

Ph.D. in Pharmaceutical Sciences

Last modified August 12, 2015

The current Ph.D. in Pharmaceutical Sciences graduate program is offered by the Department of Pharmaceutics. The departmental faculty has decided to use 'track' method for accommodating its multi- and interdisciplinary diversity of the Department.

The focus of the Department of Pharmaceutics, which houses the Center for Pharmacometrics and Systems Pharmacology and the Center for Food and Drug Interaction Research and Education, differs sufficiently from that of other departments as to justify a specialization. The uniqueness of the department is evident in present research activities which encompass basic, applied and clinical investigations in the areas of Biopharmaceutics and Pharmacokinetics-Pharmacodynamics, Pharmaceutical Biotechnology, Pharmaceutical Analysis, Drug Delivery, and Drug Discovery. Specifically, Biopharmaceutics and Pharmacokinetics-Pharmacodynamics encompasses the absorption, distribution, metabolism and excretion of drugs in animals and humans, and the relationship between drug concentration and effect. Pharmaceutical Biotechnology includes molecular biology, immunology, and aspects of the delivery of nucleic acid, peptide and protein drugs. Pharmaceutical Analysis involves the application of a broad array of analytical methods to drug determination. Drug Delivery includes physical, biological and chemical approaches to drug delivery, and the formulation and evaluation of dosage forms. Pharmacometrics focuses on dose optimization using pharmacokinetic-pharmacodynamic correlations to improve the therapeutic index for active pharmaceutical ingredients.

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The objectives of the Ph.D. program in the Department of Pharmaceutics are:

- To provide a foundation in the pharmaceutical sciences in general, as well as in the specific tracks identified, with emphasis on pharmacokinetics, biopharmaceutics, pharmaceutical analysis, pharmaceutical technology/drug delivery, pharmacodynamics, pharmaceutical biotechnology, and drug design and discovery.
- To educate individuals to be capable of conducting independent research and to be able to apply in- depth specialized knowledge in one of the above areas and to provide a solid educational, technical and experiential foundation for students in the industrial, academic, governmental or other arenas.
- To provide an environment that nurtures and stimulates the research interests and the intellectual advancement of students and faculty, including a forum for scientific and professional discussion.
- To prepare students to meet the expectations of different professional endeavors, including careers in the pharmaceutical industry (big pharma and CROs), academia, regulatory agencies such as the US Food and Drug Administration

Faculty

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Associate Professor
Pharmaceutics

Governance

Decisions concerning curricular revision and student admissions are made after the department faculty has met to discuss such matters and each faculty member has voted on that particular issue.

Recruitment of Students

The PhD program of the Department of Pharmaceutics is listed in the graduate catalog, and is advertised in mailings to well qualified graduates of the University of Florida and on the College of Pharmacy Home Page on the Internet.

Admission Policies and Procedures

The College of Pharmacy adheres to the minimum standards set forth by the Graduate School:

- A grade point average (GPA) of at least 3.0 (4-point system);
- Three (3) letters of recommendation.

In addition to the above requirements, foreign applicants must have:

- All international students seeking admission to the Graduate School must submit satisfactory scores on the GRE General Test

Although a formal interview is not required at this time, applicants are encouraged to visit the

department/center prior to or during the application process.

Financial Assistance

It is the general policy of the Department of Pharmaceutics that all students accepted to pursue graduate studies receive support in the form of a teaching or a research assistantship, or show evidence of adequate support from a fellowship or other source. Currently, the minimum stipend is approximately \$15,000/year.

Teaching assistantships are normally provided for a four (4) year period of time contingent upon continued funding from State sources. A student may receive support for one (1) more year if a relevant reason is presented to the departmental faculty by the major advisor, and the departmental faculty approves the request by majority vote of all the faculty. Except in extenuating circumstances, the department is not financially responsible for any student taking longer than 5 years to complete the doctoral program.

Those students assigned to teach during any given semester by the graduate studies coordinator are appointed Teaching Assistant (0.33 FTE) and are required to work 13.3 hours per week. All graduate students receiving a stipend who are not employed as teaching assistants will be designated Research Assistants or Fellows depending on the source of funds. Stipends are provided so that students may pursue research required to complete their educational programs. Students are expected to diligently pursue that research.

Prior to the beginning of each fiscal year, every graduate student will receive a statement specifying (i) total amount of stipend for that period, (ii) position to which appointed, e.g. TA, R.A., or other, (iii) starting and ending dates of appointment, (iv) assignment for that period, (v) the supervisor for that period, and (vi) other pertinent information. A copy of this document will be kept in the student's personnel file. Students will be asked to sign the form to indicate that it has been read, understood and accepted.

At the end of each fiscal year, each student will be evaluated on his/her assigned duties by the supervisor in writing. The student has the right to a written rebuttal in case he/she does not agree with the evaluation. The evaluation will also be kept in the student's personnel file.

A faculty member may support with his/her own funds any number of graduate students in addition to the College-supported graduate students. The stipend paid by the faculty member cannot be used to supplement an existing college supported stipend.

Students are encouraged to apply for national and graduate school fellowships and awards. If a student succeeds in receiving a grant, the department or the center may supplement the student's salary with a fraction of the amount up to the current funding levels (provided the granting agency allows such an arrangement).

Decisions concerning the allocation of state stipends are made by the departmental faculty at the same time as a decision is made to admit a particular candidate.

Selection of Discipline for Degree and Major Professor

Students must select a major advisor by the end of their second semester of graduate school but are encouraged to do so as early as possible.

If a student desires to change the major advisor, he/she must discuss the change with the current advisor. If both parties agree to such change, the student may select a new advisor. If the parties cannot come to an agreement concerning the proposed change, then the student and the faculty member must each write a letter to the department chairperson explaining the situation. The student must specify the reason(s) for deciding to change. The advisor's letter must specify the reason(s) for the disagreement and contain an overall evaluation and appraisal of the situation. The department chairperson will evaluate the letters, discuss the situation with both individuals, and decide. If the student is permitted to change advisors, he/she will not be allowed to continue the same research project with another faculty member, except if both faculty members agree in writing to the department chairperson that the student should continue the same project under the new advisor.

The department graduate coordinator will advise the student in general policies as set forth in this document. The graduate coordinator is also responsible for general oversight of the graduate program for quality assurance of the program, assignment of teaching duties, and recruitment of graduate students.

Supervisory Committee

The supervisory committee is proposed by the student's major advisor in consultation with the student, nominated by the department chairperson, approved by the Dean of the College of Pharmacy, and appointed by the Dean of the Graduate School. Each committee member should hold Graduate Faculty status with the Graduate School. The Dean of the Graduate School is an ex-officio member of all supervisory committees. The supervisory committee must be appointed no later than the second term of the doctoral program. The student is encouraged to meet with the supervisory committee as often as possible.

The supervisory committee shall consist of at least four (4) members of the Graduate Faculty. At least two (2) members must be from the Department of Pharmaceutics, and at least one (1) member other than the chairperson must be tenured faculty; at least one (1) member must be from a different educational discipline outside the College of Pharmacy. The chairperson need not be tenured, but must hold a full-time tenure track position in the Department of Pharmaceutics.

In unusual cases, the doctoral research may require the guidance of a specialist in an area of study other than that of the supervisory committee chairperson. In such cases, the department chairperson may recommend the appointment of a co-chairperson who should be on the graduate faculty.

Duties of the Supervisory Committee

- To provide optimal support and guidance to the student to help the student meet his/her academic goals.
- Inform the student of all regulations governing the Ph.D. degree. This does not absolve the student from the responsibility of becoming informed of these regulations.
- To meet soon after appointment with the student to consider the student's individual goals and proposed program, and evaluate the student's progress to date.
- To conduct the student's **written** qualifying examination after the student has completed all required course work. The supervisory committee should also assist in the departmental oral qualifying exam. After successful completion of the written and oral exam the committee will discuss and approve the student's dissertation topic, and, if the student has passed the examination to the committee's satisfaction, recommend the student's admission to candidacy.
- The supervisory committee should monitor and evaluate the student's progress and give clear directions as to the final work plan leading to graduation. It is recommended that the committee meet once a year before the student advances to candidacy and every six months thereafter to review the student's research and to make suggestions for completion of research, and approve that the student is ready to write up the dissertation as soon as the major advisor and student are convinced that the research is nearing completion.
- To conduct the final oral examination in defense of the dissertation.

Curriculum

A minimum of 90 semester hours beyond the Bachelor's degree is required for the doctoral degree. All credits earned in the approved degree program count toward this minimum. Course work must be 5000 level or higher. Courses for major credit must be taken by letter grade, except for those courses listed as S/U in the catalog.

Total Credits: 90 hours

Didactic Credits: 30 hours

Research Credits: 60 hours

Each student, together with his/her committee, will construct a course program of study specifically designed to meet the student's interest including the following core courses:

Statistics	STA 6166 (3) Statistical methods in Research 1	
	Or STA 6201 (3) Analysis of Research Data	
Drug Metabolism	PHA 6427 (2) Pharmacogenomics of Drug Metabolism and Transport	Fall Even Years
	Or PHA 6425 (3) Drug Biotransformation Molecular Mechanisms of Toxicity	Fall
Ethics	VME6767(1) Issue Responsible Research	Spring
	Or Equivalent	
Grant Writing	ALS 6046 (2) Grant Writing	Spring
	Or GMS6090	
Pharmaceutics	PHA6416(3) Pharmaceutical Analysis	Spring Odd Year
	PHA 6125 (3) Advanced Pharmacokinetics	Spring Even Years
	PHA 6938 (1) Seminar (Max 3)	
Research	PHA 7979 Non-Candidate	
	PHA 7980 Candidate	

Students with adequate training in any of the above courses may apply for exemption from such courses, but they must have credit for a minimum of thirty (30) semester hours of approved didactic courses. The remaining course requirements can be fulfilled by completion of electives from the provided list or the graduate catalog selected in consultation with the students advisory committee. It is also essential that the student ensure that they have a basic understanding of Pharmaceutics either by taking the appropriate classes or from previous education. They should be proficient in the basic sciences at a minimum to the same degree as students in the professional program. Questions will be asked during the oral qualifying exam.

ALL GRADUATE STUDENTS should register for (a) the 1 credit Pharmaceutics Department research seminar each semester, using number **PHA 6938** (Research Seminar; 1 credit; S/U option; **maximum 3 credits**).

- FOR NON- CANDIDATES: Graduate students who have not yet attained candidacy for the Ph.D. should register for **PHA 7979** (Advanced Research; 1 to 9 credits).
- FOR CANDIDATES: Candidates for the Ph.D. degree should register for **PHA 7980** (Research for Doctoral Dissertation; 1 to 15 credits).

Students are encouraged to take other courses offered by the department (like to Course Offered by Department of Pharmaceutics) and other approved graduate courses

Students with adequate training in any of the above courses may apply for exemption from such courses, but they must have credit for a minimum of thirty (30) semester hours of approved didactic courses. The remaining course requirements can be fulfilled by completion of electives from the provided list or the graduate catalog selected in consultation with the students advisory committee. It is also essential that the student ensure that they have a basic understanding of Pharmaceutics either by taking the appropriate classes or from previous education. They should

be proficient in the basic sciences at a minimum to the same degree as students in the professional program. Questions will be asked during the oral qualifying exam.

LIST OF APPROVED GRADUATE COURSES:

- PHA 5475 - Synthesis of Prodrugs (3 credits)
- PHA 5515 - Introduction to Pharmacology (1 credit)
- PHA 5516 - Pharmacological Basis of Therapeutics (4 credits)
- PHA 5517 - Pharmacology II (4 credits)
- PHA 6115 - Equilibria, Complexations, and Interactions of Drugs (3 credits)
- PHA 6118 - Molecular Diversity (2 credits)
- PHA 6354 - Natural Medicinal Products (3 credits)
- PHA 6417 - Pharmaceutical Analysis II (3 credits)
- PHA 6508 - Mammalian Physiology (4 credits)
- PHA 6509 - Mammalian Physiology (4 credits)
- BCH 6206 - Advanced Metabolism (3 credits)
- BCH 6740 - Advanced Physical Biochemistry (3 credits)
- BCH 7515 - Enzyme Kinetics and Mechanisms (2 credits)
- BMS 5201 - Introduction to Biochemistry and Molecular Biology (3 credits)
- BMS 5520C - Principles of Physiology (2 credits)
- BMS 6400 - Introduction to Pharmacology (5 credits)
- BMS 6402 - Autonomic and Cellular Pharmacology (2 credits)
- CAP 5506 - Programming Language Principles [3 credits]
- CAP 5635 - Artificial Intelligence Concepts (3 credits)
- CAP 6627 - Expert Systems (3 credits)
- CAP 6653 - Neuroal Networks for Computing (3 credits)
- CHM 4411 - Physical Chemistry (4 credits)
- CHM 5224 - Basic Principles for Organic Chemistry (3 credits)
- CHM 5235 - Organic Spectroscopy (3 credits)
- CHM 5275 - The Organic Chemistry of Polymers (2 credits)
- CHM 5305 - Chemistry of Biological Molecules (3 credits)
- CHM 5514 - Chemical Computations (2 credits)
- CHM 6154 - Chemical Separations
- CHM 6155 - Spectrochemical Methods (3 credits)
- CHM 6225 - Advanced Principles of Organic Chemistry (4 credits)
- CHM 6226 - Advanced Synthetic Organic Chemistry (3 credits)
- CHM 6211 - Chemistry of High Polymers (2 credits)
- CHM 6480 - Elements of Quantum Chemistry (3 credits)
- CHM 6520 - Chemical Physics (3 credits)
- CHM 6720 - Chemical Dynamics (3 credits)
- CHS 5110 - Radiochemistry (2 credits)
- CHS 5110L - Radiochemistry Laboratory (3 credits)
- GMS 6500 - Introduction to Pharmacology (5 credits)
- GMS 6563 - Molecular Pharmacology (3 credits)
- GMS 6735 - Neuropharmacology (3 credits)
- GMS 7593 - Principles of Drug Action (2 credits)
- GMS 7595 - Topics in Pharmacology (e.g. Principles of Drug Action, 2 credits)
- MBS 7423 - Principles of Drug Action (2 credits)

Qualifying Examination

Satisfactorily passing the qualifying examination is a requirement for admission to candidacy, i.e., when the student actually becomes a candidate for the Ph.D. degree. In order to take the qualifying examination, the student must (i) have a minimum 3.00 GPA; (ii) have completed letter-grade course work; (iii) have completed all core courses; and (iv) be registered at the time the examination is taken. Exceptions (e.g., if a core course is not offered, but the student has fulfilled all other requirements and has formulated a research program) may be granted by the supervisory committee. It is expected that the qualifying exam will focus on the student's own prepared NIH grant proposal but in addition; background information from course work and general questions of pharmaceuticals may be asked of the student.

General Guidelines

- The format for the comprehensive examination will be a combined written/oral examination.
- The comprehensive examination should be completed between the time when all course work is completed and no later than eight months prior to scheduling of the dissertation defense. It is expected that the oral comprehensive examination will be taken by the end of the third year in the graduate program.
- The written part of the comprehensive examination committee for each student will be chaired by a faculty member in the Department of Pharmaceutics who is a member of the graduate faculty. The student's academic advisor will be a member of the committee but may not be the committee chair. Composition of the committee will be consistent with University guidelines for dissertation committees (i.e., at least four faculty members with the majority being graduate faculty). It is anticipated that the examination committee will subsequently serve as the dissertation committee.
- The comprehensive examination committee will have a meeting prior to the comprehensive examination to discuss lines of questioning and to address core competencies (relative to each focus area). The chair of the examination committee will communicate the proceedings of this meeting to the Graduate Program Administrator. The oral part of the exam is open to the entire department.

Guidelines for Proposal Preparation

1. The topic of the research proposal must be an **original research project**. The topic may be the student's proposed dissertation research. A written abstract of the research proposal, maximum of one page in length, should be examined and approved by the academic advisor and the oral comprehensive examination committee prior to preparation of the complete proposal.
2. The written proposal, maximum of 10 pages of text plus references, prepared in the format of a granting agency (e.g., NIH R03) should be distributed along with "key" references to the committee at least 14 days prior to the oral comprehensive examination.
3. The graduate student will give an oral presentation that should be succinct, yet complete (approximately 20-30 minutes), and be supported by visual aids.

4. The committee will identify questions relevant to each research focus area, which may include but not be limited to:

- Literature evaluation skills
- Writing skills
- Scientific background
- Study design
- Utility of animal models of disease or conditions relative to the human situation
- Analytical methods
- Clinical measurement methods
- Data and statistical analysis skills
- Differentiation of clinical and statistical significance
- Basic Sciences covered in the Professional Program (Physical Pharmacy, Biochemistry, Pharmacokinetics, Biochemistry, Pharmacology, Medicinal Chemistry and Statistics)

5. The final evaluation by the dissertation committee should be communicated to the student and the graduate academic affairs committee utilizing the following scale:

a. **Pass** - With written feedback on strengths and weaknesses

b. **Remedial** work needed:

- Specific needs for additional learning experiences (e.g., scientific area, statistics, writing, etc.) may be identified.
- Remedial work may include a minor rewrite of the proposal or a major rewrite and re-defense of the proposal.
- Remedial work must be completed within six months from the time of examination.

c. **Fail** - A student who fails the qualifying examination will be terminated from the Ph.D. program.

Oral Comprehensive Examination Guidelines for Proposal Preparation Procedures

Oral comprehensive exam proposals are to be submitted on NIH grant application form PHS 398 continuation pages and prepared according to the directions in the application packet, with the exceptions noted below. Forms and instructions are available on the internet at:

<http://grants.nih.gov/grants/funding/phs398/phs398.html>

Research Plan

Do not exceed a total of ten pages for the following parts (a-d): Specific Aims, Background and Significance, Progress Report/Preliminary Studies, and Experimental Design and Methods. Tables and figures are included in the ten page limitation. Applications that exceed the page limitation or PHS requirements for type size and margins (Refer to PHS 398 application for details) will be returned for revision. The ten page limitation does not include parts e through i. (Human Subjects, Vertebrate Animals, or Literature Cited).

(a) - *Specific Aims* – (1 page). List the broad, long-term objectives and what the specific research proposed in this application is intended to accomplish, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, or develop new technology.

(b) - *Background and Significance* – (2-3 pages). Briefly sketch the background leading to the present application, critically evaluate existing knowledge, and specifically identify the gaps that the project is intended to fill. Concisely state the importance and healthcare relevance of the research described in this application by relating the specific aims to the broad, long-term objectives.

(c) - *Preliminary Studies/Progress Report* – (2-3 pages). Use this section to provide an account of the students'/academic advisors' preliminary studies pertinent to the application information that will also help to establish the feasibility of the proposed project.

(d) - *Research Design and Methods* – (4-5 pages). Describe the research design and the procedures to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted. Describe any new methodology and its advantage over existing methodologies. Discuss the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. As part of this section, provide a tentative sequence or timetable for the project.

See http://grants.nih.gov/grants/funding/phs398/section_1.html#8_research for complete instructions regarding sections (e) and (f).

(e) – *Human Subjects Research*

(f) – *Vertebrate Animals*

(g) – *Literature Cited*. (No page limit). List all references. Each reference must include the title, names of all authors, book or journal, volume number, page numbers, and year of publication. The references should be limited to relevant and current literature. While there is not a page limitation, it is important to be concise and select only those literature references pertinent to the proposed research.

Final Examination

After submission of the original copy of the dissertation to the Graduate School (see below) and completion of all other work for the degree, and the appropriate dates and time intervals will follow the guidelines set forth by the University of Florida Graduate School, as detailed in the Graduate Catalog.

An announcement of the scheduled examination must be submitted in writing to the Dean of the Graduate School by the chairperson of the supervisory committee at least ten (10) working days prior to the scheduled date through GIMS. An announcement of the examination is sent at least

one (1) week prior to the date of examination to faculty members in the College of Pharmacy, inviting them to attend.

At least four (4) faculty members, including all members of the supervisory committee, must be present at the final oral portion of the final examination. The four (4) faculty members must be Graduate Faculty members. Only the official members of the supervisory committee sign the dissertation signature pages.

Assuming the candidate is successful, the Final Examination Report shall be signed by all faculty members attending the examination. The dissertation, original and copies, are to be signed by the official members of the supervisory committee and by the Dean of the College of Pharmacy. Confirmation of passing the Final Examination is done online through GIMS.

Every candidate for a doctoral degree is required to prepare and present a dissertation that shows independent investigation, and is acceptable in form and content to the supervisory committee and to the Graduate School. Since all doctoral dissertations will be published it is necessary that the work be of publishable quality and that it be in a form for publication. A draft copy of the dissertation must be given to the supervisory committee members at least one month prior to the defense. This allows time for any major changes to be made. A final copy of the dissertation should be circulated to the committee at least one week before the final defense.

All copies of the dissertation, except the original copy and the Health Center copy, must be provided as a hard bound copy by the student. The original copy and the second copy of the dissertation must be presented to the Dean of the Graduate School on or before the date specified in the University Calendar.

Specific Requirements for the Master of Science in Pharmacy Degree

Students will not generally be admitted for studies toward an M.S. in this specialization. However, a student admitted to the doctoral program may be allowed to graduate with a Masters in Pharmacy subject to approval by the students supervisory committee. The M.S. in Pharmaceutical Sciences is described in the graduate catalog and requires the completion of a thesis or dissertation.

Graduate Student Classification:

Students pursuing the Master of Science in Pharmacy degree are classified 7PH.

Degree Requirements:

Unless otherwise specified, for a master' degree, the student must complete a minimum of 30 credits including no fewer than 24 hours of regular course work and up to 6 credits in thesis research as a graduate student at the University of Florida. No more than six semester hours of course work earned with a grade A, B+ or B may be transferred from institutions approved by the Dean of the Graduate School.

Major:

All course work for a master's degree must be in courses open only for graduate credit (5000 and above).

Credits and Grades:

The 24 credits of minimum regular course work recommended by the supervisory committee and the supervisory chair, must be taken by letter grade. The student must have a minimum 3.00 GPA for all course work attempted for the degree, and a minimum 3.00 GPA for course work in the major. The course program will be determined by the thesis committee.

Thesis:

The candidate is required to prepare and present a thesis acceptable to his/her supervisory committee and the Graduate School. He/she should consult the Graduate School for instructions concerning the forms of the thesis, binding, and the date when the original copy, accompanied by three (3) copies of abstracts are to be submitted to the Graduate School.

Supervisory Committee for the Master of Science in Pharmacy:

At least three members selected from the Graduate Faculty must be on the supervisory committee. These members are recommended by the student's supervisory chair, approved by the College Dean for Research and Graduate Studies, and appointed by the Graduate School. The Dean of the Graduate School is an ex-officio member of all supervisory committees. If a minor is designated, it should be represented by one member of the committee who is on the Graduate Faculty. The committee should be appointed as soon as possible, and no later than the end of the second semester or 24 credits, whichever comes first.

Only members of the Graduate Faculty may be members of the supervisory committee. Names of courtesy faculty, regular faculty, and others not on the Graduate Faculty should not appear on the student's official supervisory committee.

At least three faculty members must be present at the student's final examination. Only members of the official supervisory committee are required to sign the thesis and the report of the final examination.

Residency Requirement:

There is no residency requirement for the master's degree.

Admission to Candidacy:

Admission to candidacy is no longer required for students pursuing master's degrees.

Final Examination:

A written announcement of the examination is sent to the Graduate School Dean and all faculty in the College of Pharmacy. When the student's course work is completed, or practically so, and the thesis is in final form, the student's supervisory committee is required to examine him/her in writing or orally on his/her thesis and the subject matter of the courses taken for the degree. The

form Report on Thesis/Dissertation and Final Examination should be completed and signed by the official members of the committee, and then by the department chair/center director and the College Dean. This form should then be submitted to the Graduate School via GIMS.

The Final Examination Record should be submitted to the Graduate School with the thesis by the date specified in the University Calendar. The final examination may not be held any earlier than six months before the degree is to be conferred.

Time Limitation for Completion of The Master of Science in Pharmacy:

All work counted toward the M.S.P. degree must be completed during the seven years immediately preceding the date on which the degree is to be awarded.

Correspondence and Extension Work:

No courses may be taken for graduate credit by correspondence. No extension courses may be used for graduate credit.