

**GRADUATE STUDENT POLICIES AND PROCEDURES**  
**DEPARTMENT OF PHARMACOLOGY AND PHYSIOLOGY**  
**SAINT LOUIS UNIVERSITY SCHOOL OF MEDICINE**

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In all other instances, contact the Director of Graduate Studies for the Department of Pharmacology and Physiology (Heather Macarthur, Ph.D. ([heather.macarthur@health.slu.edu](mailto:heather.macarthur@health.slu.edu))).

Please note that many of the forms referenced in this handbook can be found at: <https://www.slu.edu/academics/graduate/current-students/index.php>.

# TABLE OF CONTENTS

<b>Chapter</b>	<b>pages</b>
Introduction	<a href="#">3</a>
Objective of the training program	<a href="#">3</a>
Overview of the training program	<a href="#">3</a>
Financial commitment	<a href="#">3</a>
Section 1. The core graduate program in biomedical sciences	<a href="#">4-6</a>
Section 2. The doctoral program in pharmacology and physiology	<a href="#">6-9</a>
Entry into the program	<a href="#">6</a>
Grading policy	<a href="#">8</a>
Responsible conduct of research	<a href="#">9</a>
Section 3. Preliminary examination	<a href="#">10-12</a>
Formation of preliminary committee	<a href="#">11</a>
Timeline	<a href="#">11</a>
Section 4. Advancement to doctoral candidacy status	<a href="#">12</a>
Section 5. Dissertation Committee and defense of doctoral dissertation	<a href="#">12-13</a>
Formation of doctoral committee	<a href="#">12</a>
Section 6. Teaching Responsibility	<a href="#">14</a>
Section 7. Academic and behavioral standards	<a href="#">14-16</a>
Individual Development Plan	<a href="#">15</a>
Remediation and grounds for dismissal	<a href="#">15</a>
Terminal masters	<a href="#">15</a>
Department sponsored travel	<a href="#">16</a>
Section 8. Summary of curriculum for M.D./Ph.D. students	<a href="#">16-17</a>
Appendices	
A. Core curriculum	
B. Policies and procedures for graduate students and fellows	
C. Process for students pursuing a Ph.D. at SLU	
D. Doctoral oral examination form	
E. Dissertation project, dissertation, and dissertation formatting	
F. Dissertation readiness form	
G. Academic integrity policy	
H. Dismissal policy	

**Introduction.** This handbook provides a concise guide to the process and policies of the doctoral graduate program of the Department of Pharmacology and Physiology of the Saint Louis University School of Medicine. While specifically tailored to the department, the standards outlined here are guided by the policies of the Graduate Program of Biomedical Sciences, the School of Medicine, and Saint Louis University, which are the ultimate authorities in matters requiring remediation. Students should refer to the documents obtained in the appendices for further information regarding University Policy. The program is overseen by the Graduate Steering Committee which is composed of: Drs. Heather Macarthur (chair), Terrance Egan, Andrew Lechner, Gina Yosten, and Jinsong Zhang, under the direction of Chair of the Department, Daniela Salvemini.

**The Objective of the Training Program.** The objective of the Saint Louis University Doctoral Training Program in Pharmacology and Physiology is to provide individuals with the opportunity to achieve a high degree of competence in the pharmacological and physiological sciences regardless of the student's background, thus preparing them to pursue productive careers in academics and industry. The five defining goals of the program are to: (1) instill enthusiasm for discovery and the scientific process; (2) foster the development of critical thinking skills; (3) develop laboratory research competence; (4) develop oral and written communication skills; and (5) promote a commitment to scholarship. This program is designed to provide students with a strong foundation in all aspects of basic biomedical science and the freedom to explore diverse research opportunities.

**Overview of the Training Program.** The program uses a multidisciplinary and integrative approach to provide a strong foundation in basic biomedical science and the freedom to explore diverse research opportunities (for curriculum, see Appendix A). During the first year of study, all traditional doctoral students enroll in the Core Graduate Program in Biomedical Sciences (see pages 4-6). Upon successful completion of the first-year curriculum, students petition to enter the department under the guidance of a chosen mentor. If accepted, these students complete formal training in pharmacology and physiology (see pages 6-9), successfully defend a preliminary qualifying examination (see pages 9-12) and undertake a research project leading to a doctoral dissertation(see pages 12-13). Students with advanced standing enter the department as second year students (see page 6) and pursue an individualized training program based on their previous experience and accomplishments that may include elements of the first-year curriculum. In the case of students with advanced standing, the dissertation research project cannot include or consist of experiments conducted prior to admission into the Pharmacology and Physiology doctoral program.

**Financial Commitment.** Graduate Research Assistantships are subject to the rules outlined in the *Policies and Procedures Manual for Graduate Assistants and Fellows* ([link](#), or see Appendix B; see also [link](#)). Financial support for assistantships in Years 1 and 2 is provided and administered by the Core Graduate Program in Biomedical Sciences. Financial support for assistantships in Years 3-5 is guaranteed by the Department of Pharmacology and Physiology. Financial support for assistantships for students who take longer than five years to complete their training is not guaranteed but will be considered on a case by case basis; in this instance, the dissertation mentor is the preferred funding source. In all cases and years, the dissertation mentor is the primary source of funding for laboratory supplies and other expenses incurred during the course of the doctoral dissertation project. Student stipends and other financial support ends at the last day of the month following the student's private defense. For example, if the student graduates on June 15<sup>th</sup>, then his/her support ends on July 31<sup>st</sup>.

## SECTION 1. CORE GRADUATE PROGRAM IN BIOMEDICAL SCIENCES

**Overview.** The Core Graduate Program in Biomedical Sciences was established by the Departments of Biochemistry and Molecular Biology, Molecular Microbiology and Immunology, Pathology, and Pharmacology and Physiology. The program is directed by Dr. Willis K. Samson (Caroline Building Room 207A; phone, 314-977-8678; email ([willis.samson@health.slu.edu](mailto:willis.samson@health.slu.edu))). The objectives of this program are to provide students with a broad foundation in basic biomedical science. At the same time, the program provides a diverse range of research experiences designed to help students identify potential dissertation projects. The one-year curriculum combines lectures, small groups discussion sessions, and seminars, and runs from August of the first year to July of the second year. The first-year curriculum consists of: BBSG-5010, 5020, 5030, 5040, 5110, 5920, and 5970; BCHM-6280; ORES-5200; and an online course in ethics for research scientists (see pages 4-6).

**Basic Biomedical Sciences I & II (BBSG-5010, BBSG-5030).** These are five-credit courses that meet on Monday, Tuesday, Wednesday, Thursday and Friday from 9:00 - 10:00 am. They are designed to give all students a strong foundation in the basic biomedical sciences including biochemistry, cell biology, genetics, immunology, molecular biology, neurobiology, pathology, pharmacology and physiology. The course is divided into 16 units representing 16 major topic areas in the biomedical sciences, taught by faculty drawn from all biomedical graduate programs.

BBSG-5010 Basic Biomedical Sciences I. *Prerequisites:* Admission into the common first-year biomedical sciences graduate program, or permission of the Course Director. Offered annually in the fall term, this intensive, multi-disciplinary lecture course is taught by faculty from all four biomedical research programs of the Medical School. The lecture topics include: macromolecular structure, shape and information; DNA, RNA and protein synthesis; genetics and control of gene expression; membranes and intracellular organelles; pathways and control of carbohydrate metabolism, development and immunology. BBSG-5020 is co-requisite.

BBSG-5030 Basic Biomedical Sciences II. *Prerequisites:* Successful completion of BBSG-5010, or permission of the Course Director. Offered annually in the spring term as a continuation of BBSG-5010, the course topics include cell biology, cell signaling, cancer, neurosciences, systems biology, endocrinology, metabolism, and virology. BBSG-5040 is co-requisite.

Grading policy. Students are advised to consult the guidelines of the Graduate Program in Biomedical Sciences for a complete description of the grading policy ([link](#)). A short synopsis is presented here.

Section Directors report the letter grade assigned to each student for that section, determined by the consensus of all faculty who taught in the section. Graduate School descriptors are used to assign letter grades. These descriptors are:

- A:** outstanding comprehension of the material and/or ability to communicate that knowledge
- A-:** excellent comprehension of the material and/or ability to communicate that knowledge, some deficiencies in expression of knowledge
- B+:** good comprehension and acceptable communication knowledge base
- B:** adequate comprehension with some deficiencies in either knowledge base or communication
- B-:** acceptable comprehension with deficiencies in either knowledge base or communication
- C:** minimally acceptable comprehension and communication abilities
- F:** unacceptable demonstration of comprehension and/or communication of knowledge base

- “A” 4.0
- “A-” 3.7
- “B+” 3.3
- “B” 3.0
- “B -” 2.7
- “C” 2.0
- “F” 0.0

Course repeats are not allowed. In the event a student must withdraw for personal reasons, a decision will be made on a case-by-case basis whether to allow the student to re-enroll during the following academic year. The decision to allow a student to re-enroll does not guarantee financial support for that enrollment.

Students must maintain a cumulative GPA of minimally 3.0. Failure to earn at least a 3.0 GPA during the Fall Semester will result in the student being placed on academic probation for the Spring Semester, which may or may not result in loss of the student stipend. The cumulative GPA after Fall and Spring Semesters must be >3.00. Students earning a GPA below that cut-off will be dismissed from the Program. If the GPA after the Fall Semester is so low that even a Spring GPA of 4.0 would not raise the cumulative GPA to above 3.00, the student will be dismissed after the Fall Semester.

**Appeals:** Students wishing to appeal a given grade must notify the Director of Graduate Programs in the Biomedical Sciences no later than three business days following posting of the grade(s). The Director will form an ad hoc committee of graduate faculty involved in the delivery of the course in question and at least one other graduate faculty member not involved in the course. They will review the appeal and recommend a final decision to the Director, who will make the final decision.

In the case of students wishing to pursue an additional level of appeal, the case will be taken to the Associate Provost for Academic Affairs who will review the file to determine if the process was followed. The Associate Provost does not overturn a decision, but may send the case back to the college, school, or center if process was not followed.

**Special Topics in Biomedical Sciences (BBSG-5020, BBSG-5040).** These are four-credit courses that meet on Tuesdays and Thursdays at 10:00 am - 12:00 pm. The objective of each course is to engage students in a variety of exercises designed to supplement and enhance the knowledge gained in the co-requisite lecture course. The class is divided into discussion groups comprised of a few students and a faculty member. Although the format for each session can vary, extensive student participation in activities such as problem solving, laboratory exercises, and discussion of primary literature is expected.

BBSG-5020 Special Topics in Basic Biomedical Sciences I. Offered annually in the Fall term, the course involves participation in small group exercises involving problem solving and critical analysis of the current scientific literature. The special topics are selected to coordinate with the lecture topics in the co-requisite course BBSG-501.

BBSG-5040 Special Topics in Basic Biomedical Sciences II. Offered annually in the Spring term, the course involves participation in small group exercises involving problem solving and critical analysis of current scientific literature in selected special topics, as related to the lecture topics in the co-requisite course BBSG-503.

**Ethics for Research Scientists (BBSG-5100).** This course is a requirement for all pre- and postdoctoral fellows. This course consists of 14 modules that cover seven content areas (research misconduct, data and management, responsible authorship, peer review, mentoring, conflicts of interest and collaborations). After an introduction to each module, the student reviews additional material including

case studies and completes a quiz. When all 14 modules are successfully completed, the web-based program generates a certificate of completion. The Director of the Core Graduate Program (Dr. Willis Samson) collects copies of the certificates to ensure student compliance.

**Introduction to Basic Biomedical Research (BBSG-5970).** This is a two-semester, two-credit course consisting of two six-seven, week rotations per semester. Students are expected to work Monday through Friday for at least 20 hours per week. The primary objective is to expose students to research opportunities across departments with the goal of identifying a dissertation mentor and research project. Students rotate through **four** different laboratories, in a minimum of **two** different graduate programs. Students are evaluated by their research mentors who submit a grade at the end of each rotation. Selection of a dissertation mentor occurs at the end of the Spring term after all rotations are complete. Research rotations in the summer prior to the beginning of their first Fall term at the University are available on a limited basis. An additional rotation is allowed in the unusual event that a student is unable to select a mentor after their initial round of rotations.

**Basic Biomedical Science Colloquium (BBSG-5920).** This is a two-semester, one-credit course meeting one hour per week on Wednesdays at 12:00 pm. The goal is to teach effective methods of critical data analysis and formal scientific presentation, and to foster the spirit of scientific exchange.

Fall Semester. Second-year Core students and postdoctoral fellows make 50-minute journal club-style research presentations (not of their own research) to provide good example of effective research presentations. Core Graduate Students are required to attend all sessions and participate in a special 15-minute discussion at the end of each session. The final grade is based on participation in discussions.

Spring Semester. First-year Core Students critically review and present a paper from the current scientific literature. Further, they are required to attend all student colloquia. The final grade is based on presentation quality, as evaluated by attending faculty, and on participation in the discussion sessions.

**Introduction to Statistics (ORES-5200).** This is a one-semester, three-credit course given in the Summer semester. It surveys of most appropriate statistical tests for the analysis of bench research-based data sets. Both parametric (including correlations, tests of robustness. Power analysis, and multifactorial analysis) and non-parametric tests will be demonstrated with real data sets submitted by biomedical researchers in the School of Medicine.

**Bioinformatics (BCHM-6280).** This is a 2-credit, 1 semester course offered every summer. The course introduces students to the use of publicly available databases and tools to support bioinformatics analyses of high-throughput experiments. The major goals of the course are to understand how next-generation sequencing technologies are used in biomedical research; learn how to use publicly available databases/websites to find specific information about gene lists; learn how to analyze gene lists to form hypotheses that can be tested experimentally and use that information to practice writing results as they would be formatted for a research manuscript.

## **SECTION 2. THE DOCTORAL PROGRAM IN PHARMACOLOGY AND PHYSIOLOGY**

**Entry into the Program.** The Department of Pharmacology and Physiology admits traditional, non-traditional, and M.D./Ph.D. students. In all cases, the requirements for entry are: (1) selection of a dissertation research advisor from amongst the Pharmacology and Physiology faculty (see below concerning faculty with secondary appointments); (2) written acknowledgement by the student and advisor of the expectations and responsibilities required by the Department of Pharmacology and Physiology (see page 6); and (3) written permission of the Chair (Daniela Salvemini, Ph.D.). Additional

requirements for each group are:

Traditional Students. Traditional doctoral students are admitted to the department after successfully completing the Fall and Spring Semesters in the Core Graduate Program in Biomedical Sciences with a grade point average of “B” or better (3.0 on a 4-point scale) in the Core Curriculum.

Non-traditional Students. Non-traditional students enter the program at the discretion of the Graduate Steering Committee and the Chair of the department. They must have completed an advanced degree (Master or Doctoral) in a relevant discipline, while maintaining a GPA of “B” or better.

M.D./Ph.D. Students. M.D./Ph.D. students enter the program at the discretion of the Chair of the department after successful completion of the first two years of the medical school curriculum.

**Overview of the Program.** The following description describes the program followed by traditional students entering through the Core Program. M.D./Ph.D. (see pages 16-17) students follow modified schedules. Depending upon their qualifications, non-traditional students may follow a modified curriculum approved by the Graduate Committee, otherwise they will follow the program outlined below.

After successfully completing the one-year Core Graduate Program in Biomedical Sciences curriculum, students in good standing (GPA of 3.0 or above) may elect to complete their Ph.D. studies in the Graduate Program in Pharmacology and Physiology. Students who enter the doctoral program take an additional six credit hours in advanced coursework (PPY-5110, -5120, -5130 and -5140), and attend weekly seminar (PPY-6800) and journal club (PPY-6900) presentations. After completing the required coursework, the students assemble a Preliminary Proposal Defense Committee, write their Preliminary Examination Proposal, and defend it before the end of February of their second year in the department (see pages 10-12).

At the same time, students begin research on their dissertation project under the direction of their faculty advisor. After successfully defending their preliminary examination, students select a Dissertation Committee who oversees their research efforts until graduation (see pages 12-13). Students ~~are required~~ to should meet with their dissertation committee at least twice per year. Continued participation in weekly departmental Journal Club and Seminars is also required, as is participation as teachers in the undergraduate course *Drugs We Use and Abuse* (BLA-2930) (see page 13); students who are verified to graduate in the upcoming semester are not required to register for PPY-6800 or PPY-6900. Students are expected to complete their dissertation work, including the oral defense of the written document, by the end of their fifth year (fourth year in Pharmacology and Physiology). Students must present a public seminar on their work upon successful defense of their dissertation.

**Introduction to Pharmacology (PPY-5110)** This is a five week, one-credit course that meets during August-September of the Fall semester. Its two-hour lecture blocks cover the topics of: binding theory; concepts of ligand efficacy and potency; partial agonists and antagonists; allosteric modulators; quantitative pharmacology (technology & statistical tools); biotransformation; drug pharmacokinetics; basic principles of medicinal chemistry; and structure/function relationships in drug design. In class time includes two sessions of problem-based practice and review; two in-class exams comprise the final course grade.

**Systems Physiology and Pharmacology (PPY-5120).** This two-credit course meets during September-December of the Fall semester. Its two-hour lecture blocks include the neuroscience subcategories of: neuroanatomy & development; basic neurophysiology; sensory systems; motor systems; neuropharmacology; and integrative neurobiology. The course then continues with dedicated lecture blocks on the autonomic nervous system, cardiovascular, renal, hematological, and respiratory systems. Four in-class exams are weighted by content exposures and comprise the final course grade.

**Systems Physiology and Pharmacology (PPY-5130).** This three-credit course meets during January-March of the spring semester. Its two-hour lecture blocks include dedicated sections on the gastrointestinal, metabolism, and endocrine systems, followed by a series of integrated systems topics including: energy balance/diabetes/obesity; hypertension and heart failure; hemorrhagic, neural, and septic shock; inflammation, infection, and antibiotics; asthma and COPD; exercise and high altitude; neurological and psychiatric disorders; cancer biology and conventional/immuno/targeted therapeutics; and personalized medicine. Three in-class exams are weighted by content exposures and comprise the final course grade.

**Constructing Grant Applications in Pharmacology and Physiology (PPY-5140).** This one-credit course meets during May-July of the spring and summer semesters. Its lecture and in-class mentored student activities cover the topics of: funding agencies and programs; developing and editing a proposal's Specific Aims; drafting and revising a proposal's Significance section; identifying a project's elements of Innovations; developing and revising a proposal's Research Design; completing a proposal's complementary elements of statistics, alternative outcomes, animal care/biohazard sections, etc. Students work both in class and on their own to finalize a final proposal that conforms to NIH guidelines with respect to length, sequence, and supporting documents. The final course grade is based upon class participation, construction of a grant proposal, and participation in a mock study section.

**Pharmacology and Physiology Weekly Seminar (PPY-6800).** This course meets weekly during the Fall (one-credit hour) and Spring (zero-credit hour) semesters. Research seminars are presented by faculty and investigators from other departments of the University, or by guest speakers from other institutions. Roundtable lunch-time discussions with students and the speaker are regularly scheduled.

**Pharmacology and Physiology Journal Club/Colloquia (PPY-6900).** This course is scheduled weekly during the Fall (one-credit hour) and Spring (zero-credit hour) semesters. It consists of weekly journal club presentations at which students discuss recent research findings and papers from the literature. Each student is required to present one journal club per year. The objectives, format and evaluation procedures are similar to those already described above for BBSG-5970 and -5980. The results of the faculty evaluation forms are discussed with each student individually by the Journal Club course director.

**Grading Policy and Remediation.** Course grades are awarded at the discretion of the course director. Below is a general outline of departmental policies.

PPYG-5110, 5120, 5130, and 5140. Section Directors report the letter grade assigned to each student determined by the consensus of all faculty who taught in the section.

≥ 95.0% = **A+** (an honorific grade, not affecting GPA calculations)

≥ 90.0% = **A**

≥ 85.0% = **A-**

≥ 80.0% = **B**

≥ 75.0% = **B-**

≥ 70.0%, < 75.0% = **incomplete.**

Remediation is permitted during first week of January (PPY-5110, PPY-5120), or by the second week of May (PPY-513). Re-testing will focus on specific deficient areas as identified by the teaching faculty. Students who successfully remediate will be assigned a final grade of **B-**. Students who fail this remediation will be assigned a final grade of **F**.

< 70.0% = **F**. No remediation is permitted in that semester. Failing students must re-take the course at the next available opportunity. Students who fail on a course may enroll



in any subsequent courses in the series for that academic year, but they must pass all four courses before advancing to the preliminary examination for advancement to doctoral candidacy. Students who receive a grade of “F” in more than one course face dismissal from the program. These students will meet with the Graduate Steering Committee who will take any extenuating circumstances under consideration in their final recommendation to the Chair. After considering the circumstances, the Chair decides the fate of the student.

PPYG-6800. Student grades are based on attendance only, with a sign-up sheet outside the door of the lecture hall. Students are allowed to miss two lectures, after which a grade point is subtracted for each lecture missed. Missing five or more seminars results in a failing grade of D. Final letter grades are assigned by the course director using the following scale:

≤2 missed seminars =	<b>A</b>
3 missed seminars =	<b>B</b>
4 missed seminars =	<b>C</b>
≥5 missed seminars =	<b>D</b>

PPYG-6900. Students are graded based on attendance and presentation quality. Faculty are asked to complete a presentation evaluation sheet for each journal club presentation, using scores that range from “1” for unacceptable to “4.25” for outstanding. The values for all categories are then averaged. An attendance score of 3.75 is given for perfect attendance. Class participation is graded in 0.025 increments, and unexcused absences result in 0.25 deductions. Final letter grades are assigned by the course director using the following scale:

4.0 and above =	<b>A+</b>
3.85-3.99 =	<b>A</b>
3.75-3.84 =	<b>A-</b>
3.5-3.74 =	<b>B+</b>
3.0-3.49 =	<b>B</b>
2.75-2.99 =	<b>B-</b>
2.0-2.74 =	<b>C</b>
0-1.99 =	<b>D</b>

**Responsible Conduct of Research.** Training in the responsible conduct of research is required of all Ph.D. students at Saint Louis University and by the National Institutes of Health ([link](#)). Training takes place in four phases and consists of the following activities:

Phase 1. Phase 1 is BBSG-5100, Ethics for Research Scientists (see page 5). All students are required to complete the course by the end of their first year in the Core Program.

Phase 2. Saint Louis University policy requires completion of the RCR online modules through the Collaborative Institutional Training Initiative (CITI program) (see [link](#)). You will be required to register if new to the site. Further, SLU requires a minimum of eight hours of face-to-face RCR training, consistent with NIH and NSF requirements. All required training must be completed prior to the end of the third year of graduate training. Early completion is encouraged. In order to meet the in-person requirement, Saint Louis University provides a series of two-hour topic focused workshops throughout the year for individuals to attend. Attending a minimum of four workshops will attain compliance with the eight-hour requirement for that person. Although this is a not-for-credit class, attendance at all of the presentations is mandatory. For further information regarding departmental RCR requirements, please contact Andrew Butler, Ph.D. ([andrew.butler@health.slu.edu](mailto:andrew.butler@health.slu.edu)).

Phase 3. Phase 3 occurs in the setting of the laboratory group responsible for the student's dissertation project. consists of discussion of topics pertinent to the Responsible Conduct of Research by individual training faculty in their laboratory meetings. In addition, advanced students (years 3-5 of their training program) are required to participate in 1-2 small group case discussions designed for 2<sup>nd</sup> year graduate students (Phase 2) discussed above. Documentation that appropriate topics have been covered in these lab meetings will be provided by students during their biannual meeting with the graduate committee.

Phase 4. All trainees who have not finished requirements for the Ph.D. in four years after they complete the Phase 2 course must participate in a Refresher Course on the Responsible Conduct of Research (RCR). The Refresher requires participation in the Responsible Conduct of Research workshops sponsored by the Office of the Vice President for Research and Office of Compliance of the Saint Louis University . Workshops are held throughout the Fall and Spring semesters. Each workshop will cover at least one of the major topics in RCR and count two hours for the eight hours of face-to-face training required by the NSF/NIH workshop consist of a panel of faculty and/or staff members representing different disciplines and areas of expertise on the topic.

### **SECTION 3. PRELIMINARY EXAMINATION FOR ADVANCEMENT TO DOCTORAL CANDIDACY.**

**Overview of the Preliminary Examination.** Each traditional student in the Department of Pharmacology and Physiology must successfully complete before the end of February of their second year in the department a written and oral examination in order to continue in the Ph.D. program and advance to doctoral candidacy. The Preliminary Examination has three components. The first component is a 1-page written proposal that is equivalent to the Specific Aims page of an NIH grant. The second component is a longer written proposal that follows the guidelines for the research proposal section of an NIH R21 grant application. This includes background, any preliminary data including that found in the literature, and experimental design of proposed experiments. The third component is an oral examination/defense of the written proposal. The proposal may be based on either the student's expected dissertation research project or a topic of research that is totally independent and unrelated to that of the dissertation.

All M.D./Ph.D. students and students entering the program with advanced standing must successfully defend the Preliminary Examination within the timeframe described for traditional students. M.D./Ph.D. students must defend by the end of their first year in the department. Non-traditional students must defend within one year of completing coursework requirements.

Students are referred to Sections 1 and 2 of Appendix C (or see [link](#)), *Process for Students Pursuing a Doctor of Philosophy Saint Louis University*, for discussion of the University process for students pursuing a Ph.D. at Saint Louis University and a discussion of the written and oral preliminary examinations.

**Purpose of the Preliminary Examination.** The goal of the preliminary examination is to assess the ability of the graduate student to formulate a hypothesis and to design an experimental approach. The written examination tests the student's ability to think independently and survey the appropriate literature, and to probe the student's knowledge in research areas considered essential for understanding the chosen research topic. The oral examination is meant to provide the student with an opportunity to present and discuss the written proposal, and to demonstrate how the proposed experiments fit within the context of pharmacological and physiological science. The oral examination is not a comprehensive examination designed to test all information that the student has been exposed to throughout the graduate-level coursework, but rather is restricted to information that is pertinent to their preliminary proposal.

**Formulation of the Preliminary Examination Committee.** The Preliminary Examination Committee is assembled in two stages. First, two members of the departmental Standing Preliminary Committee (Dr. Mickey Ariel, Chair, [michael.ariel@health.slu.edu](mailto:michael.ariel@health.slu.edu)) and the dissertation mentor form a three-person *ad hoc* committee that reviews a one-page “Specific Aims” summary of the research proposal supplied by the student. One of the two members of the Standing Committee serves as chairperson (see below). If the mentor is a member of the Standing Committee, then an additional member of the Standing Committee is recruited (i.e. the committee must contain two independent members of the Standing Committee). All members of the committee must have Graduate Faculty Status. After the *ad hoc* committee accepts the written short proposal, the student’s final preliminary examination committee is formed by the addition of two departmental faculty members. Identifying appropriate faculty is the responsibility of the student in consultation with his/her faculty mentor.

**Timeline of Preliminary Examination and Deadlines.** In the case of traditional and non-traditional students, the preliminary examination occurs after completion of the second year of the required course work. The deadline for an accepted version of the written 7-page proposal by the expanded committee is February 1<sup>st</sup> of the graduate student’s third year. The oral defense must occur by February 28<sup>th</sup> of the same year.

**Components of the Preliminary Examination.** The **first component** of the preliminary examination is a one-page Specific Aims component that describes the project in enough detail so that the initial three-person preliminary committee can judge the scientific merit and feasibility of the plan. Upon approval of the Specific Aims, the committee expands by addition of two departmental faculty mentors with expertise relevant to the research project. Then, the student has four weeks to complete the **second component** of the examination which is a 6-page Research Plan that resembles the research plan of an NIH R21-type application. The bibliography and title page do not affect page limits. The subject of the proposal is open and does not have to involve a current research project in the laboratory. Preliminary data are not required of the student. However, the student is allowed to include data available from other sources (i.e., previous experiments from the mentor’s laboratory that impact the proposal), or data gathered from the literature. Students are encouraged to present their ideas in a clear and concise manner and with proper grammar, spelling, and punctuation, as would be required if the proposal was to be reviewed by a regular NIH study section.

After receiving the full proposal, the 5-person Preliminary Examination Committee has one week to review the document after which they meet to decide if the document is acceptable and to plan the oral portion of the exam. The final date for the defense is no more than two weeks after the Preliminary Examination Committee approves the full 7-page (1 page of Specific Aims and 6 pages of Research Plan). If the committee decides that the written document is not acceptable, the student is required to meet with all committee members, as a group or individually, so that clear understanding of the deficiencies in the written proposal is reached. The student is then given additional 30 days to correct the deficiencies and submit an acceptable written proposal. Failure to submit an acceptable proposal after two attempts is grounds for dismissal. This step must be passed before the oral defense can be scheduled.

The **third component** of the preliminary examination is the oral defense of the written long proposal. The oral examination occurs with 2 weeks of submitting an acceptable written proposal; the oral examination must not be scheduled before the written proposal is approved by all members of the Preliminary Examination Committee.

The purpose of the oral exam is to provide the student with an opportunity to present and discuss the written proposal, and to demonstrate how the proposed experiments fit within the larger context of pharmacology and physiology. In terms of methodology, the student will be examined on content of the proposal. For example, with regard to breadth of the examination: if the proposal discusses a topic

such as catecholamines, the questions during the oral examination may relate to broader context and general knowledge of catecholamines that include synthesis, degradation, and release of this particular transmitter family. The oral exam is a test of the student's understanding of how the hypothesized questions, aims and experimental design fit within the context of the scientific field. It is not a comprehensive examination of everything covered in general classes. The date of the oral presentation should not be scheduled until the written proposal is fully approved by the examination committee.

The oral examination/defense begins with a 15-20 min presentation by the student in which key points of the written proposal are reviewed. It is not an all-inclusive presentation of the long proposal. The presentation should include discussion of: (1) the background, to establish relevance and to place the project within historical context; (2) the hypotheses; (3) the major elements of the experimental design; and (4) preliminary data, if available from previous work in the laboratory or from the literature. It is not expected that the student will have personally generated any preliminary data in order to write or present the preliminary exam. The oral presentation sets the stage for the questions that follow from the committee members. These questions will seek to clarify or expand on points made in the written or oral presentations of the proposal and to test the student's ability to place the research proposal in context of the larger scientific picture with specific emphasis on current knowledge in pharmacology and physiology. Further, students are expected to have a thorough understanding of the background of the project and the relevant literature. Successful completion of the oral defense is determined by a vote of the members of the Preliminary Examination Committee. If the student fails the oral examination, then the Director of Graduate Programs in the Biomedical Sciences, Dr. Willis K. Samson ([willis.samson@health.slu.edu](mailto:willis.samson@health.slu.edu)), may authorize a second attempt. In the case of a second examination, the Department of Graduate Education appoints an outside member (SLU faculty from another department) to ensure a fair re-examination. The second attempt cannot be scheduled with the same academic term as the first.

#### **SECTION 4. ADVANCEMENT TO DOCTORAL CANDIDACY STATUS**

Upon successful completion of the written and oral examinations, the Doctoral Candidacy Advisor submits the Doctoral Oral Examination Form (Appendix D; see also [link](#)) by email to Dr. Christine F. Harper ([christine.harper@slu.edu](mailto:christine.harper@slu.edu)), Doctoral Candidacy Specialist, Office of Graduate Education, DuBourg Hall, Room 420D (phone: 314-977-2243). Receipt of this form by the Graduate Education Office automatically advances the student to doctoral candidate status. Students are required to be enrolled in at least one hour of dissertation credit upon achieving doctoral candidacy status until completion of required credits (see "Advancement to Candidacy: Research Phase", see [link](#)).

#### **SECTION 5. DISSERTATION COMMITTEE AND DEFENSE OF THE DOCTORAL DISSERTATION.**

Students are referred to Sections 3-7 of Appendix B (or see [link](#)) for discussion of the University requirements for students pursuing a Ph.D. at Saint Louis University that includes a discussion of the written and oral dissertation examinations. Included in Appendix B are descriptions of the written requirements for successful completion of the doctoral candidacy; students are encouraged to strictly adhere to the guidelines presented there, including timely completion of the Degree Audit form, on-line application for degree through the Banner System, and the Notification of Readiness for the Public Oral Defense form.

##### **Formulation of the Dissertation Committee.**

The chair of a Doctoral Committee must be from the student's program and a member of the current Saint Louis University faculty. Normally the primary mentor of the student serves in this capacity. The

committee for the dissertation defense may have a minimum of three members and 50% of members must be SLU faculty. All committee members must hold Graduate Faculty status. A non-Saint Louis University faculty member or someone outside of the major field may serve as co-chair of a student's Doctoral Committee. In order for a non-Saint Louis University faculty member to serve on a Doctoral committee, the person must have a terminal degree in the field and/or have significant expertise or experience of particular relevance to students' dissertation. Non-SLU committee members (or SLU faculty without Graduate Faculty status) must be approved to serve on an ad hoc basis by the associate dean or director of the college, school, or center. Approvals may be made upon written request by the dissertation committee chair. The request should include a brief rationale for the member's service and the proposed member's CV. In Pharm/Phys case please send this to Willis K. Samson, Ph.D., Director of Graduate Programs in the Biomedical Sciences ([willis.samson@health.slu.edu](mailto:willis.samson@health.slu.edu)).

**NOTE: Only full time SLU faculty qualify for Graduate Faculty Status.** Dr. Samson's office grants permission for non-SLU faculty to be outside members of dissertation committees. They may sit on the committee, but not chair it. They cannot vote; rather, they are there for advice and mentoring.

**The Dissertation Committee.** The first meeting of the Dissertation Committee occurs within six months of passing the preliminary examination and before the end of the student's third graduate year. The primary purpose of the first meeting is to provide an outline the proposed project to the Dissertation Committee, including discussion of experimental aims, methodology, and expected outcomes. Preliminary data is not required but encouraged.

Committee Meetings. Doctoral candidates are required to meet with their Dissertation Committee at least twice a year. The charge of the Dissertation Committee is to approve, advise, and evaluate research progress, and recommend suitability for submission of the written document for oral defense.

Grading. Students must complete 12 credit hours of PPY-6990 (Dissertation Research) to be eligible to graduate. Grades of IP (i.e. "In Progress") are assigned during semesters leading up to the dissertation defense. A final grade of "S" (i.e. "Satisfactory") is then awarded during the semester that the dissertation is successfully defended. The written dissertation must follow University guidelines set out in the manual, *Policies and Procedures for Dissertation, Project, and Dissertation Formatting* ([link](#), or see Appendix E). Upon agreement of the committee, a dissertation readiness notice is provided to the student, mentor and Director of Graduate Studies (Appendix F; see [link](#)).

Private and Public Oral Defenses. When the student's Dissertation Committee decides that the student is ready to defend, the "notification of readiness to defend" form ([link](#)) will be completed by the chairperson of the committee. Please note that the date for the public defense on that form is for the public oral presentation and **NOT** the private defense. The candidate will then prepare their written document and submit it to the committee **at least two weeks prior** to the date of the private defense. The Dissertation Committee will then meet with the candidate to conduct a private defense of the dissertation. The student will present results if available, and answer any remaining questions asked by the committee. Then, the candidate will be excused from the meeting, after which the committee will discuss their evaluations of the candidate and complete the official results form.

Following the private defense, successful candidates are required to present a public oral presentation of their dissertation work as a formal seminar. The presentation should conclude after 45 minutes, and is followed by a discussion/examination period at which time all members of the audience may examine the Ph.D. candidate. Spontaneous questions that arise during the presentation are encouraged.

If the committee requires major revisions of the dissertation following the defense, the ballot form will not be completed until every committee member is satisfied. A unanimous positive evaluation of the dissertation committee, that is, all members whose signatures appear on the Candidate's approved prospectus, is necessary for final approval of the dissertation. Should the candidate not be approved for

graduation because of one negative vote from a dissertation committee member, the Candidate may appeal. The appeal process is described in the Catalog of the Graduate School.

## **SECTION 6. TEACHING RESPONSIBILITY.**

Graduate students in the Pharmacology and Physiology Doctoral Program are required to obtain formal teaching experience by participating as lecturers in *Drugs We Use and Abuse* (PPY 1450). This 3-credit undergraduate course for non-science majors is presented each Fall Semester, and meets Monday, Wednesday and Friday mornings. The course syllabus is prepared and revised annually with each block of lectures or chapter written by its graduate student lecturer.

## **SECTION 7. ACADEMIC AND BEHAVIORAL STANDARDS.**

**Overview.** Students are expected to comply with all academic coursework and research standards outlined in this document, unless specific requirements have been waived or substituted with the prior approval by their preliminary and/or dissertation committees and the departmental Graduate Steering Committee. All students are obliged to participate in regularly scheduled journal clubs, weekly seminars, teaching assignments, and departmental retreats/meetings when applicable, unless excused in advance by the faculty Directors of those events or the Graduate Advisor. Furthermore, specific students may be encouraged or required to attend training seminars, technical or grant-writing workshops, and scientific meetings, as determined by consultations with their faculty advisor, preliminary exam and dissertation committees.

At all times, students are required to maintain a grade point average of “B” or better. Students who fail to do so will be placed on probation. Probationary status lasting two consecutive academic semesters (excluding the Summer semester) is grounds for dismissal.

In keeping with the policies outlined in the *Saint Louis University Student Handbook* ([link](#)) and the *Academic Integrity Policy* ([link](#), or see Appendix G), students are expected to comport themselves in a professionally appropriate manner when interacting with colleagues within the department and throughout the School of Medicine, as well as in broader academic settings as those arise. Such events may include but are not limited to visits and luncheons with institutional guests such as seminar speakers and special lecturers, as well as during all their interactions with undergraduate, graduate, and postdoctoral trainees. Furthermore, all students are expected to obtain and maintain institutional certifications relevant to their activities, in areas such as animal care, biosafety, human subjects, hazardous waste handling and disposal, and emergency preparedness.

Failure to comply with these standards is grounds for dismissal.

**Monitoring Student Progress and Performance.** During the year that students are in the Core Graduate Program in Biomedical Sciences, student progress is monitored by the Core Program Director in consultation with the Curriculum Committee and the teaching faculty. During and after the second year (first year in the Pharmacology and Physiology Training Program), student progress is monitored by the departmental Graduate Steering Committee. Progress is gauged at the end of each semester, and during annual meetings of each student with the departmental Graduate Steering Committee. The Director of Graduate Studies maintain records of student grades, journal club presentations, progress on proposals and selection of a Doctoral Candidacy Advisor. These are reviewed by the full committee at least semi-annually, and more frequently if problems arise.

The required Graduate School academic standard for all students receiving Fellowships is the maintenance of a B average (3.0 grade point average) in each academic year. A student with a grade point average below 3.0 is put on academic probation, and may lose the Fellowship if this average is not restored to 3.0 in the next semester. At the time of the oral preliminary examination, the Doctoral Candidacy Advisor reviews the progress with the rest of the student Proposition Defense Committee. From this point on, student's progress is monitored by the Doctoral Candidacy Advisor and Dissertation Committee, which meet at least twice per year.

**Individual Development Plan.** All students are required to develop an Individual Career Development Plan using MyIDP ([link](#)) as soon as they complete their Preliminary Qualifying Exam. The goal is to help students and postdoctoral fellows define and pursue career goals. Progress through MyIDP is monitored by a senior faculty member (Dr. Ian De Vera; [ian.devera@health.slu.edu](mailto:ian.devera@health.slu.edu)).

**Remediation of poor performance and grounds for dismissal.** Students who fail to comply with the academic or behavioral standards outlined above will be required to meet with the Graduate Advisor and/or the relevant Course Director, Teaching Supervisor, or Preliminary Exam and Doctoral Defense Committee Chairperson. Issues that can result in such required meetings include but are not limited to poor classroom performance or participation, failing or substandard exam or course grades, unexcused absences, noncompliance with regulatory certification standards, and documented examples of inappropriate behavior. During a first such meeting, the infractions or other issues will be discussed with the student and minutes of the meeting taken for distribution to the trainee and mentor and other faculty members or supervisors that detail the specific remediation plan to be imposed. Follow-up meetings or other benchmarks may be imposed at that time, such as timelines to complete missed assignments, complete certification training sessions, or modify inappropriate behavior.

Depending upon the severity of the situation or the department's concerns about the student, a period of probation for up to a full semester may be imposed, so that the student can correct deficiencies or behavior. During an initial probationary period, a student's stipend will customarily not be at risk of immediate suspension. However, more serious matters including breaches of professional ethics may be brought to the full Departmental Graduate Committee for its deliberation. Students who require more than two such probationary periods during the entire course of their graduate studies will, at the discretion of the Graduate Committee and the Departmental Chair, will be informed of the intent to initiate dismissal proceedings. After informing the student, the Department will follow the formal procedure for dismissal outlined in Appendix H, Procedure for Graduate Student Dismissal, Saint Louis University School of Medicine.

**Procedure for terminal Masters in Science degree.** Some doctoral students fail to achieve acceptable coursework grades, advancement to candidacy, or research progress by the timelines and rubrics outlined above. Most often this can occur due to scientific and technical difficulties with a project, unresolvable issues between the student and mentor, or personal matters such as a trainee's health or support system that develop once the trainee has begun the official doctoral research studies. Whenever possible, the Department Graduate Committee and/or the Graduate Advisor will have met on several occasions with the student to recommend plans of action that facilitate continued progress in overcoming such obstacles. If such efforts by all parties fail to resolve issues that are impeding final completion of the doctoral dissertation, the Department reserves the right to recommend the awarding of a Masters in Science degree, so that the student can then move forward with other career plans.

Students are referred [here](#), which lists the degree requirements for a Masters Degree. In the Department and Pharmacology, the student is required to have successfully completed the first (Core) and second (Departmental) year curriculum. Successful defense of the Preliminary Examination is not

required. A written dissertation is also required, which must be orally defended before a committee composed of the Doctoral Candidacy Advisor and at least two other departmental faculty members with Graduate Faculty Status. The written document can be a stand-alone dissertation, or a copy of a first-authored published or in press manuscript. Successful defense of the written document is judged by the dissertation committee. Once approved, the student must apply online for graduation at: ([link](#)).

**Department sponsored travel.** The department will pay for one domestic trip to a science-based meeting per year. After the first year in the department, the student is expected to present his/her original work in the form of a poster or oral presentation. The student must get the approval of the chair before booking flights.

**SECTION 8. SUMMARY OF CURRICULUM FOR M.D./PH.D. STUDENTS** (adapted from, *A Student Guide to the M.D./Ph.D. Program*; for more information, contact Dr. Ajay Jain ([ajay.jain@health.slu.edu](mailto:ajay.jain@health.slu.edu)), Director, M.D./Ph.D. program, Saint Louis University School of Medicine)

The Department of Pharmacology and Physiology provides a Ph.D. program that trains students to be independent investigators in the interrelated disciplines of physiology and pharmacology. The department also contains the Center for Neuroscience. The overall goals of the Ph.D. program are to: instill enthusiasm for discovery and the scientific process; foster critical thinking, research competence, and oral and written communication skills; and promote a commitment to lifelong scholarship. Diverse research interests of the department faculty ensure that trainees can select projects that span physiology and pharmacology from the subcellular through integrative levels. M.D./Ph.D. trainees join this graduate program with 30 credits transferred from the Phase 1 and 2 M.D. curricula toward the total of 36 credits and 12 dissertation credits required for the Ph.D. degree by the Office of Graduate Education. The remaining six coursework credits are satisfied through completion of two 1-credit required courses described below, and by regular participation in the Department's scheduled journal clubs and seminar series that are also detailed below. Journal clubs cover a broad range of subjects, as do the weekly departmental seminars that feature outstanding speakers from the U.S. and abroad.

### **Preliminary Examination**

Every M.D./Ph.D. trainee in the Department must pass written and oral exams that are based on a research proposal written by the student as a grant application. Following a satisfactory performance in PPY-5110 and PPY-5140, the trainee develops an original proposal that complies with NIH R21 page limits (Specific Aims + six pages + bibliography). The requirements are identical to that described above for standard Ph.D. students except that the preliminary examination committee must include a Pharm/Phys faculty member who is also a member of the M.D./Ph.D. steering committee.

### **Dissertation Committee**

Completion of the preliminary exam permits the M.D./Ph.D. trainee and mentor to assemble a Dissertation Committee and to file formal Ph.D. candidacy papers with the Graduate School. Again the requirements for this process are identical to those described above for standard departmental Ph.D. students except one member of the dissertation committee must serve on the M.D./Ph.D. steering committee (not the mentor).

**Prerequisites:** Successful completion of Phases 1 and 2 of the M.D. Curriculum and USMLE Step 1. M.D./Ph.D. trainees receive up to 30 graduate credits that are transferred from Phases 1 and 2 courses as listed elsewhere in this Guidebook.



**Required Didactic and Participatory Department of Pharmacology and Physiology Courses during Ph.D. Training Years:**

- PPY-5110 Introduction to Pharmacology and Drug Discovery
- PPY-5140 Fundamentals of Effective Grant Construction
- PPY-6800 Pharmacology and Physiology Departmental Seminar
- PPY-6900 Pharmacology and Physiology Colloquium Journal Club

**PPY-5110 Introduction to Pharmacology and Drug Discovery** (1 credit). Taught at the beginning of each fall semester, this 5-week course is an intensive review of: basic pharmacokinetics; receptor binding theory; assessments of efficacy and potency; full and partial drug agonists/antagonists; and new drug design and discovery. The course format includes lectures, discussions, and problem-solving assignments.

**PPY-5140 Fundamentals of Effective Grant Construction** (1 credit). Beginning at the end of the spring semester and extending through mid-summer, this 12-week course includes didactic lectures, one-on-one mentoring sessions, and dedicated proposal writing time, culminating in a 20 – 30 min oral presentation followed by questions and faculty critiques. The final proposal must include all main narrative sections of an NIH- formatted R01 grant application (12 pages + bibliography). Students may use a shortened revision of their PPY-5140 proposals for their Preliminary Exam for advancement to doctoral candidacy (see above).

**PPY-6800 Pharmacology and Physiology Departmental Seminar** (0-1 credit per semester). Selected topics in pharmacology and physiology are presented by local, national, and international guest speakers. Seminars are held at least twice monthly and usually more often. Attendance and participation are required for all Ph.D. students for this yearlong course.

**PPY-6900 Physiology and Pharmacology Colloquium Journal Club** (0-1 credit per semester). Selected topics in pharmacology and physiology are discussed from the current literature in these fields. Colloquial journal clubs are held at least twice monthly and usually more often. Attendance and participation are required for all Ph.D. students.

**PPY-6990 Dissertation Research** (0 – 6 credits per semester).

**Responsible Conduct of Research.** Training in the responsible conduct of research is required of all Ph.D. students at Saint Louis University and by the National Institutes of Health. Training takes place in three phases (see page 9).

# APPENDICES