GRADUATE STUDENT HANDBOOK

DEPARTMENT OF PHYSIOLOGY AND BIOPHYSICS

CASE WESTERN RESERVE UNIVERSITY
CLEVELAND, OH

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OVERVIEW

The Physiology and Biophysics Graduate Program provides comprehensive training leading to the Ph.D. and Master's degrees for applicants with backgrounds in the biological and physical sciences. The Ph.D. program also welcomes applications from MDs who are completing their residency requirements at one of the regional hospitals or students working on their MD degree.

The Department offers two Master's degree programs:
1 - The Tech Master's program is a Type A program designed for research assistants at Case Western Reserve University, its affiliated hospitals, regional hospitals, and biotechnology companies in Northeast Ohio. It is a research program that requires the students to conduct original research and write a Master's thesis. Tech Master's students can take up to 3 years to complete the program. Students in this program will conduct their research in the laboratories in which they are already working. Students can take advantage of the benefits employers provide for employees taking classes at the university. For example, full-time CWRU employees can take up to 6 credit hours/semester and CWRU will cover the full cost of tuition.
2 - The Master's in Medical Physiology program is a Type B, non-thesis program designed for individuals who are preparing for admission to professional schools (medical, dental, veterinary, physician assistant, pharmacy, etc), graduate programs in biophysical sciences, or careers in biomedical sciences. Students can take the program on a full time or part-time basis. If a student is working full-time for CWRU, they can take advantage of their employee benefits as noted above for the Tech Master's program.

The Department offers two MS and Ph.D. research tracks:
Although there are many different research programs in the Department, students in the research-based programs will choose one of two programs of study which emphasize either *Biomedical Physiology* or *Structural Biology & Biophysics*. The first year of studies includes required courses conducted in a discussion format. A major component of the first year is a series of graded laboratory rotations which run throughout the year and prepare students to conduct original research and to choose a mentor. Mentors must be chosen from faculty with either primary or secondary appointments in the department. Our advanced courses are often interdepartmental and students can choose from a large number of electives both inside and outside the department. Ph.D. students must demonstrate their capability to conduct original research. One of the required ways to demonstrate this is to satisfy the requirement that all Ph.D. students must publish two, first authored papers. Our graduates pursue careers in both academia and business. Whatever your career goals, when you enter one of our degree programs, you will embark on a new journey that is exciting and designed to develop and stretch your abilities.

Although this document has been assembled to help guide you along the way, you will certainly have questions that may not be answered here. The faculty and staff have an open door policy and are committed to providing whatever assistance you may need if you can't find the answers here. The names and contact information for individuals you may be interacting with most frequently are provided in the preceding section. More detailed information about our department, faculty, students, and educational programs is available on our web site: http://physiology.case.edu or http://biophysics.case.edu.

An interactive representation of our department has been created in "Second Life" which can also be accessed from our web site. Meetings with some of our faculty can be arranged in this virtual, social networking environment.

TRAINING PHILOSOPHY

The faculty have developed a challenging course of study aimed at providing students with all of the necessary tools to compete effectively for the best academic and non-academic positions in the biomedical sciences. Our goal is to train future health science professionals in the physiological sciences and to train skilled biomedical scientists who demonstrate integrity, think critically, and communicate effectively. The educators? Faculty mentors? affiliated with the graduate program strongly believe that this is best achieved by partnerships between faculty mentors and individual students that are mutually beneficial. Faculty and students both prosper when students are treated as promising junior colleagues deserving of the best training possible in an environment where freedom of inquiry and expression is valued and encouraged. As such, faculty and students each have important obligations to prepare students to be life-long scholars. Admission to our graduate program is a privilege that will provide lasting opportunities for growth throughout your professional career. A graduate student's success depends on everyone involved. This includes Department and University administrators, as well as training faculty. But most importantly, it depends on you, the student, taking your responsibilities seriously.

WORK ETHIC

Science is a profession that requires dedication and drive, and a strong work ethic, which does not involve watching a clock. All full-time students are held to a high standard of accountability. From the first semester on, full-time Ph.D. students should plan to work in the laboratory and pursue scholarly activities such as attending seminars and journal clubs even when classes are not in session. Unless special permission is granted by the student's graduate advisor and the Director of Graduate Education, vacation time is limited to 2 weeks in addition to official University holidays. Students who do not comply with Department and University regulations may be placed on academic watch, lose financial privileges, or face dismissal in extreme cases.

UNIVERSITY REGULATIONS FOR GRADUATE STUDENTS

It is the responsibility of each student to become familiar with the specific rules that apply to the program of graduate study in Physiology and Biophysics, as well as the general rules and regulations of the University. Any requirements not specifically addressed in this document conform to the regulations for the PhD or MS degrees specified in the School of Graduate Studies (SGS) section of the General Bulletin of Case Western Reserve University (available online at http://gradstudies.case.edu). This website also contains down-loadable forms that must be filed with the SGS as the student advances through their graduate career. All students are encouraged to contact the SGS office directly (Tomlinson Hall 2nd floor, telephone 368-4390) to discuss any concerns or questions they may have. That office is especially helpful when it comes time to prepare and defend the dissertation and to apply for graduation. It is expected that students will be proactive in seeking information regarding University regulations.

PRACTICAL MATTERS

Tuition and Stipend Support

PhD students registered full-time in the Physiology and Biophysics Program are eligible for tuition and stipend support. This support may derive from a variety of sources, including National Institutes of Health (NIH)-supported training grants (for students who are U.S. citizens or permanent residents), investigator-initiated NIH research grants, other federal and private research grants, and Departmental resources. Stipend support begins upon matriculation and is guaranteed as long as the student remains in good standing and is making progress toward the degree. The base stipend level for 2012-2013 is $25,000 for 12 months. If students are making plans to leave the program for any reason, they must immediately notify their advisor and the Director of Graduate Education. Should a student accept an offer to join a degree program at another institution, they must immediately withdraw from the Ph.D. program.

There is no financial aid support available through the Department for Master's students. Financial Aid can be obtained through the University's Financial Aid Office (http://financialaid.case.edu/).

Individual Predoctoral Grant Support

Obtaining a fellowship can greatly enhance a student's CV, giving them a distinct competitive advantage in the academic market place. Thus students are encouraged to apply for individual grant support. Common sources of such fellowships are the *National Science Foundation* (http://fastlane.nsf.gov/grfp/) and the *American Heart Association* (http://www.americanheart.org). Note that many funding agencies often require applications to be submitted early in

graduate training. Students should discuss the possibility of applying for individual funding with their graduate advisor. The stipend for any student obtaining an independent fellowship will be enhanced by a $1,000 incentive above the base level.

Stipend/Fellowship Payments
Stipend/Fellowship payments are made on the last working day of each month. Arrangement for direct deposit of these payments to your bank account must be arranged by completing forms that are available from Morley Schwebel.

Tax Liability
Stipend and tuition benefits are reported to federal and Ohio state governments as taxable income. Students may also be required to pay local taxes if they live outside the city of Cleveland. Information can be obtained from each municipality.

International Students
International students often face additional challenges especially if they are first-time visitors to the US. The University has two offices whose primary job is to help ease the transition to life at an academic institution in the U.S. *International Student Services* (ISS), located Tomlinson Hall, rm. 143, provides information for incoming and current international students. ISS provides assistance to a population of more than 1,000 international students from over 80 countries around the world. Please visit the ISS website (http://studentaffairs.case.edu/international/) for a further description of their services. Another important resource for the foreign student is the office of *Foreign Faculty and Scholars* (FFS), which is the University's liaison with the federal agencies that are concerned with visa-related matters. FFS facilitates immigrant/permanent resident status, is responsible for employment eligibility verification (I-9) and W-4 tax status confirmation, and determines whether or not to file tax treaty exemption forms with the Internal Revenue Service. The University's global outreach initiative is supported through FFS by providing technical visa services required in connection with visiting scholars and researchers who come to the University from all parts of the world for various purposes including research, teaching, and training. In addition, FFS provides information and services that international faculty, visitors, and their families may require. The FSS office is located in Tomlinson Hall (8 a.m. to 4:30 p.m.). They may be reached by calling 216-368-4289 or by visiting the *Human Resources* website (http://www.cwru.edu/finadmin/humres/ffs/).

Health Insurance
For full-time Ph.D. students, insurance coverage through student health services begins upon matriculation. A copy of the CASE Medical Health Plan for Students can be obtained at University Health Services (UHS), 2145 Adelbert

Road. UHS is staffed by several professionals with an interest in college health. These include physicians, nurse practitioners, psychologists, psychiatrists, social workers, and registered nurses. A number of the physicians are affiliated with University Hospitals of Cleveland and with the CASE School of Medicine. More information may be obtained by visiting the UHS website (http://studentaffairs.case.edu/health/) or by calling one of the numbers listed below.

General Information:	368-2450
After Hours EMERGENCY SERVICES:	368-2450
General/Specialty Clinic Appointments:	368-4539
Women's Health Clinic Appointments:	368-2453
Counseling/Mental Health Clinic Appointments:	368-5872

Dental Care

The CASE School of Dental Medicine's Clinical Education Program has several dental clinics to provide training of dental health professionals. Patients are charged a fee to defray operating costs of the clinic in return for dental services. This is often significantly less expensive than going to a private practice dentist. The clinics are open from 9:30 a.m. to 5:00 p.m. Monday through Friday throughout the school year, excluding holidays, with the exception of the Emergency Clinic, which is open from 9:30 a.m. to 3:30 p.m. Emergency care coverage during vacations and holidays is from 9:30 - 11:00 a.m. Fees are the individual's responsibility. Appointments can be made by phone at 216-368-8730, or in person at the School of Dental Medicine ground floor main clinic reception area.

Informative website regarding health insurance and dental care: http://studentaffairs.case.edu/health/

Counseling and Other Issues

Counseling and other issues that may be best handled in a confidential manner outside the department – please see information on the University Counseling Services (UCS) at the end of this booklet. If the issues are of an academic nature or affect your performance, we would encourage you also to talk confidentially to your advisor, program director and/or the director of education.

Legal Services

The *Milton A. Kramer Law Clinic Center* at CASE provides legal services to members of the community unable to afford legal counsel. Third-year law students act as the primary legal counsel in matters related to civil, community development, immigration, and health law.

Housing

Most graduate students elect to rent housing in one of the many nearby neighborhoods or municipalities. The *Office of Housing, Residence Life &*

Greek Life publishes the *Off-Campus Housing Bulletin*. The Bulletin contains apartment and housing listings, roommate wanted advertisements, etc. that are located within a short distance from campus. The bulletin is updated each Friday at noon and can be viewed online by incoming graduate students. Many municipalities also have housing offices as well as guided tours of available rental properties. Contact local city governments for further information. Another alternative is the Steiner House Cooperative, which is a student-run organization offering housing for graduate students from Case Western Reserve University, the Cleveland Institute of Music, the Cleveland Institute of Art, Cleveland State University, and the Montessori Institute. Vacancy information as well as applications can be obtained by contacting the Admissions Manager of Steiner House, 11408 Bellflower Rd, Cleveland, OH 44106 or by visiting their website (http://www.case.edu/affil/steiner/).

Parking and Shuttle Services

The *Case Office of Access Services* manages the University's parking program and is responsible for implementing its policies and procedures. All commuter students are eligible for parking permits upon enrollment. Students who need parking should contact *Access Services* at 368-2273 or by e-mail at parking@case.edu for questions related to parking.

University Circle, Inc. (UCI) operates a fleet of buses to provide free transportation service for employees, students, and visitors in the University Circle area. Established bus routes allow riders to travel from designated areas to central drop-off points. Visitors may use UCI's public routes to reach various University Circle institutions. Service is provided approximately 18 hours per day Monday through Friday, with reduced service on weekends and holidays. Bus route schedules and maps are available at various locations or they may be viewed on-line at the *Busing and Shuttles* website (http://greenie.case.edu/).

Student Mail

Shared student mailboxes are located before the 5th floor bridge. Please check your box regularly for mail. Using your Case Mail address for private mail, esp. non-letter formal mail is not allowed.

Telephones

Students may make campus and other local calls from telephones in the Department as well as appropriate lab-related long distance calls. There is no specifically designated student telephone. Personal long distance calls may be made from various pay phones located throughout the School of Medicine.

Departmental Library E-504

A comprehensive collection of biomedical periodicals and books are available in the Allen and Cleveland Health Sciences Libraries. An online catalogue of resources available to CASE and its affiliated institutions can be found on the

EuclidPLUS website (http://www.cwru.edu/uclibraries.html). The department maintains a small collection of periodicals and textbooks in E-504.

Poster Printing
The department has a large format printer for printing posters for meetings. Students are allowed to print one poster in their first year, charged to the Department. After this, posters are charged to their faculty advisor. A copy machine is located in the Administration office area.

Building and Department Access, Campus Security
Nearly all University buildings require ID card access. The Department also requires ID card access between 5 pm and 7:45 am daily and on the weekends. The Department office personnel will submit information to the University requesting card access once you have your University ID. This usually takes 24 to 48 hrs. If you have forgotten your ID or your ID will not activate the card reader during evening hours, you can call the CWRU Police Department at ext. 3333, and an officer will be dispatched to let you in. However, you will still need to present a picture ID.

The University provides a variety of security and safety programs to help ensure a safe educational environment. These programs are directed by *the CWRU Police Department (*http://police.case.edu/), located at the North Campus Security Office (11320 Juniper Rd). The Security Communications Center is located in the basement level of the Health Services Building, 2145 Adelbert Road. The University's professionally trained police officers patrol the campus facilities and grounds on a 24 hour-a-day basis throughout the year. In addition to basic patrol, security personnel respond to emergencies, fire alarms, and routine security incidents. The Police Department Central Dispatch Center is staffed continuously and can be reached at extension 368-3333 for emergencies and 368-4630 for non-emergencies. The campus is also patrolled by the *University Circle Police Department* (UCPD), a private police agency consisting of fully trained and commissioned police officers. The UCPD also patrols on a 24 hour-a-day, and they respond to all emergencies. They can be reached at (216) 368-2222).

Student Computers
All full-time incoming Ph.D. students will receive a laptop PC computer with wireless internet capability. These computers are an integral part of the student's graduate training before and after entering the laboratory for dissertation research. Each student is expected to take full responsibility for the security of their computer. Each computer comes with a three year extended warranty. The student is financially responsible for all maintenance issues (including replacement batteries) not covered by the warranty. The Department will also not replace computers that are lost or stolen. Furthermore, these computers are the property of the Department and must be returned should a student have to

leave the program for any reason before graduation. After graduation, the computer becomes the property of the students.

Once you are formally enrolled at the University, you will be able to activate your network/e-mail account by following the instructions on the Information Technology Service's website (http://www.case.edu/its/students.html). Since all official departmental communication is conducted electronically, it is imperative that you check your e-mail at least once a day to stay informed of all required graduate student activities and other events. Please contact Joseph Winkler for help with any computer related questions.

GETTING STARTED

As soon as possible after arriving on campus, incoming students should contact Jean Davis, the Educational Program Coordinator. The necessary registration materials for the first semester will be emailed to students in their welcome packet. Students should plan to arrive no later than the third Monday in August. Students will register for their first semester and all subsequent semesters using the Student On-Line Academic Registration (SIS) system. Late fees, which are the responsibility of the student, are assessed beginning the first Tuesday after classes start.

During the week prior to the beginning of classes, there will be a general orientation sponsored by the School of Graduate Studies. There will be an additional orientation specifically for first year graduate students in the Physiology and Biophysics Programs on Thursday, August 23rd at 9:00 AM in E-501 for MS in Medical Physiology students, at 1:00 PM in E-504 for Ph.D. and Tech Master's students and 2:45 PM in E-501 for 2nd Year MS in Medical Physiology students. Incoming PhD students will also be expected to complete Radiation Safety and Chemical Safety Classes during the first week of classes. Information on the times and locations of these activities can be obtained from Jean Davis or their web site.

COURSEWORK

Ph.D. sand Tech Masters students within each of the departmental training program are required to successfully complete a combination of formal coursework, research rotations, and thesis/dissertation research in order to graduate from the program. The formal coursework consists of a core curriculum common to all programs. For Ph.D. and Tech Master's students, this includes CBIO 453 (Cell Biology), PHOL 456 (Proteins/Nucleic Acids), and PHOL468 (Membrane Physiology). These courses, taken in the fall semester of the first year (Ph.D. students) or fall semester of the first and second year (Tech Masters students) , are designed to provide the foundation upon which the graduate training of all Physiology and Biophysics students can be built. In addition to the core curriculum, students will take a customized set of courses

tailored to their individual needs. Each student's curriculum will be determined in consultation with the Director of the Graduate Program and approved by the Graduate Education Committee and the department chair. The School of Graduate Studies form titled "Student's Planned Program of Study" will be used for this purpose. The School of Graduate Studies requires for graduation that Ph.D. students successfully complete at least 36 hours of course work (24 of which must be graded and not pass/fail) and at least 18 hours of dissertation research (PHOL 701). Typically, the course work is completed before admission to candidacy and the dissertation research is completed after admission to candidacy. Tech Master's students are required to successfully complete at least 18 hours of course work (12 of which must be graded and not pass/fail) and 9 hours of thesis research (PHOL 651). Students are encouraged to consider courses offered by other departments. The typical sequence of courses for each of the research programs is listed below.

Year One, Fall

All Programs – Required Core (Tech Master's over 2 years)

CBIO453	Cell Biology
PHOL456	Proteins/Nucleic Acids
PHOL468	Membrane Physiology
PHOL498	Departmental Seminar
PHOL505	Laboratory Research Rotation (1)

Year One, Spring

PhD and Tech Master's Programs – Biomedical Physiology

Select 2 from:

PHOL466	Cell Signaling
PHOL514	Advanced Cardiovascular Physiology
PHOL519	Advanced Pulmonary Physiology

All Student must take:

PHOL480	Physiology of Organ Systems
PHOL498	Departmental Seminar
IBMS500	Ethics and Biomedical Research
PHOL505	Laboratory Research Rotation (1 continued)

PhD and Tech Master's Programs – Structural Biology & Biophysics

PHOL434	Introduction to Structural Biology

PHOL475 Cell Biophysics
PHOL476 Protein Biophysics
PHOL498 Departmental Seminar
IBMS500 Ethics and Biomedical Research
PHOL505 Laboratory Research Rotation (1)

In addition to the above other biophysics courses should be taken as electives in year 1 or 2, e.g.

PHOL430 Advanced Structural Biology
PHOL412 Membrane Proteins and Transport Processes

Year One, Summer

All PhD Programs

PHOL505 Laboratory Research Rotation (2)
PHOL505 Laboratory Research Rotation (3)

All Tech Master's Programs

RSCH650 Summer Research – Master's Level (In the lab of their advisor)

Year Two, Fall

All PhD Programs

PHOL530 Technology in Physiological and Biophysical Sciences
PHOL498 Departmental Seminar
PHOL601 Lab Research

All Tech Master's Programs

PHOL530 Technology in Physiological Sciences
PHOL498 Departmental Seminar
PHOL651 Thesis Research

Year Two, Spring and all Subsequent Semesters

All PhD Programs

PHOL498 Departmental Seminar
PHOL701 Dissertation Research

All Tech Master's Programs

PHOL651 Thesis Research
PHOL498 Departmental Seminar

Students enrolled in the research Tech Master's program for research assistants (the Tech Master's Program) may take up to three years to complete the curriculum. Students are required to take only one major 3 credit hour course/semester but may take up to 6 credit hours/semester. They will conduct their original research in the laboratory in which they are employed. They are not required to take the laboratory rotation courses but are encouraged to do so. While the major advisor for all Ph.D. students must hold either a primary or secondary appointment in the Department of Physiology and Biophysics, this requirement does not apply to Tech Master's students. Their major advisory may hold an appointment in any department at Case Western Reserve University.

The actual time of year that students are involved in their laboratory research rotations does not necessarily correspond with the semester in which they are registered for PHOL505. To avoid confusion, Jean Davis will assist students with registration for the appropriate courses each semester. Once registered, students cannot add or drop courses without the permission of the Graduate Education Committee, since it will impact both tuition and stipend support.

During all years of study, students are required to attend at least 75% of the weekly research seminars sponsored by the Department of Physiology and Biophysics to receive credit for PHOL498 and PHOL701. After being admitted to candidacy, all Ph.D. students are required to actively participate in a departmental journal club of their choosing in order to receive credit for PHOL701 (see section on *Seminars and Journal Clubs*).

Master's in Medical Physiology Program

This is a 30 credit hour program that can be completed in as little as 9 months or as long as 2.5 years. (Students must receive permission from their Academic Advisor and the Director of the MS in Medical Physiology program in order to complete the program in 9 months.) The program has 21 hours of required courses in Physiology and Biophysics and 9 hours of electives.

Required courses:

Year One, Fall
- PHOL 481 Medical Physiology I (6 hrs)
- PHOL 483 Translational Physiology I (2 hrs)
- PHOL 498 Departmental Seminar (1 hr)

Year One, Fall
- PHOL 481 Medical Physiology II (6 hrs)
- PHOL 483 Translational Physiology II (2 hrs)
- PHOL 498 Departmental Seminar (1 hr)

Last semester

PHOL 451 Independent Study in Physiology (3 hrs)

PHOL 451 must be passed in order for the student to complete the program. The long review paper requirement of this course synthesizes the student's knowledge in a particular area of Physiology and serves as the Comprehensive Examination required of Type B Master's degrees.

Students are required to complete 9 hours of electives at the 400 level or above. These elective courses can be taken in any department of the university or at regional institutions with the approval of the student's Academic Advisor.

Students are required to take and pass at the 50th percentile the National Board of Medical Examiner's Shelf-Exam in Physiology and Neuroscience in May of their first year of study. If a student does not pass the exam at this level on their first attempt, they have one more opportunity to take and pass the exam at their own expense.

MS in Medical Physiology students are assigned an Academic Advisor at the time of matriculation. They should consult their advisor about the timing of their program and selection of elective courses. A Career Advisor is also assigned to each student to help them determine the best path to achieve their career goals. Peer Advisors from the second year MS in Medical Physiology class will also be provided to each student.

Performance requirements:

The Physiology and Biophysics Program considers only grades of "B" or better to be satisfactory. To remain in good standing and to graduate from the Ph.D. or MS programs (Tech Masters or Medical Physiology), a student must achieve a minimum grade point average (GPA) better than 3.0 (A= 4.0; B = 3.0; C = 2.0). This means that each student will need to earn a grade of "A" in at least one class during their course of study. Any student who receives a grade of "C" will be placed on probation until they have a GPA that meets the Department standard of better than 3.0. Any student who receives more than one "C" will be dismissed from the program.

Each Ph.D. student's GPA will be reviewed at the time of the Qualifying Exam. While it is possible to pass the Qualifying Exam without having obtained an "A" in at least one course, students who pass the Exam, but at this stage have a GPA of 3.0 (or lower) will be advanced to Candidacy under probation. After the completion of two more academic semesters (i.e. at the end of their second year in the program), the Education Committee will review the probationary status and decide whether the student's progress and performance is sufficient to merit further enrollment in the PhD program.

Tech Master's and MS in Medical Physiology students will have their academic performance evaluated at the end of each semester.

No student can graduate until they have met the standard of achieving a GPA better than 3.0.

MSTP Students
Students who are part of the School of Medicine's Medical Scientist Training Program (MSTP) and are completing their PhD in the Department of Physiology and Biophysics are given credit for coursework completed as part of the medical school curriculum. Successful completion of four additional courses for a total of twelve credits is required. These courses are typically taken concurrently with the first and second year medical school curriculum. The exact choice of courses is tailored to meet the needs of individual MSTP candidates. In most cases, MSTP students may substitute courses and laboratory rotations taken in other departments/programs. Most MSTP students will complete all of their course requirements prior to initiating their first research year. In all other ways, the MSTP students are full-time Ph.D. students in the Department and must satisfy the same requirements as all other Ph.D. students.

BSTP and SBBTP Students
Students who enter one of the Ph.D. programs in the department from the Basic Scientist Training Program (BSTP) or from the Structural Biology and Biophysics Training Program (see http://sbb-tp.case.edu), will be subject to the same requirements as all other Ph.D. students in that program except that they will not be required to take the three graded laboratory rotations (PHOL 505). However, BSTP and SBBTP students are encouraged to take these rotations to broaden their research experience and help them decide upon the lab in which they will conduct their dissertation work. BSTP and SBBTB students entering the Physiology and Biophysics Ph.D. program are not required to select a major research advisor and lab until they have passed the comprehensive examination in September of their first year.

Switching from the Master's Program to a PhD Program
A student who wishes to switch from the Tech Master's program to a PhD program must do the following:

1. Discuss the possibility of transfer with the Director of Graduate Education (DGE).
2. Advise the Office of Graduate Studies of their desire, with an endorsement letter from the student's advisor, the DGE, and the Department Chairperson.

3. If the student wishes to convert the credit for PHOL651 to PHOL701, they may do so by petitioning the Dean of Graduate Studies. Endorsement by the Department Chairperson is again required.
4. Any additional course work must be completed within the guidelines provided for in the University Bulletin.
5. All other requirements for the PhD degree must be fulfilled - including Grade Point Average, timeliness of completion of work, etc.

RESEARCH ROTATIONS

Before Starting - Selection of Laboratory and Enrollment

Ph.D. students are required to take 9 credit hours of laboratory rotation. Each rotation is worth 3 graded credit hours, and each rotation must be completed within the time lines indicated in the table below.

LAB ROTATION DATES

Program	**1st Rotation**	**2nd Rotation**	**3rd Rotation**
PhD Programs	September 15 – April 15 (Fall/Spring)	May 1 – June 30 (Summer)	July 1 – August 30 (Summer)

Laboratory rotations offer a unique opportunity to learn how to ask scientific questions and design experiments to answer those questions. Lab rotations enable students to become familiar with a variety of techniques, the research activities being carried out by the faculty members of the Department, and to assess the laboratory environment. Laboratory rotations may only be carried out under the supervision and guidance of faculty members having primary or secondary appointments in the Department of Physiology and Biophysics, and each faculty member may supervise up to 2 rotating students per semester.

Students are expected to spend a minimum of 15 hours per week working in the lab during the fall/spring rotations. Because the amount of time available for research is limited while classes are in session, the first rotation is extended across the first two semesters. During the summer, students have no other requirements. Accordingly, they are expected to spend a minimum of 40 hours per week working in the lab. Failure to meet these expectations of time spent in the laboratory will result in an automatic grade of "C" in the rotation.

Before a student begins a laboratory rotation, they must complete the following steps:

1. Identify 5 to 6 potential rotation laboratories whose research interests the student. To start this process, each student should use the Department web site listing of faculty research areas. Each student must meet with the Director of Graduate Education who will serve as their Academic Advisor until they choose a laboratory in which to do their Ph.D. research. This meeting is intended to help the student develop a broad view of labs to consider and to ensure that students have not overlooked potential labs they might be a good match.
2. Meet with top faculty choices for rotations to determine whether space is available and what type of projects exist. This process should begin at least two weeks in advance of the rotation start date. Students typically meet with at least 3-4 different faculty in advance of their first rotation decision.
3. Inform the Director of Graduate Education of the progress of these discussions and notify him/her as soon as a rotation choice has been confirmed.
4. Submit a one page proposal to the Director of Graduate Education and Jean Davis. This proposal, which must be submitted <u>before</u> the rotation begins, should contain:

    a. Student's name
    b. Title of the proposed project
    c. Dates of the project and name of the faculty supervisor
    d. Statement of the major problem to which the project relates – This must include the statement "*I hypothesize that…"* and a description of the question to be addressed
    e. Rationale for the project and expected results
    f. Outline of new methods that will be learned
    g. Signature of approval by the faculty supervisor to confirm that they are willing to supervise the project
    h. Signature of student

The selection of the mentor for each rotation must be approved by the Director of Graduate Education.

<u>*Finishing The Rotation - Laboratory Reports*</u>

Students are required to submit a short report (five to ten pages) at the end of each rotation to the Director of Graduate Education and Jean Davis. The report must contain the following information:

a. Student's name
b. Name of the faculty supervisor under whom the rotation was conducted
c. Abstract - one paragraph summary of project

d. Introduction - statement of the goal of the lab rotation, i.e. the scientific problem addressed
e. Materials and Methods - Describe the methods and materials used and the techniques learned
f. Results - Report on the actual experiments carried out and present data
g. Discussion - critical evaluation of data indicating conceptual and technical limitations and what improvements could have been made
h. References

In preparing the document, the student should discuss the content of the report with their mentor. The student should also provide their mentor with a final draft at least 2-3 days before the end of the rotation. The final version, signed & dated by their mentor, must be submitted electronically to the Education Coordinator (Jean Davis, jxd16@case.edu) no later than 5 days after the end of the rotation. **If this deadline is not met, the student's grade in the rotation will be reduced by one letter grade: i.e., if an A were earned, the final grade will be reduced to a B, etc. It is important that students recognize the importance of meeting deadlines. NIH and other granting agencies will not accept grant applications after their submission deadlines no matter how strongly you argue your case.** Under no circumstances may a student begin their next rotation before completing the report and providing it to their mentor for review.

Grading

Upon completion of the laboratory rotation, the supervising faculty member will submit an evaluation to the Director of Graduate Education and Jean Davis. The final grade will be determined by the Director of Graduate Education (who is the course director of record for PHOL 505) in consultation with the Directors of the two research programs. Grades will be based on the clarity, comprehensiveness and depth of content of the laboratory report, time commitment of the student to the laboratory, as well as the student's performance in relation to other students registered for the course. In case of difficulties or shortcomings that may jeopardize the expeditious and satisfactory progress of the proposal, the course director should be notified immediately.

Students in the Tech Masters program are not required to take the laboratory rotations. However, they are encouraged to do so or substitute other graded courses to fulfill the School of Graduate Studies requirements for successfully completing graded courses.

Recknagel Symposium:

At the beginning of the second year of studies, all Ph.D. students are required to present a 15 minute seminar at the Recknagel Symposium over the research they carried out during one of their three rotations. Faculty will judge these presentations and award the Recknagel Student Awards for the best

presentations and for the student with the highest academic record in first year courses. The winners will receive a cash award and have their names added to the award plaques that are displayed in the departmental showcase. This year's symposium will be held at 2:00 PM on October 8th in E-501 with a reception to follow on the bridge. All MS and Ph.D. students are required to attend this symposium.

SELECTING A GRADUATE ADVISOR

Criteria

The laboratory in which one's research project is conducted provides the setting for a student's most crucial learning experiences. For that reason, it is important to consider this decision carefully. Although choosing a graduate advisor whose research interests match one's own is an important consideration, it is by no means the only factor that should be taken into account. In addition to evaluating the environment in various labs, students should consider the type and quality of available research projects, the influence of other personnel in the lab, the level of the advisor's involvement in the day-to-day life of the laboratory, and the kind of relationship the advisor has with students. All of these factors, combined with the student's own strengths and weaknesses, will determine the success of the student's graduate education.

Decision-Making Process

It is important for the student to have a candid discussion with any faculty member they are considering as an advisor. However, students should be aware that faculty members are not allowed to recruit a student into their lab until that student has completed all of their research rotations. Furthermore, any student feeling pressure to join a particular lab should report that information to the Director of Graduate Education (DGE) and/or the Chair of the Department. Students will discuss their choice of an advisor with the Director of their research program.

The ultimate responsibility for approving the assignment of students to laboratories falls to the DGE in consultation with the Director of the research programs. As indicated above, this process does not begin until after the student has completed their final research rotation. At that time, each student should meet with the Director of their research program to discuss the reasons behind the student's preferences. Once all student preferences have been assembled and the appropriate faculty members have been consulted, the Director of Graduate Education will make final faculty assignments after the student successfully passes the comprehensive exam and is admitted to candidacy. The process, in most cases, will result in a student being assigned to his or her preferred advisor. However, students should be aware that no faculty member may serve as the advisor for more than two (2) Physiology and Biophysics PhD students at any one time. Exceptions may be made at the discretion of the Director of Graduate

Education in consultation with the Graduate Education Committee. Typically, an exception to the 2-student rule is made only if one of the other students in the proposed lab is near completion.

In resolving conflicts over advisor selection, all pertinent information is taken into account, including the strength of the preferences expressed by the students, the preference of the faculty member, and the alternative assignments available to each student. In rare cases, a student may exhaust their options without being assigned to a lab. Such cases are handled on an *ad hoc* basis. If necessary, the student may be allowed more time to consider additional laboratories and take additional rotations.

QUALIFYING EXAM

Ph.D. students are admitted to candidacy after successful completion of a two-part Comprehensive Examination (MS students are not required to take the Comprehensive Examination)

Part 1. Written essay examination covering first year course work:

a. Administered over a 2 day period scheduled by the Director of the Graduate Education Program during the second week of September. This is a closed-book exam.
b. Two essay questions are submitted for each of the five required courses the students have taken in the first year. Students select 7 out of 10 questions to answer with at least one question being answered for each course. Answers are expected to be 1 to 2 pages long.
c. The essays are graded within one week of administration of the written exam by the course director of the course or his/her designee and grades provided to the examining committee
    i. Each question is graded A – outstanding (4 pts), B – adequate (3 points), or C – unsatisfactory (2 points).
    ii. To pass this part of the examination, the student must receive an average on the 7 essay questions of greater than 3.0.

Part 2: Oral examination

a. Administered by an examining committee consisting of the Director of the Graduate Education Program, Director of Advancement, the three program Directors, and at least one faculty advisor for a lab rotation taken by the student

(preferably the faculty member with whom the student plans to conduct his/her research).

b. Up to 90 minutes long.
c. Administered 2 weeks after the written component of the Comprehensive Examination.
d. Test covers:
    i. Three laboratory rotations.
    ii. First year course work. Questions will be focused on, but not limited to, topics answered by the student on the written examination.

Students are graded pass/fail on this component of the exam -majority vote by secret ballot determines the grade. Students are required to pass both parts of this examination to be admitted to candidacy and start taking the dissertation research course PHOL701. Any student who does not pass the exam may petition the graduate education committee for an opportunity to take the examination a second time

Students who pass the examination may be asked to remediate certain material that they did not exam adequately over. Students who do not pass the examination will be dismissed from the Ph.D. program with a terminal Master's degree, either Type A or Type B (see the Graduate School Handbook), at the discretion of the Graduate Education Committee.

Research Proposal

Both Ph.D. and Tech Master's students must submit their research proposal (in the format described below) to their graduate advisory committee two weeks before its first meeting. Ph.D. students should choose an advisor by October 1st. Tech Master's students will have the faculty member for whom they work as their advisor. Students may consult with their advisor on the Specific Aims of the proposal but the writing has to be the work of the student and is not to be based on grant proposals written by the advisor. The advisor will be asked to certify the originality of the proposal. The student will give an oral presentation of the research proposal to the advisory committee at its first meeting. The student may consult with the advisor between submission of the proposal and the first committee meeting. The graduate committee members will vote pass/fail on the quality of the proposal, with the majority determining the final grade. The committee may ask the student to rewrite all or parts of the proposal. The research proposal must be approved by the student's graduate advisory committee in order for the student to proceed in the program. For Ph.D. students, this approval should take place in January/February following

completion of the Comprehensive Exam. For Tech Master's students, approval of their thesis should take place by the end of the first semester they are enrolled in the program.

Important Note: In science, the publication of original work is a highly valued enterprise. Thus, plagiarism of any kind will not be tolerated. The Department defines plagiarism as "the taking and using of even a single intact sentence from another person's proposal, manuscript or review." This includes copying any segment of the Methods section from another source. It also includes the use of diagrams or example data figures without attribution. Any student who plagiarizes will be dismissed from the program. (See Academic Integrity section below).

Format for the Research Proposal
The research proposal shall be in the form of a research application that that includes the following sections: *Specific Aims, Background and Significance, Experimental Design and Methods, and Literature Cited.* If the student has relevant preliminary data (e. g., from a laboratory rotation) a *Preliminary Data* section can be included (following *Background and Significance*).

Students will be given a general introduction on how a grant proposal should be written as well as how grant proposals are reviewed by the Director of Advancement.

All sections are to be in 12 point font, single-spaced with one inch margins (top, bottom and sides), and the pages must be numbered and follow consecutively. The body of the proposal may not exceed ten pages. This does not include the literature cited.

Specific Aims (*1 page*) This section must have the following three subheadings: *Introduction, Hypothesis,* and *Specific Aims*. The *Introduction* must provide a brief overview of the topic, its importance, and set the stage for the hypothesis and specific aims. The *Hypothesis* must include the overall hypothesis to be tested in the proposal in the form of a statement starting with "*I hypothesize that - - -."* The *Specific Aims* are the most important part of the proposal. Construction of a focused, mechanism-based set of aims facilitates writing of the subsequent sections of the proposal. Two specific aims are recommended. They must be narrowly focused on specific scientific questions, related to the overall hypothesis, and must be designed to provide new mechanistic insight. They must be related to and complement each other, but they must not be dependent upon one another such that if one fails the other also fails. Each specific aim typically consists of three parts, each stated in a single sentence. The first sentence should include a statement of the importance of the problem. The second sentence should state the specific hypothesis being tested in the form "*I*

hypothesize that…" The third sentence must state how the investigator plans to accomplish testing the hypothesis.

Background and Significance *(2-3 pages)* This section must have two subheadings - *Background* and *Significance*. The *Background* section must present a reasonably detailed background/history that is pertinent to the project. The *Significance* section must highlight the importance/significance of the topic. The student investigator must state why it is important to complete the proposed experiments, what new knowledge will be gained, and how it will push back the frontiers of science.

Preliminary Data (Optional; maximum 2 pages). This optional section presents results from the student's work in the advisor's lab, relevant to the *Specific Aims* of the proposal. Figures and/or Tables may be included. Text in Tables, Figures, and Figure Legends may be smaller than 12 point but should be easily legible.

Experimental Design and Methods *(5-6 pages)* This section states how the experiments will be performed, and how the results will be interpreted. Each specific aim is treated independently using the following five (5) subheadings. First, the *Specific Aim* is restated. This is followed by the *Rationale* which is a statement of the purpose of the proposed experiments. Next is the *Experimental Approach*, which briefly describes the experimental strategy/design that will be used. Remember, it is critically important that the experiments be designed to include the appropriate controls, time courses, concentrations, etc. - otherwise the experiments cannot be interpreted! The *Methods* section is next and provides a concise description of each method - including enough detail to prove that the student investigator understands the technology. Finally, a section on *Potential Problems* should be included so that the student investigator can describe what may go wrong and what alternative experimental strategies may be considered.

Literature Cited (*2-3 pages*)
This section is to provide a complete list of all literature that is cited in the text of grant proposal. It should consist of at least 40, but no more than 60 references. Each reference should include the names of all authors, as well as the full title of the article, in addition to the title of the journal/book, volume, page numbers, and year of publication. Follow the format used in a leading journal in the field.

GRADUATE ADVISORY COMMITTEE

A graduate advisory committee is created specifically for each Ph.D. and Tech Master's student. The members of this committee serve two roles. Firstly, they act as advisors, helping the student to assess research questions and to overcome problems associated with the research. Secondly, the members assess the

student's progress. Committee members are intended to be active participants in all stages of the research project, and students are encouraged to draw on their professional expertise and judgment.

Membership of the committee includes the student's advisor, the director of the training program that the student has selected, and at least three other faculty members: two must have primary or secondary appointments in Physiology and Biophysics; one must have a primary appointment outside of Physiology and Biophysics. The student and the Director of his/her training program will submit a recommendation of the composition of the committee to the Director of Graduate Education who will make the appointments. A valid committee meeting requires the presence of the advisor and at least three other committee members.

For Ph.D. students, the graduate advisory committee must be appointed within two weeks after the student has passed the qualifying exam and begun dissertation work in the mentor's laboratory. The first committee meeting must be held before the end of the spring term of the second year of study. Subsequent meetings must occur every six months unless the committee feels that a shorter interval is desirable. For Tech Master's students, there are only two scheduled meeting of the committee. The first meeting must be held before the end of the first term of study (to evaluate the thesis proposal) and the second to evaluate the completed thesis. At this second meeting, the student presents his/her thesis research to the committee in both an oral and written format. Two weeks before these meetings, the MS students should provide their thesis committee with their thesis proposal/completed thesis.

For Ph.D. students, one week prior to the graduate advisory committee meeting, the student must provide a brief report (~2 pages) to Jean Davis, who will then see that it is distributed to all members of the committee. This report must contain the student's name, that days date, a brief description of the background and significance of the proposed work, the hypotheses being tested, the specific aims, the experimental approach, pertinent experimental results (data), any conclusions, and future plans. If the student's report is not received by the faculty one week before the meeting of the advisory committee, the meeting must be rescheduled.

Each committee meeting is to be conducted in several stages: 1) brief opening discussion of student progress led by the student's advisor (without the student present); 2) presentation by the student of new research findings (approximately 15 min); 3) committee discussion with the advisor present (without the student); 4) private committee deliberation (without the advisor or student present); 5) closing discussion with student alone - verbal discussion of committee report with student, 6) transmission of written report (prepared by the director of the

training program the student is in) to the student, all committee members, Jean Davis, and the Director of Graduate Education.

The student presentation is a talk that is limited to approximately 15 min. It must include a title, a schematic description of the experimental system, the physiological and pathophysiological importance of the work, the hypotheses that are being tested, the experimental methods being used, any results obtained, conclusions, and future directions. Faculty members are allowed to stop the student during the presentation to ask questions.

The student's write-up to the committee, the recommendations of the committee, and a record of the thesis meetings will be maintained in the student's official departmental file.

GUIDELINES FOR DISSERTATION/THESIS RESEARCH

Dissertation/thesis research should be the primary focus of students once they have chosen a laboratory in which to complete their research. Although the actual writing of the dissertation/thesis may be some years off, students should bear in mind the following guidelines during the formative stages of their project.

Goals for Graduate Students:

- Students must develop, with their advisor, a research project that yields a coherent and original body of work.
- The dissertation/thesis must be written in a scholarly manner with a detailed historical introduction and a critical discussion.
- The dissertation/thesis must be original and reflect the individual effort of the student. The final version submitted to the Graduate Advisory Committee should be a polished document developed in consultation with the mentor.
- In the written dissertation/thesis, dissertation defense, and dissertation seminar, students should demonstrate expertise in their field of research.
- Before the dissertation seminar and oral dissertation defense can be scheduled for the Ph.D., students must have a minimum of two (2) first author manuscripts published or accepted for publication in peer-reviewed journals and have the approval of their graduate advisory committee to start writing the dissertation. Once two first authored manuscripts are published or accepted for publication AND the student believes he/she has produced an adequate body of original work to warrant a Ph.D., the student will schedule a meeting of their Graduate Advisory Committee for the purpose of reviewing the student's body of work. It must be emphasized that the publication of two first-authored manuscripts is only one of the requirements for the Ph.D. At this meeting, for the student to be given permission to start writing their dissertation, the graduate advisory

committee must determine that: 1) the student's body of work is adequate for the Ph.D.; 2) the student is ready to defend their dissertation; 3) the student has satisfied all departmental and university requirements for the Ph.D., AND; 4) the student has a GPA > 3.0. It is the student's responsibility upon approval of the graduate advisory committee, to schedule the dissertation seminar and the oral defense with the School of Graduate Studies. At least two weeks before the scheduled oral dissertation defense, the student must provide a final copy of their dissertation (approved by their advisor) to all members of the graduate advisory committee.

- Students should seek opportunities to present their dissertation/thesis research at one or more national or international meetings.

Role of Training Faculty:

- The advisor will provide the student with intensive training in the scientific method, including the ability to formulate clear research questions, develop feasible experimental approaches to answering them, critically evaluate data from his or her own research and that of others, and discuss the significance of the work in the context of the field as a whole.
- The advisor, in conjunction with the graduate advisory committee, is responsible for developing and implementing a training plan with the student, including the elaboration of an independent research project.
- The advisor is responsible for providing the physical, financial, and intellectual resources necessary for completing the research plan.
- The advisor should work regularly with the student to develop strong communication skills, both oral and written.
- The advisor should encourage the student to think broadly about the research project and not necessarily be limited to approaches/techniques currently used in the advisor's laboratory.

Residency Requirement

Before a student may graduate, they must meet the University and Department residency requirements. The University's Graduate Student Handbook states that:

> *"Graduate students are considered to be in residence when they are fully engaged in academic work." … "Regardless of the nature of the work, the student's regular presence at the university is expected during fulfillment of the residency requirement."*

Although University rules require a minimum of six semesters of residency, the Department of Physiology and Biophysics requires continuous residency and registration for PHOL 701 until successful completion of the oral defense. Exceptions to this policy may be considered by the *Graduate Education Committee* but only in rare circumstances and only upon the request of the

student's graduate advisory committee. Students who leave the *University* before all PhD requirements are met put themselves at risk of not being able to return to complete these requirements should dissertation concerns or manuscript issues arise that require additional bench work. Exceptions to the residency policy are therefore considered highly undesirable and will not be granted lightly. Outside employment by PhD candidates during residency is not permitted unless explicitly approved by the *Graduate Education Committee*.

It is the responsibility of the graduate advisory committee to approve (or not) the shift in a student's priorities from conducting experiments to writing the dissertation. How long it takes each student to reach this point will vary. However, it is expected that after five years of enrollment, the project should be complete, or very nearly so. Therefore, for a student to continue enrollment and receive a stipend beyond the fifth year, the student and advisor must agree upon a well-defined plan for concluding the dissertation and have it approved by the *Graduate Education Committee*. This plan should concisely describe progress to date, the specific tasks (experiments, manuscripts, etc.) to be completed, and a realistic estimate of the time that will be required to finish. The *Graduate Education Committee* will continue to monitor the student's progress until graduation and take appropriate action if the dissertation is not completed in a timely fashion.

Graduation procedures:
In order to graduate at the end of any given semester, the student must be registered for at least one credit hour of courses that semester. Also, there are specific forms that must be completed and submitted to the School of Graduate Studies by a particular date. If these forms are not received by the Graduate School by these dates, a student cannot graduate until the next semester. The following dates apply to ALL students, MS and Ph.D. unless otherwise noted.

To graduate at the end of fall semester 2012

September 7	Deadline for January 2013 graduation candidates to qualify for Waiver of Registration For Students Requesting the Waiver: All required forms, fees and Final Materials (including Approved Thesis/Dissertation) are due by this early date.
October 5	**DEADLINE TO SUBMIT APPLICATION FOR JANUARY 2013 GRADUATION**
October 26	Last Day (**RECOMMENDED**) to Submit Dissertation Defense Form (PhD) for January 2013 Graduation
November 16	Last Day (RECOMMENDED) for Final Oral Exam (PhD) for January 2013 Graduation Last Day (RECOMMENDED) for Master's Thesis Defense, Project Presentation or Exam for January 2013 Graduation

December 7	Deadline to Submit All Materials for January 2013 Graduation All required forms, fees and Final Materials (including Approved Thesis/Dissertation) are due by this date
December 7	Deadline to Resolve Incomplete from Spring 2012
January 18, 2013	Awarding of Degrees (no Convocation or Diploma Ceremony) All financial obligations to the University must be resolved
January 18, 2013	Diploma Mailing Process opens for Fall Graduates
February 15, 2013	Last day to complete the Diploma Mailing Process

To graduate at the end of spring semester 2013:

January 25	Deadline for May 2013 graduation candidates to qualify for Waiver of Registration For Students Requesting the Waiver: All required forms, fees and Final Materials (including Approved Thesis/Dissertation) are due by this early date
February 1	**DEADLINE TO SUBMIT APPLICATION FOR MAY 2013 GRADUATION**
February 22	Last Day (RECOMMENDED) to Submit Dissertation Defense Form (PhD) for May 2013 Graduation
March 15	Last Day (RECOMMENDED) for Final Oral Exam (PhD) for May 2013 Graduation Last Day (RECOMMENDED) for Master's Thesis Defense, Project Presentation or Exam for May 2013 Graduation
April 5	Deadline to Submit All Materials for May 2013 Graduation All required forms, fees and Final Materials (including Approved Thesis/Dissertation) are due by this date.
April 29	Deadline to Resolve Incomplete from Fall 2012
May 19	Awarding of Degrees All financial obligations to the University must be resolved
May 20	Diploma Mailing Process opens for Spring Graduates
June 14	Last day to complete the Diploma Mailing Process

To graduate at the end of summer semester 2013 (The 2013 summer calendar is not yet available. The dates will be very close to the dates for summer 2012 listed below.)

June 8	**DEADLINE TO SUBMIT APPLICATION FOR SUMMER 2012 GRADUATION**
June 8	Deadline for Summer 2012 graduation candidates to qualify for Waiver of Registration

	For Students Requesting the Waiver: All required forms, fees and Final Materials (including Approved Thesis/Dissertation) are due by this early date.
July 6	Deadline to Submit All Materials for Summer 2012 Graduation All required forms, fees and Final Materials (including Approved Thesis/Dissertation) are due by this date.
August 17	Awarding of Degrees (no Convocation or Diploma Ceremony) All financial obligations to the University must be resolved

ACADEMIC INTEGRITY

The importance of this topic cannot be over-emphasized. The goal of the scientist enterprise is to carry out original work, and throughout the course of their scientific careers, scientists must be very careful to properly allocate credit for data or written material generated by others. The Office of Research Integrity (ORI), which is the regulatory arm of the National Institutes of Health, considers plagiarism "…the theft or misappropriation of intellectual property and the substantial unattributed textual copying of another's work".

"Substantial unattributed textual copying of another's work means the unattributed verbatim or nearly verbatim copying of sentences and paragraphs which materially mislead the ordinary reader regarding the contributions of the author." This and other ethical issues will be covered in IBMS500 (On Being a Professional Scientist: Ethics and Biomedical Research). More information may also be found by visiting the ORI website at http://ori.dhhs.gov.

Other issues concerning research ethics, such as suspected fraud or falsification, mis-or selective presentation or interpretation of data, are best initially discussed in private with the parties concerned, and should this fail, with the Director of Graduate Education.

The School of Graduate Studies Handbook (page 2) (http://gradstudies.case.edu/webfm_send/100) contains the following Statement of Ethics:
"Universities seek to preserve, disseminate, and advance knowledge. At Case, as elsewhere, we recognize that to fulfill these purposes requires a norm of expected conduct shared by all in the University community, governed by truthfulness, openness to new ideas, and consideration for the individual rights of others, including the right to hold and express opinions different from our own. The University's mission rests on the premise of intellectual honesty in the classroom, the laboratory, the office, and the solitary examination desk. Without a prevailing ethic of honor and integrity not only in scientific pursuits but also in all scholarly activity, the very search for knowledge is impaired. In these respects, each of us—especially but not exclusively faculty — must regard ourselves as mentors for others.

These principles we strive to uphold make it possible for the larger society to place trust in the degrees we confer, the research we produce, the scholarship we represent and disseminate, and the critical assessments we make of the performance of students and faculty, as well as judgments of staff and administrators. To safeguard the standards on which we all depend, each of us must, therefore, accept individual responsibility for our behavior and our work and refrain from taking credit for the work of others. The culture of a university also requires that the rights of all be protected, particularly by those entrusted with authority for judgment of the work of others.

The University being a human community is subject to human failings, ambiguities, and errors. It is, therefore, the responsibility of the bodies regulating the affairs of faculty, students, and staff to maintain processes for judging and resolving instances where these principles may have been violated. However, all such systems depend for their effectiveness, in turn, on the acceptance of common norms of contact—the ties of trust which bind the university community together."

More on this topic can be found on page 20 of the School of Graduate Studies Handbook.

The CWRU School of Graduate Studies has a detailed list of Procedures and Rules that will be followed should there be an allegation of a breach in academic ethics. This document is found at:
http://gradstudies.case.edu/downloads/AcadInteg.pdf

SUGGESTED PROTOCOL FOR ADMINISTRATION OF EXAMINATIONS TO LARGE CLASSES
(These guidelines should be appropriately modified for the administration of examinations to small classes.)

FACULTY RESPONSIBILITIES:
The Faculty should take whatever steps are reasonably necessary to discourage academic dishonesty. During the administration of examinations, the faculty member or one of their designated proctors must be present at all times within the examination room to monitor the process. It is recommended that more than one proctor be present, but it is required that one be monitoring the test at all times. It is the responsibility of the Faculty or the designated proctor to ensure that no students are seated adjacent to each other and that all backpacks, handbags, and jackets are placed at the front of the room before each examination, and that those items are monitored throughout the exam. If a cell phone is discovered to be turned on and located on a student's person, it is the responsibility of the Faculty to confiscate and hold that phone until the examination is complete. If a student takes a break from an examination to use

the bathroom or for any other reason, any cell phones or other communication devices should be held by the proctor until the student returns. Above all, the Faculty or designated proctor is responsible for monitoring the exam room throughout the examination for signs of cheating or misconduct.

STUDENT RESPONSIBILITIES:
It is the responsibility of the Student to take whatever steps are reasonably necessary to discourage academic dishonesty or any violation of the Case Western Reserve University ethical standards. It is the responsibility of the student to ensure that cell phones and other communication devices are turned off during the examination. It is the student's responsibility to not communicate in any way with other students during the examination unless under the supervision of the proctor. If a student suspects misconduct on the part of another student taking the exam, s/he should immediately notify the responsible Faculty member or proctor.

SEMINARS AND JOURNAL CLUBS

Seminars and journal clubs are considered invaluable components of a student's training experience. These activities provide students (and faculty) with opportunities to learn about the cutting edge of science. In some cases this will be directly relevant to the student's own research interests. In other cases, the subject matter may seem far afield, but these are often times the experiences that are most influential. In order to gain a meaningful perspective and learn how to achieve one's own research goals using the best approach, it is important to be exposed to a wide range of techniques and disciplines. It is for that reason that a great deal of emphasis is placed on not just attendance but active participation in seminars and journal clubs.

PHOL701 Credit
Journal club and Departmental seminar attendance are required components of Dissertation Research (PHOL701). Adequate research progress and performance at graduate committee meetings are also expected. Failure to meet these requirements will result in a grade of "U" (unsatisfactory) for PHOL701. The Department considers this the same as receiving a grade of "C". A student who receives an unsatisfactory grade in PHOL701 will be expected make up the deficiency during the next semester. The student must register for any make up credits in addition to the normally required PHOL701 credits. These extra credits will not be paid for by the Department. The student will be expected to pay the cost of retaking the deficient PHOL701 credits. Please note that the graduate college requires that a PHOL701 grade of unsatisfactory be successfully repeated during the subsequent semester - failure to do so results in dismissal. An unsatisfactory grade "U" in PHOL701 will remain permanently on a student's transcript and the credits cannot be counted toward the total of 18

credits of PHOL701 required for graduation. The student will also be placed on probation.

Seminar Requirements

Students are required to attend at least 75% of the Monday Physiology and Biophysics seminars (4:00- 5:00 PM in E-501). In addition, students are expected to attend ALL Physiology and Biophysics dissertation seminars, which are scheduled as needed, on Fridays (11:00-12:00 noon). Students are also expected to attend the Department's annual *Frontiers Seminar*. Seminar attendance is required for PHOL498 credit during the first two years and PHOL701 credit for all subsequent semesters. Unexcused absences are not permitted. Students are expected to notify the Direct of Student Advancement (Dr. Stephen Jones - swj@case.edu) if they are unable to attend a seminar in any given week. Failure to attend at least 75% of the required seminars will result in a grade of "U" or unsatisfactory (see above). Attendance will not be taken at the seminars for MS in Medical Physiology Students. Ph.D. students are required to submit a report to Jean Davis by the first of each month listing for each week of the month the: 1) Date of the seminar attended; 2) Name of the person presenting the seminar; 3) Title of the seminar. Students are on their honor to report this information accurately. Inaccurately reporting seminar attendance will be considered a serious breach of research ethics and will result in disciplinary action that could include expulsion of the student from the program.

Graduate Student/Post-Doc Seminar Series

Graduate students and Post-Docs at all stages of their training are encouraged to participate in this monthly seminar series organized by the graduate students. No faculty are invited to these seminars which are intended as informal talks where students can share with other students the results of their research efforts.

Journal Club Requirements

Students are encouraged to participate in journal club as soon as they enter the graduate program. However, beginning in the fall semester of year two and continuing throughout the remainder of their graduate training, students must attend and participate in one of the Departmental journal clubs (listed below) to receive full credit for PHOL701. Each student is required to notify Jean Davis at the beginning of each year of the journal club that they have chosen to attend. Students are then expected to attend all meetings of the journal club they have selected and will typically lead one to two discussion sessions in that Journal club per semester.

Electrophysiology Journal Club

Contact: Stephen Jones (swj@case.edu)

This journal club meets weekly during the academic year to discuss recent papers on ion channels and other aspects of electrical activity. Most papers deal with electrophysiological techniques, but molecular and structural approaches

are also welcome. Emphasis is on excitable cells (often neurons or cardiac cells), but participants are free to choose any topic that they find interesting. Journal club participants include people from both the Physiology & Biophysics and Neurosciences Departments. Students normally present at one journal club session per year.

Cell Signaling and Organ Systems Physiology Journal Club
Contact: Andrea Romani (amr5@case.edu) and Carol Liedtke (carole.liedtke@case.edu)
This journal club involves bi-weekly presentations of recently published research articles presented by PhD students, postdocs, and faculty from the Department of Physiology and Biophysics and from other Medical School departments. Presentations and discussions focus on critiquing content, implications, strengths and weaknesses of these published reports. Articles for presentation are picked by the week's speaker, chosen from any area of interest in the broadly defined areas of organ physiology, cell signaling, and cell biology. The expectation is to expose the audience to areas of research or techniques not necessarily related to their own and promote innovative thinking.

Molecular Biophysics Journal Club
Contact: Matthias Buck (mxb150@case.edu)
Breakthrough papers on the molecular structure and function of both soluble and membrane proteins, and their interactions, energetics, and kinetics are covered in this journal club. Special focus is given to the application (and introduction) of biophysical, molecular techniques. At least once a year students are expected to present an article of their choosing by introducing the techniques used, discussing strengths and weakness, and critically evaluating the novelty.

Cardiac Electrophysiology Journal Club
Contact: Isabelle Deschênes (ideschenes@metrohealth.org)
This journal club meets weekly all year-round to discuss classic and recent papers related to cardiac electrophysiology. The journal club covers aspects going from whole-heart electrophysiology to cardiac ion channels mainly relating to arrhythmias. Papers usually deal with topics ranging from mechanisms of arrhythmias to gene and cell therapy for arrhythmias. Emphasis is on cardiac electrophysiology, but participants are free to choose any topic that they find interesting which could then be translated to cardiac electrophysiology. Journal club participants include people from both the Physiology & Biophysics and BME Departments along with members of the Heart & Vascular Research Center. Students normally present at about two journal club session per semester.

PROFESSIONAL DEVELOPMENT

In addition to the requirements described above, students are encouraged to participate in other activities, many of them student-run, in order to further their professional development. Some examples are listed below.

Departmental Committees

Student representatives are encouraged to participate in many Departmental committees. This includes, for example, the seminar committee, where students are given the opportunity to host seminar speakers of their choosing. In the fall of each year, the students should elect one of the advanced graduate students to serve as the student representative to the Graduate Education Committee.

Departmental Retreat

The Department sponsors an offsite retreat every other year. In odd-numbered years, this includes two full days (and evenings) of scientific presentations in a relaxed and friendly atmosphere, usually held at a nearby state park and conference center. In even-numbered years, this includes a single day of activities at a site down-town Cleveland. This year's retreat will be held on Friday, October 5th. All classes will be canceled on the days of the retreat. Activities involving students, postdoctoral fellows, and faculty encourage collaboration and foster collegiality among all members of the Department.

Biomedical Graduate Student Symposium

The Biomedical Graduate Student Symposium at CASE is an annual meeting organized and led by a student-run committee. It is designed to promote and recognize the exceptional biomedical science research accomplishments of graduate students at Case Western Reserve University and to encourage dialogue between students of diverse interests and fields. We advise that all Physiology and Biophysics students participate in this symposium.

Research ShowCASE

This annual event is an opportunity for faculty, researchers, undergraduate and professional/graduate students and postdoctoral fellows from CASE and its affiliated research institutions to display their latest research. Affiliated research institutions include the Cleveland Clinic Foundation, the Louis Stokes Veterans Affairs Medical Center, the MetroHealth Medical System and University Hospitals of Cleveland.

Graduate Student Senate

"The Graduate Student Senate (GSS) is a representative government for graduate students pursuing advanced degrees in the School of Graduate Studies at Case Western Reserve University. The GSS serves as a forum of graduate students whose focus is to meet, discuss, and take action on academic, social, and professional affairs. The GSS actively represents students' individual and collective interests by pledging to lobby faculty and university administrators on

their behalf. All departments under the School of Graduate Studies are afforded senators who regularly attend monthly general assembly meetings of the GSS and help shape university policies directly affecting graduate students through their dialogue with the university administration. All graduate students are members of the GSS and all are welcome to attend its meetings, forums, and sit on its committees."

The Department of Physiology and Biophysics also has its own student organization for both graduate students and post-doctoral fellows called the Graduate Professional Council of Representatives (GPCR). The GPCR: 1) maintains and develops an intellectually stimulating atmosphere and a high level of academic excellence; 2) promotes and maintains the exchange of information between students and faculty; 3) acts in the best interest of the department and student body, providing a representative voice through which student's opinion may be expressed. GPCR activities, including their monthly Students and Science Luncheons, will be announced throughout the year.

The GPCR is much more than just a group of people that want to talk to faculty once in a while. Membership is composed of people who want to play an active role in developing our department and solving problems which face us as graduate trainees. This is achieved through representation on a number of departmental committees (New Student Orientation Committee, Seminar Committee, Admissions Committee, Publicity Committee) and interdepartmental organizations (Women in Science, Graduate Student Senate). Any student who is interested in working on some aspect of the department (public outreach, etc.) is welcome to work with the GPCR to make positive change to our department.

Communication & Representation

Please contact any of the representatives with ideas/issues and/or to become involved:

GPCR Coordinators: Quentin Jamieson (qxj10@case.edu)

Seminar Representative: Prattana Samasilp (pxs293@case.edu)

Women in Science Coordinator: Ahlam Salameh (ais20@case.edu

Graduate Student Senators: Ahlam Salameh (ais20@case.edu)

Postdoctoral Representative: Jessica Berthiaume (Jessica.berthiaume@case.edu)

University Counseling Services & Center for Collegiate Behavioral Health

University Counseling Services
201 Sears Library Building 2nd Floor
Monday – Friday 8:30 – 5:00
Phone: 368-5872 Phone: 368-2510
Fax: 368-1972 Fax: 368-8530
http://studentaffairs.case.edu/counseling

Center for Collegiate Behavioral Health
2145 Adelbert Road – Health Services 2nd Floor
Mon., Tues., Wed., & Fri. 8:30 – 4:30
Thursday 9:30 to 4:30
http://studentaffairs.case.edu/counseling/mindbodyUniversity Counseling Services and Collegiate Behavioral Health specialize in assisting students undergoing important personal and social changes that may affect their academic performance, career plans, emotions and/or relationships.

Services

- Personal counseling
- Couples counseling
- Group counseling
- Psychological testing
- Psychiatric services
- Substance abuse counseling
- Consultation services
- Referrals