

## **Molecular, Cellular and Systemic Physiology Graduate Policies**

Graduate courses in physiology may be taken leading to the Doctor of Philosophy or the Master of Science degrees with a major in molecular, cellular and systemic physiology. The Department of Physiology offers advanced training in mammalian physiology, aging, cancer biology, cell physiology, molecular biology, molecular endocrinology, neuro-endocrinology, neurophysiology, neuropharmacology, reproductive biology and reproductive endocrinology, metabolism and human anatomy. Students entering the graduate training program are advised to plan the course work so as to acquire a broad knowledge of the field before emphasizing one of these sub-disciplines. The advisory system in the department is set up to help students in planning their work. All graduate training programs in the department are subject to approval of the graduate program committee (GPC) of the department.

The GPC is charged with evaluating applications to the Molecular, Cellular and Systemic Physiology Graduate Program and making decisions on admission. The GPC also helps determine the financial support of students on departmental funds, assigns teaching responsibilities, and tracks student progress toward the completion of their degree.

Each term the student must be engaged in a training assignment which supplements formal course work and will consist of research or teaching or both. The student is required to have participated in both types of activities, research and teaching, as a graduate student at SIU as a condition for receiving a graduate degree.

Prerequisites for graduate training in molecular, cellular and systemic physiology include an undergraduate degree in one of the biological, physical or behavioral sciences, preferably with one year each of physics, mathematics and chemistry.

### **Admission**

The current policy is to limit the number of students admitted to the program, based on the availability of financial support for the students. While the majority of students are supported by departmental teaching assistantships, there are a limited number of research assistantships available, and this support is directed to students who have completed their coursework and are exclusively doing research with preference given to those in the Ph.D. program. Only a few students have been admitted into the graduate program without financial support.

### **Financial Assistance**

The Department of Physiology offers financial assistance to qualified applicants accepted by the department. The funds which provide this assistance come from a variety of sources which include: teaching assistantships from the department; university fellowships which are applied for directly by the student; and research assistantships from grants obtained by the graduate program faculty. When applying to our program, students interested in financial assistance should fill out the Financial Support form available online. Additional financial aid information may be found at the SIU Financial Aid Office web page. Financial assistance depends on availability and the student's qualifications and academic status. Continued financial support is contingent upon the student's progress toward the degree and good academic standing.

The department may support master's students for up to 30 months and Ph.D. students for 60 months on department teaching assistantships. However, every effort will be made to encourage the student and his/her adviser to find alternative sources of funding. Continuation of support will be conditioned on satisfactory performance in areas of academics, research, and teaching. Academic performance will be based on good standing in the Graduate School (3.0 GPA) and passage of the preliminary exam by the end of the third year (Ph.D. students only). Evaluation of teaching effectiveness will be carried out by the GPC from sources possibly but not limited to the course coordinator, student evaluations and by direct observation of classes by the GPC.

**Guidelines for Departmental Assistantships:** A departmental stipend for graduate student research will be available to molecular, cellular and systemic physiology graduate students working in laboratories of regular physiology department faculty members. Renewal of stipend is dependent on the student making satisfactory progress in their research program (as determined by their advisory committee and the GPC) and remaining in good academic standing (as defined above).

Once students are admitted to the program, the Graduate Program Committee determines funding and tries to maintain the level of financial support for the student through to the completion of their degree. Financial support is contingent upon the student's progress toward their degree with satisfactory performances in their coursework, research, and teaching. The ability to support new students is dependent on incoming funds from the state and School of Medicine to the department for graduate assistantships, grants obtained by faculty and fellowships awarded to current students.

To be equitable to faculty members in the Physiology Department, one graduate student per faculty member will be supported by departmental funds to the extent possible with the available funds and determined each fiscal year. Faculty in the Physiology Department who have one department-supported graduate student are expected to financially support any additional graduate students that they recruit to their laboratories within one semester of the student joining their laboratory.

Faculty outside the Physiology Department, who recruit a student in the graduate program to their laboratories, are expected to financially support the graduate student upon the student joining their laboratory.

Incoming students who are dependent on financial support will be encouraged to rotate through laboratories that do not have a department-supported graduate student and through laboratories that have funds to support multiple graduate students.

### **Doctoral Program**

The Graduate School requires a grade point average in previous graduate work of at least 3.0 and acceptance by the academic unit offering the Ph.D. program. See the following pages for accelerated and direct entry options.

The application should be submitted online through the Graduate School. Applications are due January 15. All applicants must submit a brief (300-600 words) statement of goals and ambitions indicating why they wish to go graduate work and three letters of recommendation submitted by

individuals who can comment on their academic abilities, character, and potential for doing research. The Graduate Record Exam (GRE) is required, and the score on the general part must be submitted with the application.

This program requires a nonrefundable \$65.00 application fee that must be submitted with the application for Admissions to Graduate Study in Molecular, Cellular and Systemic Physiology. Applicants may pay this fee by credit card. The graduate program committee of the department will examine the credentials which include the application form, transcript(s), letters of recommendation, goal statement and GRE scores (if applicable) only after all materials have been received.

International students must take the TOEFL exam and obtain a score greater than 550 (paper score) or 220 (computer score) to qualify for admission by the Graduate School, and must pass a Test of Spoken English prior to the awarding of teaching assistantships by the Department of Physiology.

### **Ph.D. Direct Entry Option**

This option is presently available for admission to the Graduate School. The Department of Physiology may accept a post-baccalaureate student directly into a Ph.D. program provided that the student has:

1. A cumulative undergraduate grade point average of 3.0 ( $A = 4.0$ ).
2. Sufficient undergraduate course work in biology, chemistry, physics, and mathematics or an outstanding score on the graduate record exam (GRE).

A student admitted to the doctoral program under this option is subject to the admissions requirements stated above and all other requirements of the doctoral degree, including: course work, retention, residency, examinations, research proposal, dissertation, and all applicable time limits. The Advisory Committee may adjust the course work and requirements of the student based on the student's background and research area. Students who have taken one or more core courses at another accredited university may be given credit toward their core requirements if such courses are deemed equivalent to our core courses by the GPC and department academic requirements are met.

### **Ph.D. Accelerated Entry Option**

The Department of Physiology offers the Ph.D. accelerated entry option to a graduate student in the Master's program who demonstrates the intellect, research aptitude, and commitment for pursuing a doctoral degree. At the end of at least one year of studies at the Masters level, the student may request that their Advisory Committee review their qualifications and performance in order to establish eligibility for entry into the doctoral program under this option.

Procedure for acceleration to Ph.D. program:

1. To be considered for acceleration the student must be in good academic standing with a GPA of at least 3.0 for their Master's coursework so far at SIU. The graduate school requires a GPA of at least 3.0 for acceptance to the Ph.D. program. The student must have also received a grade of A or B (at least 3.0) in PHSL 511A and PHSL 511B.

2. If the student's advisor is supportive of acceleration, the student must give a departmental seminar that shows the progress they have made on their research, clearly defines their role in the development and implementation of their studies, and outlines the project they propose for their Ph.D.
3. Within two weeks following the seminar, the student will meet with their advisory committee. The Advisory Committee must establish that the student is prepared and able to conduct research at the doctoral level. The student must have made sufficient research progress to demonstrate that they are capable of performing the research necessary to obtain a Ph.D. and have presented posters and/or given talks at professional meetings or conferences. Ideally, MS students accelerating to the Ph.D. track should have nearly completed their proposed MS thesis work (i.e. acceleration is not a delaying tactic because their research to date has not gone as anticipated) or could do so within a short time frame if acceleration is not approved.
4. The student and committee members fill out the acceleration form and submit it to the Department of Physiology office.
5. If the majority of the student's advisory committee members are supportive of acceleration, the student shall apply to the Ph.D. program with letters of support from their mentor and committee members.
6. The GPC will review the student's application and vote on acceptance/denial. The GPC will consider the advisor's ability to support the student.

A student admitted to the doctoral program under this option is subject to all requirements of the doctoral degree, including: course work, retention standards, residency, examinations, research proposal, dissertation, and all applicable time limits. Please note that only courses taken after admission to the doctoral program will count toward residency.

### **Total Hours Required**

The requirements for the Ph.D. degree are those established by the Graduate School, the Department of Physiology and the student's advisory committee. The Graduate School requires 24 semester hours prior to candidacy and 24 semester hours of dissertation research (PHSL 600). Up to 6 hours of dissertation research earned prior to candidacy may be counted. Of the total hours completed, at least 10 of these must be graded (A, B) hours at the 400 or 500 level. These 10 hours are in addition to PHSL 511A and PHSL 511B.

### **Research Tools**

Doctoral students must acquire competence in one research tool and are encouraged to attain competence with two tools. The requirements for a research tool may be satisfied by establishing proficiency in advanced statistics, computer science, electronics, advanced mathematics, electron microscopy, foreign language (with suitability of a particular language being determined by the student's committee), or a technique which is acceptable to the student's advisory committee. Courses which are normally part of a track requirement or are highly recommended for students

in a particular track cannot serve as tools for students in that track. Approval of a given tool by the student's committee will be granted only if the student has demonstrated proficiency by taking a formal course and receiving a grade (preferably *B* or better) or by passing a formal examination given by an expert in that field (preferably a faculty member in the university department where the subject is normally taught). PHSL 510 can serve as a research tool.

### **Teaching**

At least one semester of teaching is required for the degree and this usually consists of one or two sections of an undergraduate laboratory.

### **Advisory Committee**

The Director of Graduate Studies will act as an advisor to new graduate students until a research advisor is selected. The choice of a research advisor is a very important step and should be carefully considered. During the first semester, most students rotate through four research laboratories to get acquainted with faculty members and research programs before selecting an advisor who will direct the dissertation research and help plan course work.

The functions of the research advisor are:

1. To provide guidance in the student's research and the use of facilities.
2. To provide mentorship in conducting, evaluating, and publishing scientific research.
3. To serve as chair of the Advisory Committee and consultant for the selection of other members of the Advisory Committee. Members of the Advisory Committee should provide expertise in or complementary to the research area and provide guidance in the selection of course work.

The composition of the PhD Advisory Committee shall consist of at least 5 graduate faculty members including the research advisor. The majority of the members (at least 3 of 5) must have their primary appointment in the Physiology Department and at least one member is required to be from outside the department.

Following the selection of a research advisor and the Advisory Committee, the Graduate Faculty Committee Approval form (available in the department office) must be filled out with the names and signatures of committee members and filed with the department secretary. The completed form will then be forwarded to the Graduate School for final approval.

The student must hold their first committee meeting and submit their Committee Approval form by the end of the spring semester. The student must meet with the Advisory Committee yearly to discuss research and academic progress. The student shall bring the Annual Committee Meeting form with them to each committee meeting. It is the responsibility of the student to submit the signed form with committee comments to the Physiology Department. Failure to schedule annual meetings and submit the form will result in non-renewal of the student's assistantship contract.

### **Preliminary Examination**

Preliminary examinations for doctoral students consist of a set of written exams covering the student's research area and course work, a research proposal in the area of the dissertation research project, and an oral defense of the proposal. In most cases, the written exams are taken

in early August after completion of the second year of study. After passing the written exams, the student will have one month to write the research proposal. The student's Advisory Committee will evaluate the research proposal and if it is found acceptable, the oral defense of the proposal will be scheduled with the Advisory Committee.

### Written Examination

The student's Advisory Committee, which consists of at least five graduate faculty members (including one from outside the department), will prepare the written examinations. The written examinations should test the student's knowledge, analytical skills, and synthesis through a combination of question types, including: essay, interpretation of research data, and designing experiments. The emphasis of the exams should be on topics related to the student's research area, but may also include topics covered in the student's course work in molecular, cellular and systemic physiology. The Advisory Committee should meet and discuss topic areas for examination and types of questions. Each member should write and submit one or two questions to the Graduate Program Committee (GPC). The GPC will review the questions for consistency and uniformity across exams given from year to year and will assemble the exam. The GPC will be responsible for scheduling and proctoring of the exam.

The written exams will be given over two-three days and the student will be given three hours to answer each committee members' question(s). Each member of the Advisory Committee will grade the student's answer to their question(s) and send the results to the GPC. The criterion for a "pass" will be at 80% in terms of completeness and accuracy. The GPC will meet and determine if the combined scores are at 80% or above and passing. The student will be notified of their "pass/fail" status within 10 days of taking the written exams. In the event that they do not pass, the student may request one re-examination only. If the student obtains an overall pass, but one or more individual exam scores are below 70%, the GPC in consultation with the Advisory Committee may require the student to retake the individual exams. Failure to pass the written exams on the second attempt will result in consideration for dismissal by the GPC.

### Research Proposal

After passing the written exams the student will be asked to prepare a research proposal. The proposal will be based on the student's own research. Some of the proposed experiments may be similar to experiments proposed by the research advisor in grants, but they must be written in the student's own words. The majority of the proposal should represent the student's independent ideas and approaches and these may or may not be carried out in the final dissertation project. The student should propose studies that have not yet been completed. Completed studies may be used as preliminary data. The proposal should be written with minimal help of the advisor, but this does not exclude discussions with the advisor or other faculty on proposal content or experimentation.

The proposal should be written in concordance with the guidelines for an R01 application to NIH. It should be single-spaced type, excluding the abstract, specific aims and references. Font size should be at least 11 point Arial, Georgia, Helvetica or Palatino Linotype (excluding figure legends) and margins at least 0.5 inches. Detailed guidelines available at (<https://grants.nih.gov/grants/how-to-apply-application-guide.html#inst>) and examples at (<https://www.niaid.nih.gov/grants-contracts/sample-applications#r01>). You may also check "The Grant Application Writer's Workbook" out from the Department of Physiology office.

The research proposal must include the following sections:

**Project Summary/Abstract** (30 lines or less)

**Specific Aims** (testing a hypothesis - 1 page limit)

**Research Strategy** (12 page limit)

**Significance**

**Scientific Premise**

**Relevant Literature in Support of Scientific Premise**

**Preliminary Data in Support of Scientific Premise**

**Significance of the Expected Research Contribution**

**Innovation**

**Approach**

**Each Aim:**

**Introduction**

**Research Design**

**Expected Outcomes**

**Potential Problems & Alternative Strategies**

**Timeline and Benchmarks for Success**

**Future Directions**

**Budget and Justification** (including commodities and contractual costs, not including salaries, 1 page limit)

**Rigor and Reproducibility** (no page limit)

**References** (no page limit)

The student will be allowed one month to complete the proposal, after which time it should be submitted to the Advisory Committee for comments and feedback. The Advisory Committee will be given one week to read the proposal and decide if the proposal is acceptable. In some situations, a longer period may be necessary if one or more members of the committee are traveling or otherwise unavailable. If the research proposal is not acceptable, the committee may give the student up to two additional weeks to correct deficiencies. After the proposal or revised proposal is found acceptable, the student will be responsible for scheduling a time within two weeks for the oral defense of the research proposal. A notice of the date and location of oral defense should be sent to the GPC and the Department of Physiology faculty. A final copy of the research proposal with the signed cover sheet should be submitted to the GPC for filing.

### Oral Defense

The oral defense will begin with a presentation of approximately 20-25 minutes, covering the background, preliminary studies, and specific aims of the proposal, followed by questions from the Advisory Committee. The questions will focus on the proposal ascertaining the student's knowledge of the research area, understanding of methodologies and experimental design, ability to defend their ideas and to process information added during questioning, etc. Deficiencies noted on the written exams may also be reassessed during the oral exam. Faculty in the Department of Physiology may attend the oral exam and ask questions they deem appropriate. The oral defense is expected to last about 2 hours, but is likely to extend beyond that and should be scheduled for a 3-hour session.

Immediately after the oral defense is over, the Advisory Committee will meet in private to decide on whether the student has passed the preliminary examinations. Forms evaluating the preliminary exams (written exams, research proposal, and oral defense) should be filled out at this time. The Advisory Committee will notify the student of the results immediately following their decision. In the event the student does not pass the oral defense, he/she may request another examination, which must be given within 30 days. Failure to pass on the second attempt will constitute failure of the entire preliminary examination and the matter will be referred to the GPC for a dismissal hearing.

### Candidacy

To qualify for doctoral candidacy: a student must 1) complete 24 semester hours of coursework in the Ph.D. program for residency, 2) complete the tool requirement, 3) pass the written exams, 4) write a research proposal and 5) orally defend the research proposal. Qualified students are recommended to the Graduate Dean for admission to candidacy.

After admission to candidacy, a student must take 24 hours of PHSL 600 (dissertation). The student is only required to take 6 credits during the spring and fall semesters and 3 credits during the summer after admission to candidacy. If the student has completed their 24 hours of PHSL 600 and the dissertation is not completed, he/she may register for PHSL 601 (Continuing Enrollment) if not supported by an assistantship.

### **Dissertation**

The topic and the substance of the student's dissertation must be approved by the student's Mentor and Advisory Committee. The dissertation is expected to be a competent piece of original research that adds to the body of scientific knowledge. This research should be of sufficient quality to merit presentation at scientific meetings and for publication in a peer-reviewed journal.

The dissertation should represent a competent piece of original research carried out on a specific physiological problem or area under the advisor's supervision. It should include an adequate review of the literature, a statement of the hypothesis, a set of experiments testing the hypothesis by whatever methods are appropriate, an analysis of the results, and an interpretation of the work and its significance. The research should be of sufficient quality and quantity to merit publications in peer-reviewed journals. Upon completion of the dissertation research, a final department seminar is presented followed by an oral examination. The examination will be conducted by the Advisory Committee and will cover the subject of the dissertation and topics related to the discipline.

Before a doctoral student may schedule their defense, they must have at least one first-author publication in press. This must be primary literature based on work from their doctoral studies (review articles do not count).

### **Master's Degree**

The application should be submitted online through the Graduate School. All applicants must submit a brief (300-600 words) statement of goals and ambitions indicating why they wish to do graduate work and three letters of recommendation submitted by individuals who can comment



on their academic abilities, character, and potential for doing research. The Graduate Record Exam (GRE) is required, and the score on the general part must be submitted with the application.

This program requires a nonrefundable \$65.00 application fee that must be submitted with the application for Admissions to Graduate Study in Molecular, Cellular, and Systemic Physiology. Applicants may pay this fee by credit card.

The GPC will normally examine the credentials, which include the application form, transcript(s), letters of recommendation, goal statement, and GRE scores, only after all materials have been received. A minimum GPA of 3.00 ( $A = 4.0$ ) in all undergraduate and graduate work is needed for serious consideration.

International students must take the TOEFL exam and obtain a score greater than 550 (paper score) or 220 (computer score) to qualify for admission by the Graduate School, and must pass a Test of Spoken English prior to the awarding of teaching assistantships by the Department of Physiology.

Students are not required to write a research proposal for the Master's degree.

### **Total Hours Required**

A total of 30 semester hours at the 400- and 500-level is required for the master's degree. Of the total hours completed, at least 21 of these must be graded (*A, B, C*) hours. At least 15 of the total 30 must be 500-level courses taken at SIU. Of these 15, a *minimum* of 3 hours of PHSL 599 (thesis) is *required*. More than 3 hours of 599 may be taken, however only 6 may be counted toward the 500-level requirement.

### **Teaching**

At least one semester of teaching is required for the degree and this usually consists of one or two sections of an undergraduate laboratory.

### **Advisory Committee**

The Director of Graduate Studies will act as an advisor to new graduate students until a research advisor is selected. The choice of a research advisor is a very important step and should be carefully considered. During the first semester, most students rotate through four research laboratories to get acquainted with faculty members and research programs before selecting an advisor who will direct the thesis research and help plan course work.

The functions of the research advisor are:

1. To provide guidance in the student's research and the use of facilities.
2. To provide mentorship in conducting, evaluating, and publishing scientific research.
3. To serve as chair of the Advisory Committee and consultant for the selection of the other members of the Advisory Committee.

The composition of the MS Advisory Committee shall consist of at least 4 graduate faculty members including the research advisor. The majority of the members (at least 3 of 4) must have

their primary appointment in the Physiology Department and at least one member is required to be from outside the department.

Members of the Advisory Committee should provide expertise in or complementary to the research area and provide guidance in the selection of course work. The student should meet with the committee yearly or as needed to discuss research and academic progress.

Following the selection of a research advisor and the Advisory Committee, the Graduate Faculty Committee Approval Form (available online and in the department office) must be filled out with the names and signatures of committee members and filed with the department secretary. The completed form will then be forwarded to the Graduate School for final approval.

### **Advisory Committee Meetings**

Students will schedule their first meeting with the advisory committee in the spring semester of their first year. The purpose of this meeting is to review course grades, provide input on the student's proposed research project and research progress. The first committee meeting must be scheduled as soon after the seminar as can be arranged and before the end of the spring semester. Students must submit the Research Project Approval form to the Department of Physiology immediately after their first committee meeting. The second advisory committee meeting must be scheduled before the start of the spring semester of the student's second year to review student progress and set a deadline for the completion and defense of the thesis. Failure to schedule either meeting will result in non-renewal of your assistantship contract.

### **Thesis**

The thesis should represent a competent piece of original research carried out on a specific physiological problem or area under the research advisor's supervision. It should include an adequate review of the literature, a statement of the hypothesis, a set of experiments testing the hypothesis by whatever methods are appropriate, an analysis of the results, and an interpretation of the work and its significance. Upon completion of the thesis research, a final department seminar is presented followed by an oral examination. The examination will be conducted by the Advisory Committee and will cover the subject of the thesis and other matters related to the discipline.

### **Certificate in Anatomy**

The purpose of the anatomy certificate is to allow graduate students to become proficient in anatomy teaching. This will allow them to compete more effectively for jobs in this field. Students are eligible for the anatomy certificate if they are in an existing anatomically-based master's or Ph.D. program (e.g. Physiology, Anthropology, or Zoology). Additional prerequisites (e.g., embryology, basic vertebrate anatomy) are preferred. Students lacking such prerequisites will be encouraged to obtain them prior to admission into the anatomy certificate program. The Graduate Program Committee of the Department of Physiology will review all applications. In addition to graduate coursework in anatomy, students in the anatomy certificate program will obtain experience teaching gross anatomy to undergraduates and medical students. A minimum of 17-18 graduate credit hours are required for fulfillment of the certificate requirements. They are: Advanced Human Anatomy, (PHSL 401A, B, 10 hours), Histology, (ZOOL 409, 4 hours) and either Neuroanatomy, (PHSL 573, 3 hours) or Comparative Vertebrate Anatomy, (ZOOL

418, 4 hours). Where appropriate, these courses may also count for credit toward the master's or Ph.D. degree. The Graduate Program Committee in the Department and the student's advisory committee will make recommendations for other course-work and oversee the student's progress. In addition to graduate coursework in anatomy, students in the anatomy certificate program will obtain experience teaching gross anatomy to undergraduates and medical students. Students supported by assistantships will have the same teaching obligations as all other departmentally supported students. Students will be required to teach at least two semesters of gross anatomy assisting Physiology and Anatomy Department faculty in the Medical School.

### **Policy for Academic Performance of Graduate Students:**

The academic progress and research performance of any graduate student who is placed on academic probation by the Graduate School and still remains on academic probation after one semester, excluding summer sessions, will be reviewed by the graduate student's advisory committee. The graduate student's advisory committee may consider dismissal or remediation based on academic progress and research performance. The Graduate Program Committee will then consider dismissal or remediation.

Any student who earns a grade of less than a B in both PHSL 511A and PHSL 511B or upon repeating either of these courses will be considered for dismissal by the Graduate Student's Advisory Committee within one month of the posting of semester grades, followed by consideration of dismissal by the Graduate Program Committee.

In accordance with Graduate School guidelines on retention, any graduate student on academic probation whose grade point average remains below 3.0 for two consecutive semesters in which she or he is enrolled, excluding summer sessions, will be dismissed from the Molecular Cellular Systemic Physiology program and permanently suspended from the Graduate School.

For example, if a student earns a grade of C in PHSL 511A in the fall and is placed on academic probation in the spring semester by the Graduate School, they will have until the end of summer session to bring their GPA above 3.0 before they are considered for dismissal by their advisory committee. However, if the student also earns a C in PHSL 511B in the spring they will be considered for dismissal by their advisory committee at the end of the spring semester. If a student earns a C in PHSL 511A upon repeating the course, they will be considered for dismissal by their advisory committee at the end of the second fall semester. The GPC will indicate this policy in a letter to the student at the start of the spring semester as a follow-up to the academic probation letter from the Graduate School.

### **Graduate Student Reviews**

Graduate students will be reviewed by the GPC every spring semester. Students who are having academic issues will also be reviewed in the fall.