy establish feasibility and will particularly risky aspects be managed?"

3. References

The reference section does not count toward the length restrictions. Reference citations should include the full citation, i.e., author names, year, volume and page numbers, and title of the article, as per NIH guidelines.