

**Department of
Integrative Biology & Physiology**

**Graduate Student Handbook
2009-2010**

Graduate Program Office Location:
Jackson Hall 6-125
612.625.5902

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IBP Graduate Program Overview

Message from the Director of Graduate Studies (DGS):

Welcome!

Physiology may be defined as the application of mathematics, physics, and chemistry to the study of structure and function in living systems. As such, physiology is a "hybrid" field in which expertise from many other disciplines is ordinarily required and combined.

The program emphasizes a quantitative approach to understanding the functions of cells, organs, and systems in living animals. Ph.D. students take a core concentration that provides a broad background in the physiology of membranes, cells, transport, and organ systems. Individualized programs are structured to build on the student's strengths and to fill in gaps that would otherwise be an impediment to specific problem solving.

Areas of specialization include a growing cardiovascular core and other areas as well. We are glad you are in the IBP graduate program and wish you success in your endeavors!

J Osborn, DGS

This handbook is designed to help ease your transition into the IBP graduate program. It provides helpful information on programs, policies, and logistics in the IBP department, the University and the Graduate School. IBP Graduate Students should become familiar with the contents of the following University guidelines and resources:

One Stop Student Services (link: <http://onestop.umn.edu/>)

Graduate Assistants Employment Information (link <http://www1.umn.edu/ohr/gae/>)

Graduate School (link <http://www.grad.umn.edu/>)

Graduate School Catalogue (link <http://www.grad.umn.edu/catalog/>)

Counsel of Graduate Students (link: www.cogs.umn.edu)

If you have questions, please consult this handbook first. Then please feel free to come to the department office in Jackson Hall 6-125 and/or to make an appointment with the Assistant to the Director of Graduate Studies or email rlunde@umn.edu.

Keep this *Graduate Program Handbook* until you have graduated from the program since it contains the degree requirements that pertain to you! You are also responsible for knowing and adhering to the relevant rules and procedures described in the *Graduate School Catalog*, obtained from the Graduate School office, Johnston Hall, 3rd floor (<http://www.grad.umn.edu/gsss/>), and the relevant rules and procedures in each semester's *Class Schedule*, available on the internet at <http://onestop.umn.edu/registrar/index.html>.

Goals and Objectives of M.S. and Ph.D. in Integrative Biology & Physiology

The goals and objectives the M.S. and Ph.D. in IBP are aligned with IBP Mission Statement:

Dedicated to an integrative systems biology approach to biomedical discovery.

We partner with colleagues across disciplines to investigate questions ranging from the gene/molecule to the whole animal, striving for excellence in research and dissemination of new knowledge with local, national, and global impact.

Committed to mentoring and training graduate students.

We empower students to develop a deep understanding of the complexity of physiological systems to enable them to pursue unique career pathways spanning from academia to bio-industry.

Devoted to excellence, innovation, and scholarship in education.

We educate students in the integration of structure and function of cells, organ-systems, and living animals, providing a strong foundation for knowledge discovery in basic science and human health fields.

The IBP Graduate Training Program

As the title Integrative Biology and Physiology suggests, faculty research interests focus on cardiovascular, muscular, cellular and molecular, and integrative physiology.

The graduate program is interdisciplinary. The graduate program faculty consists of all active researchers in the IBP Department and many other researchers from other basic science and clinical departments. We have faculty members from both the Minneapolis and St. Paul campus as well as the Duluth campus.

For further information, see [Ph.D. Degree at the Twin Cities](#)

A full listing of Graduate faculty and their individual research interests can be accessed here: <http://physiology.med.umn.edu/people/GradFaculty.htm>

Success in research demands creativity, the ability to think critically and mastery of technical skills. Although it is often said that one "cannot teach creativity", it certainly can be encouraged and rewarded. As for critical thinking and technical skills, these are acquired through a carefully structured curriculum that emphasizes learning from original research papers and hands-on laboratory experience rather than summaries usually found in textbooks. In all cases, the training program at Minnesota is highly individualized so that each student has the freedom to pursue their own scientific interests with respect to their unique academic history. There is, however, a fundamental base of knowledge in the life sciences (cell biology, biochemistry, systems physiology and neuroscience) that provides a strong foundation for advanced study. Course work in these areas constitutes

the core curriculum and demonstrated understanding of this material is required of all students. These courses are usually taken within the first two years of study. Beyond the core requirements, individualized [programs](#) are structured to address advanced work in the student's area of specialization.

Each student is encouraged to participate in laboratory rotations with faculty having research interests similar to that of the student. These rotations provide hands-on experience with state-of-the-art techniques and give the student an opportunity to explore a variety of specialization options available within the program.

IBP History

The Department of Physiology has a long and distinguished tradition for excellence in research and graduate education. The Department was founded in 1889 and achieved national and international prominence in large part through the efforts of Dr. Maurice Visscher during his tenure as Chairman from 1936 to 1968. Dr. Visscher received both his MD and Ph.D. degrees from the University of Minnesota. His pioneering research on cardiac energy metabolism began in Starling's laboratory in Cambridge and eventually provided a foundation for the development of open heart surgery techniques at the University of Minnesota. He was a member of the [National Academy of Sciences](#), served as president of the [American Physiological Society](#) and as president of the International Union of Physiological Scientists. In recognition of his scientific contributions and his service to the University, an endowed professorship was established in his honor.

Dr. Visscher also began another tradition at Minnesota: A tradition of collaboration between the departments of Physiology, Surgery and Medicine that emphasized the importance of understanding basic physiologic mechanisms and applying this knowledge to the development of new approaches in clinical medicine. This tradition continues today through an interdepartmental graduate program in Integrative Biology and Physiology, which draws upon the expertise of physiologists in both basic science and clinical departments. This program provides a greater range of opportunities and experiences for graduate training than could otherwise be provided through a single department. It also increases access to state-of-the-art research facilities and equipment in each of these departments to support graduate student and faculty research activities within the program.

In 1999 the Physiology Department moved into new space in the completely renovated Jackson Hall, located in between the Hasselmo Hall and the new Cellular and Molecular Biology Building, which opened in 2002.

In 2008, Dr. Joseph Metzger became the new head of Physiology. The current name for the department is the Integrative Biology and Physiology (IBP) Department.

Department Location and Staff Contact Information

Department's Main Mailing Address:

Department of Integrative Biology & Physiology
Jackson Hall 6-125, 312 Church St. SE
University of Minnesota
Minneapolis, MN 55455
Fax: 612-625-5149
<http://physiology.med.umn.edu>

John Osborn, Director of Graduate Studies

Jackson 2-153, (612) 624-3074, osbor003@umn.edu

Stephen Katz, Associate Director of Graduate Studies

Jackson 2-145, (612) 626-6899, katzx001@umn.edu

Randi Lundell, Assistant to the Director of Graduate Studies

Jackson 6-129A, (612) 626-4925, rmlunde@umn.edu

Deb Fergus, Executive Assistant to the Head of the Department

Jackson 6-125, (612) 625-9137, fergu226@umn.edu

Yang Chong, Principal Accountant

Jackson 6-129, (612) 625-2970, chong001@umn.edu

Molly Rochford, HR Specialist

Jackson 6-120, (612) 625-3687, rochf003@umn.edu

Graduate Student Mailboxes

Department Reception Area, 6th Floor Jackson Hall 6-125

After-Hours Building Access

Students who have an adviser with lab space in Jackson Hall or Nils Hasselmo Hall (NHH) will be authorized for after-hours access to the relevant building. After hours-access to Jackson Hall and NHH is granted through use of the U-Card, your University of Minnesota identification card.

IBP Graduate Program Advising

The Director of Graduate Studies (DGS) is the default advisor for all new students excluding students admitted to the graduate program with a research assistantship provided by a particular faculty member. These students will have that faculty member as their academic advisor and thesis/dissertation advisor.

The DGS serves as the initial adviser for all incoming graduate students and can assist you with such core academic questions as developing a program of study to meet your interests or selecting an adviser. The DGS or the Associate DGS can assist you with most administrative matters, such as Graduate School paperwork, or course permission numbers. Graduate School forms are also available from the literature rack at the Graduate School, on the 3rd floor, Johnston Hall, and at <http://www.grad.umn.edu/forms/list.html>. Department-specific forms are available at <http://www1.umn.edu/IBP/info.html>.

Your initial advisor is the DGS and associate DGS. All students are expected to select a thesis mentor who then also becomes the advisor by the end of their first year, after taking courses in various areas, attending seminars and individual discussions, and becoming otherwise acquainted with graduate faculty members. Additionally, you are encouraged to speak with different faculty members about their interests and possible research topics. Your initial advisors can brief you on appropriate choices for a thesis mentor.

The thesis mentor /adviser guides you in choosing remaining coursework and thesis research. He/she also provides financial support for you from his or her research grants. In order to facilitate the process of identifying your top choices for an adviser, members of the graduate faculty will make short presentations of available research projects during a series of afternoon meetings in September. Students must then take the initiative to arrange individual meetings with faculty of interest. Students should also meet with current graduate student advisees of faculty and explore the infrastructure that exists at the University for research projects of interest.

New students who have at least two years of full support (fellowships or traineeships) may submit their choices for advisor anytime between November 15th and May 15th, of the first year. Students with traineeships should check with the stipulations of the training grant regarding the timing of adviser selection.

Remember that the advisor-advisee relationship is mutual; faculty members must agree to become your advisor. Upon selection of a faculty member and that faculty member's acceptance of advising responsibilities, you should inform the graduate program coordinator.

Application and Admission Information

Currently the Integrative Biology and Physiology graduate program in the Twin Cities offers the Ph.D. degree. We usually accept applications from four categories of applicants.

1. We do have some slots open for very well qualified independent individuals who do not fit within the 3 categories below. If you believe you are well qualified (appropriate Calculus, Physics, Biochemistry prerequisites, excellent grades, high GRE scores, preferably with research experience.....) then contact Stephen A. Katz, Associate Director of Graduate Studies at katzx001@umn.edu to see if you are a good fit for the Integrative Biology and Physiology graduate program in the Twin Cities.
2. We are also accepting applications for Ph.D. training from people with previous medical training who are already at the University of Minnesota or are considering the University of Minnesota Medical School for residency or fellowship training. For instance, a surgical resident, a renal or cardiology fellow, or other comparable student may be interested in bundling their required research into a Ph.D. program. The new Physician – Scientist program is an option here.
3. We are also trying to establish ties to local private industries that are engaged in relevant Physiological projects. For instance, there are people working in various biotechnology and bioengineering companies in the Twin Cities that are already doing work in Physiology, and who may benefit from formal training.
4. Also, people already affiliated with our graduate faculty are encouraged to apply for admission. For instance, appropriate undergraduate students, lab techs, or other people already working in a graduate faculty laboratory may be good candidates for the Ph.D. program.

At this time, we are a small program, but we hope to continuously grow over the next few years. If you fit any of the above criteria, or, if you do not fit the above criteria but still have a unique interest in the Twin Cities Integrative Biology and Physiology Ph.D. Program, then contact Stephen A. Katz, Associate Director of Graduate Studies at katzx001@umn.edu to see if you are a good fit for the Integrative Biology and Physiology graduate program in the Twin Cities.

We encourage applications from individuals who are bright, inquisitive and capable of independent thinking and learning. These are essential traits for a successful career in scientific research.

Prerequisites and How to Apply

Undergraduate degree with at least one year (3 quarters or 2 semesters) of Calculus, one year of Physics, one year of Biology, and two years of Chemistry. (For the Ph.D.,

Physical Chemistry is not required, but is recommended). Previous research experience is not required, but is recommended. Prerequisites are not absolute, and often a tailor-made program can make-up for a particular deficit.

Scores from either the Graduate Record Exam (GRE, general test only; for more information go to: <http://www.gre.org/ttindex.html>) or scores from the Medical College Admission Test (MCAT) are **required**. As a general requirement of the Graduate School, international student applicants whose native language is not English are also required to take the Test of English as a Foreign Language (TOEFL). The Integrative Biology and Physiology graduate Program does not use an automatic reject threshold for applicants below a set GRE score. We use the GRE scores to help identify potential strengths and weaknesses so that if the applicant is accepted, we can tailor an academic program that best fits the student's needs.

Three letters of recommendation are mandatory.

Admission is on a competitive basis. Admission decisions and decisions on financial support are made separately. However, for maintaining a high quality program, the faculty requires that all entrants be free to devote full-time to scholarship for the Ph.D.. Generally, this means that virtually all students admitted to the Ph.D. program are afforded full financial aid for the duration of their studies. The Special Master's Degree Program is designed to be completed while the student is employed in the Twin Cities.

In considering your application we look at more than your academic record and scores on standardized exams. We search for evidence of creativity and initiative in letters of recommendation, previous laboratory experience or other work experience.

There is no deadline for receipt of applications. We can admit students for entry into either Fall (early September) or Spring (mid January) Semesters. However, completed applications received before January 15th for entrance next fall are eligible for special funding.

Please note: The University of Minnesota Graduate school maintains a web site for application to any graduate program including the Integrative Biology and Physiology graduate program. The web site is the preferred method for application. Go to: <http://www.grad.umn.edu/application.html>. If that site is not operational, then try <https://app.applyyourself.com/?id=umtc-grad>.

However, before you apply, you should directly contact Stephen A. Katz, Associate Director of Graduate Studies, Integrative Biology & Physiology Graduate Program. An individualized discussion with Stephen A. Katz (preferably via phone, e-mail, or in person) will immediately let you know if the Integrative Biology & Physiology Graduate is a good fit for you.

Also, the Graduate School catalog has much more information concerning requirements, transfers, and degree programs. Go to their Web site

<http://www.catalogs.umn.edu/grad/index.html> and then click on general information, or choose another topic. Integrative Biology and Physiology.

Graduate Program and Graduate School Commitment to Diversity

The Graduate School embraces the University of Minnesota's position that promoting and supporting diversity among the student body is central to the academic mission of the University. A diverse student body enriches graduate education by providing a multiplicity of views and perspectives that enhance research, teaching, and the development of new knowledge. A diverse mix of students promotes respect for, and opportunities to learn from, others with the broad range of backgrounds and experiences that constitute modern society. Higher education trains the next generation of leaders of academia and society in general, and such opportunities for leadership should be accessible to all members of society. The Graduate School and its constituent graduate programs are therefore committed to providing equal access to educational opportunities through recruitment, admission, and support programs that promote diversity, foster successful academic experiences, and cultivate the leaders of the next generation.

Application Checklist

A Checklist For Applying for the Ph.D. Program in Integrative Biology and Physiology

- Complete the Application for Admission Form. The web site is the preferred method for filling out the form. Go to: <http://www.grad.umn.edu/application.html> Under New Applications, click on **Start a new application for admission**. First time users must **create an account**. Choose a password and a PIN will be generated for you; then follow the directions.
- The electronic application form asks if our program requires electronic (online) submission of (3) letters of recommendation. **Our program does require 3 online letters of recommendation.**
- The current application requires two separate written statements to be uploaded. You do not have to write extensively for each statement. However, we do need to know why you are applying, if you have any specific graduate educational plans, and if you have a research area you hope to specialize in or a specific mentor you hope to work with. If you have anything you want us to consider or any unique experiences, feel free to let us know. This can be accomplished with statement 1. You may briefly answer statement 2, although it is optional.
- **WARNING!** The Application for Admissions form asks what semester you expect to enter if admitted. Carefully choose the semester (and year) you wish to enter. You should understand that the graduate school assumes you will be registering for at least one course in the semester you enter. If you get admitted for a given semester and do not register for a course in that semester, then you must switch your admission to the Graduate School to a latter semester via the admissions office. It is sometimes possible to take graduate level classes (in consultation with Stephen Katz) before official admission, and apply them towards your degree after you are admitted.
- The application will ask for your proposed Major and degree objective. Click on Integrative Biology and Physiology or Cellular and Integrative Physiology, Ph.D. Use the following: (Major code = 015360208).
- Under downloadable forms, click on **Transcript Request Form** and ask your current and/or previous undergraduate or graduate schools for a transcript to be sent to the University of Minnesota.
- Have your official **GRE** scores (and TOEFL scores if your native language is not English) submitted to the University of Minnesota Graduate School.
- The application form will allow you to **upload a resume or curriculum vitae**. We ask that you upload a brief resume that lists what you have been doing since high school in chronological order. Please do not leave any gaps in time.
- You do not have to apply for a fellowship via the online application. The PhD program in Integrative Physiology and Biology typically supports all of our Ph.D. students with a monthly stipend (competitive with other nationally ranked schools) as well as free tuition, and fringe benefits. Financial support is provided through the IBP department and associated graduate program.

All admissions decisions are made after an individualized review of the applicants' completed application files.

If you are unable to use the on-line application form, please contact:

Randi Lundell
Assistant to the DGS
Department of Integrative Biology & Physiology
University of Minnesota
6-129A Jackson Hall
321 Church St. SE
Minneapolis, MN 55455 USA
Phone: 612-626-4925 Fax: 612-625-5149
Email: rlunde@umn.edu

Thank you for your interest in the IBP Graduate Program at the University of Minnesota. Applications are accepted on a rolling basis. We recommend that you have your application complete by January 31st for admission the following fall. Only under special circumstances are applications considered for spring and summer admission.

Each individual's application, supporting material and background information will be considered holistically to determine eligibility for admission.

The Graduate Program in IBP cannot consider any application that has not been processed by the Graduate School.

Still have questions? Please visit our [frequently asked questions](#) page.

Other Programs to consider:

1. A Masters Degree in Integrative Biology and Physiology is available in cooperation with the Duluth campus. The Masters Degree program is open to all applicants. Contact Dr. Lorentz E. Wittmers at lwittmer@d.umn.edu if interested, or, to visit the Duluth Physiology web site, go to http://www.med.umn.edu/duluth/about/Phys_Pharm/graduate-PHSL/home.html
2. A great alternative with a different focus is the Master of Biological Science (MBS) program.
Check it out at: <http://www.cbs.umn.edu/biolink/mbs/index.html>
3. If you are interested in Neuroscience you might want to contact the NEUROSCIENCE graduate program. E-mail to neurosci@tc.umn.edu.

Registration

Registration for each semester begins approximately one month prior to the end of the previous term. For example, registration for spring begins the previous November. All graduate students must register for both fall and spring semesters throughout the term of their appointments as graduate assistants, or lose employment and health benefits.

The deadline for fall registration is usually somewhere around September 1st. You will be assessed a late fee if you register after this date. Please see the one stop registration web site at <http://onestop.umn.edu/registrar/registration/index.html> for complete information about fall semester registration. All new graduate students should meet with the DGS to review their initial registration following orientation, as necessary. Thereafter, continuing graduate students should register with the approval of their assigned adviser. All graduate students should also consult the Graduate School's *Summary of Procedures from Initial Registration to Graduation* (<http://www1.umn.edu/ohr/teachlearn/int/indexita.html>) .

Some courses will require approval from the department offering the course. If you have questions or need registration approvals, you should speak to Randi Lundell as far in advance of the start of the semester during which you wish to take the course.

To register via the University of Minnesota **One Stop** website, <http://onestop.umn.edu/registration/index.html> , you will need your student ID number or social security number and your password to log on. Your initial password is your date of birth; once logged into the system, you can choose a different password. If you are unable to login initially with your date of birth, contact the Student Services Center, 200 Williamson Hall, 612-625-5333.

You must clear all registration holds before you will be permitted to register. A new student who has the hold "BACH DEGREE" on record must submit a transcript or other evidence of graduation from the undergraduate institution to the Registrar's Office, 200 Fraser Hall. For more information on holds and hold clearance, go to the One Stop website.

A student who holds a graduate assistantship must register for a minimum of 6 credits for each of the fall and spring semesters. However, the graduate assistant tuition benefit is capped at 14 credits per semester; if you register for more than 14 credits, you will be responsible for paying the additional tuition. A Ph.D. candidate (i.e., a Ph.D. student who has successfully completed the preliminary examinations and has completed 24 thesis credits) need only register for a minimum of 1 graded thesis credit per semester to maintain the graduate assistantship. An M.S. candidate should request this option upon completion of all coursework and project or thesis credits and with an approved *Degree Program Form* on file with the Graduate School.

Your adviser must approve your enrollment in summer session classes.

An M.S. student may register during any semester for coursework or for M.S. thesis credits. A Ph.D. student may register during any semester for coursework or directed research.

A Ph.D. student may register for doctoral thesis credits only after passing the preliminary oral exam.

A student who has completed all of their coursework and thesis credits and who needs to maintain a minimum number of credits to satisfy non-Graduate School requirements, such as receiving or deferring repayment of loans, keeping assistantships, or maintaining visa status, may register for FTE: Masters, FTE: Doctoral, or Doctoral Pre-Thesis Credits. These courses are intended only for advanced M.S. and Ph.D. students who have completed all their program coursework and required thesis credits, but still are working full-time on the research or writing of their thesis, papers, capstone project or dissertation. These credits cannot be used to meet specific program course or credit requirements, nor can they be used to meet the 24 doctoral thesis credit requirement. See Randi Lundell for registration approval and further advice.

Each student is required to register every fall and spring semester to maintain active status in the Graduate School. Requests to schedule final oral examinations, for example, will not be honored if a student is considered inactive. If your student status has become inactive, you will need to reapply for admission to the Graduate School. Please consult the most current version of the *Graduate School Bulletin* for complete information on all Graduate School-wide policies and procedures.

- The University of Minnesota uses a four-digit course numbering system. Graduate students typically fulfill their course requirements by registering in courses at the 5xxx and 8xxx levels. In some cases, such as coursework necessary for the research which is outside the student's prior major and graduate coursework to date, 4xxx level courses can be used towards degree course requirements with pre-approval of the adviser and DGS. DGS pre-approval may be granted occasionally for a course at the 6xxx or 7xxx levels. M.S and Ph.D. candidates who believe they have taken courses for undergraduate credit that are the equivalent of required Phd graduate core courses should consult their advisor.
- * Technology electives are courses in engineering physical sciences and mathematics offered in the Institute of Technology, or courses outside of IT that have a predominately mathematics, physical science, and/or engineering content (require pre-approval of the DGS).

IBP Degree Requirements

IBP M.S. Degree Requirements

Twin Cities Campus

An MS degree for individuals is sometimes available. We require 14 graduate credits in physiology and 6 graduate credits outside of physiology, plus at least 10 thesis research credits.. The degree is based on laboratory research, and requires a written thesis or written project and an oral presentation of the work for the final exam. The M.S. degree is Plan A, unless there are special circumstances requiring a Plan B. For Plan B, the final exam is oral.

IBP Ph.D. Degree Requirements

In the first year, the Ph.D. program requires courses in medical physiology and Cell Physiology, as well as three laboratory rotations and some seminar courses (see below).. The coursework is tailored to the student's interests with input from the director of graduate studies and the adviser. During the first year, students rotate through three laboratories, pick an adviser, and begin a research project. A preliminary written exam in physiology and neuroscience is taken before the preliminary oral exam. The preliminary oral exam is given to test the student's ability to apply principles of both physiology and the minor or supporting program to a proposed research based thesis. **A minimum of 12 credits must be completed in the minor field or supporting program.**

See next page for a sample program of study:

**PhD Curriculum
Integrative Biology and Physiology (IBP) Graduate Program
Incoming students Fall 2009**

YEAR 1

<u>Semester</u>	<u>Course</u>	<u>Credits</u>
Fall	Cell Physiology PHSL 5700 (or ANSC 5700)	4
	Molecular biology/genetics course (options below)	3-5
	Biostatistics (options below)	3-4
	1 st and 2 nd Laboratory Rotations (PHSL 5094)	2
	IBP seminar series (PHSL 5095)	1
	Other options are possible depending on prior coursework	
Spring	*Medical Physiology PHSL 5101	5
	Systems Physiology Research Topics* PHSL 5095	1-3
	Bioethics (BTHX 5000, BIOC 8401)	1-4
	Late Breaking Discoveries in Biomedical Science (PHSL 8220)	1
	2 nd and 3 rd Laboratory Rotation (PHSL 5094)	2
	Special topics/ Seminar Series (or PHSL 5095)	1
Other options are possible depending on prior coursework		

* This course for graduate students will include weekly meetings with a graduate faculty member for each system (e.g., CV, respiratory, etc.) which will cover current literature on a selected disease state for that system. This could be a “journal club” format that develops critical thinking skills and reinforces concepts covered in the Cell Physiology course but at the “systems” level.

Written Ph.D. Prelim Exam

This exam will be given within 2 weeks of completion of the Spring Semester. It will be essay format testing the ability of the students to apply concepts learned in the core courses and integrate these concepts into the ‘big picture’.

Summer	Special topics/ Seminar (or PHSL 5095)	1
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By the end of summer of Year 1 student must choose laboratory for thesis work.

See next page for year 2 and beyond.

YEAR 2

<u>Semester</u>	<u>Course</u>	<u>Credits</u>
Fall	Supporting program/minor	3-4
	Supporting program/minor	3-4
	Special topics/ Seminar	1
Spring	Supporting program/minor	3-4
	Supporting program/minor	3-4
	Special topics/ Seminar	1

File thesis Committee Selection/Degree Program with Graduate School
Schedule Oral Exam with Graduate School
Write Thesis Proposal in “NIH NRSA” format

Oral Ph.D. Prelim Exam

This exam will be based on the Thesis Proposal but the student will be expected to address all and any questions requiring knowledge gained from their coursework.

Summer Research

Submit Thesis Proposal Form to Graduate School

Must have a minimum of 12 Non-PHSL credits accumulated at this point

Submit Predoctoral Grant Proposal (NIH NRSA or AHA Predoctoral Fellowship)

YEAR 3

<u>Semester</u>	<u>Course</u>	<u>Credits</u>
Fall	PHSL 8888 (Thesis Credits)	12
Spring	PHSL 8888 (Thesis Credits)	12
	Give Seminar	

YEARS 4 and 5

PHSL 8444 1
Give Seminar

Final Thesis Defense no later than end of Year 5

Possible Options for Graduate Courses

Molecular/Cellular Biology Options

BIOL 4003 - Genetics

(3.0 cr; =[GCD 3022]; Prereq-[[BIOC 3021 or BIOC 4331], [any CBS major or major in [animal science or applied plant science or BA biology or BA microbiology or nutrition or physiology or biology/society/environment]]] or #; fall, spring, summer, every year)

Introduction to the nature of genetic information, its transmission from parents to offspring, its expression in cells/organisms, and its course in populations.

BIOL 4004 - Cell Biology

(3.0 cr; Prereq-[3021 or BIOC 3021 or BIOC 4331], [4003 or BIOC 4332]; fall, spring, summer, every year)

Processes fundamental to cells. Emphasizes eukaryotic cells. Assembly/function of membranes/organelles. Cell division, cell form/movement, intercellular communication, transport, secretion pathways. Cancer cells, differentiated cells.

BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems

(4.0 cr; Prereq-[[BIOL 1002 or BIOL 1009 or BIOL 2003 or equiv], [CHEM 2302 or equiv]] or #; fall, spring, every year)

Advanced survey of structure/catalysis, metabolism/bioenergetics.

BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression

(4.0 cr; Prereq-4331 or #; spring, every year)

Advanced survey of molecular biology, mechanisms of gene action, and biological regulation.

*** 4000 level courses above only by permission of DGS and advisor**

BIOC 5001 - Biochemistry, Molecular and Cellular Biology

(5.0 cr; =[BIOC 6001]; Prereq-undergrad course in biochemistry, #; fall, every year)

Integrated course in biochemistry, molecular biology, cell biology, and developmental biology.

BIOC 6021 - Biochemistry

(3.0 cr; =[BIOC 3021]; Prereq-general biology, organic chemistry, #; intended for MBS students; fall, spring, summer, every year) Fundamentals of biochemistry. Structure/function of proteins, nucleic acids, lipids and carbohydrates. Metabolism, regulation of metabolism. Quantitative treatments of chemical equilibria, enzyme catalysis, and bioenergetics. Chemical basis of genetic information flow.

GCD 5036 - Molecular Cell Biology

(3.0 cr; Prereq-Biol 4004 or #; [sr or grad student] recommended; fall, every year)

Modern, integrative approaches combining cell/molecular biology, biochemistry, and genetics to investigate cell organization/function. Membranes, signaling, extracellular matrix, secretion, endocytosis, cytoskeleton, nucleus. Analysis of scientific papers to illustrate new concepts in and experimental approaches to cell organization/function.

Statistics Options

STAT 5021 - Statistical Analysis

(4.0 cr; =[ANSC 2211, ESPM 3012, STAT 3011]; Prereq-=: 3011; College algebra or #; Stat course recommended; fall, spring, every year)

Intensive introduction to statistical methods for graduate students needing statistics as a research technique.

PUBH 6414 - Biostatistical Methods I

(3.0 cr; =[PUBH 6450]; Prereq-Public Health [MPH or certificate] student or [environmental health [MS or PhD] or health journalism MA or health informatics [MS or PhD]] major or #; A-F only, fall, spring, summer, offered when feasible)

Descriptive statistics, graphical methods. Use of Excel. Proportions, relative risk, odds ratios. Random sampling. Estimates of

mean, medians, measures of variability. Normal distribution, t-/chi-square tests. Confidence intervals. Correlation/regression. Inference/causality.

PUBH 6451 - Biostatistics II

(4.0 cr; Prereq-[[[6420, 6450] or [6414, 6415]] with grade of at least B, health sciences grad student] or #; spring, every year). Two-way ANOVA, interactions, repeated measures, general linear models. Logistic regression for cohort and case-control studies. Loglinear models, contingency tables, Poisson regression, survival data, Kaplan-Meier methods, proportional hazards models.

Possible Supporting Program/Minor Courses

Biomedical Engineering

BMEN 5001 - Advanced Biomaterials

(3.0 cr; Prereq-3301 or MatS 3011 or grad student or #; A-F or Aud, fall, every year)

Commonly used biomaterials. Chemical/physical aspects. Practical examples from such areas as cardiovascular/orthopedic applications, drug delivery, and cell encapsulation. Methods used for chemical analysis and for physical characterization of biomaterials. Effect of additives, stabilizers, processing conditions, and sterilization methods.

BMEN 5041 - Tissue Engineering

(3.0 cr; Prereq-IT upper div or grad student or med student or #; fall, spring, every year)

Fundamentals of wound healing and tissue repair; characterization of cell-matrix interactions; case study of engineered tissues, including skin, bone marrow, liver, vessel, and cartilage; regulation of biomaterials and engineered tissues.

BMEN 5101 - Advanced Bioelectricity and Instrumentation

(3.0 cr; Prereq-[IT upper div, grad student] or #; spring, offered when feasible)

Instrumentation, computer systems, and processing requirements for clinical physiological signals. Electrode characteristics, signal processing, and interpretation of physiological events by ECG, EEG, and EMG. Measurement of respiration and blood volume/flow.

BMEN 5102 - Bioelectric Measurements and Therapeutic Devices II

(3.0 cr; Prereq-5101 or #; spring, every year)

Theory/application of electrical stimulation in areas of therapeutic/functional neuromuscular stimulation and pain control, cardiac pacing, defibrillation, tissue healing, and electrotherapy. Safety of electric fields. Electrical tissue impedance measurements.

BMEN 5351 - Cell Engineering

(3.0 cr; Prereq-[2501 or 5501], CSCI 1107, [Math 2243 or Math 2373], [IT upper div or grad student or #]; fall, spring, offered when feasible)

Engineering approaches to cell-related phenomena important to cell/tissue engineering. Receptor/ligand binding. Trafficking/signaling processes. Applications to cell proliferation, adhesion, and motility. Cell-matrix interactions.

Physiology Courses

PHSL 4021 - Advanced Physiology and Bioengineering: Bionic Human

(3.0 cr; Prereq-3061 or 3063 or 5061 or #; A-F only, spring, every year)

"Six million dollar man" theme used to present physiology of different organ systems. Human organs versus advanced synthetic devices. Artificial heart, kidney, lung. Eye versus digital camera. Artificial intelligence of pattern recognition. Web-based course.

PHSL 5095 - Problems in Physiology

(1.0 - 5.0 cr [max 20.0 cr]; Prereq-#; fall, spring, summer, every year)

Individualized study in physiology. Students address selected problem through library or lab research, supervised by physiology faculty.

PHSL 5444 - Muscle

(3.0 cr; =[BIOC 5444]; Prereq-3061 or 3071 or 5061 or BioC 3021 or BioC 4331 or #; spring, every year)

Muscle membranes: structures, mechanisms, and physiological roles of channels/pumps. Muscle contraction: force generation by actin/myosin.

PHSL 5510 - Advanced Cardiac Physiology and Anatomy (Short Course)

(2.0 - 3.0 cr [max 2.0 cr]; Prereq-#; spring, every year)

Fundamental concepts, advanced topics related to clinical/biomedical cardiac physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one week course.

PHSL 5511 - Advanced Neuromuscular Junction Physiology (Short Course)

(2.0 - 3.0 cr [max 2.0 cr]; Prereq-#; summer, every year)

Fundamental concepts and advanced topics related to clinical/biomedical aspects of neuromuscular junction physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one week course.

PHSL 8222 - Central Regulation of Autonomic Function

(3.0 cr; =[NSC 8222]; Prereq-NSC 5561 or #; A-F or Aud)

Neural/hormonal sensory pathways affecting central autonomic nuclei involved in maintenance of homeostasis. Current research on physiological control systems at cellular, organ, and integrative levels. Offered fall of odd-numbered years.

PHSL 8310 - Advanced Topics in Cellular Physiology

(1.0 cr [max 4.0 cr]; Prereq-#; fall, spring, every year)

Discussion of primary research publications. Topics vary by semester

Supporting Program Courses

“Designer” pharmacology course (Katz has details) 2-3 credits

GCD 4134 - Endocrinology

(3.0 cr; Prereq-Biol 3211 or Biol/BioC 3021 or BioC 4331 or #)

Survey of structure and function of invertebrate and vertebrate endocrine systems.

PHCL 8110 - Advanced Pharmacology

(4.0 cr; Prereq-5110 or #; A-F or Aud, spring, every year)

Contemporary research concepts, experimental approaches in investigative pharmacology. Mechanisms of action of drugs on systems (whole animal), organ, and cellular levels.

PHCL 8216 - Signal Transduction and Gene Expression

(3.0 cr; =[O1540]; Prereq-BIOC 8002 or #; spring, every year)

Mechanisms of intracellular signal transduction. Transcriptional regulation> Cellular/molecular techniques to study cell signaling. Well-characterized signaling pathways, Experimental approaches. Current issues/problems.

CMB 8344 - Mechanisms of Hormone Action

(2.0 cr; Prereq-Course in biochemistry or cell biology or #; fall, even years)

Mechanisms of hormone/cytokine action. Focuses on major signal transduction/apoptosis. Topics incorporate pharmacology, biochemistry, and cell biology of hormone action in relevant physiological systems. Lectures on basic principles. Specialized lectures. Discussion of primary literature.

NSC 5540 - Advanced Survey of Biomedical Neuroscience (Short Course)

(2.0 cr; Prereq-#; intended for members of biomedical community or students with advanced scientific backgrounds; summer, every year)


Current topics in biomedical neuroscience, accompanied by supporting, fundamental concepts. Intensive, one week course.

Degree Progress, Forms, and Exams

For the MS degree, go to

http://www.grad.umn.edu/current_students/masters/index.html

for the latest information on all degree related procedures. Click on forms to find all needed forms.

-  [Masters Degree Forms Process Chart](#): Information on the forms and the order in which they should be submitted for a successful and timely completion of the Master's degree program.
 - **Applicable to:** All students pursuing a master's degree either plan A or plan B or current Masters

Masters Degree Program Transmittal Form

- Should be filed at the end of the spring semester of the first year if possible
 - ****IBP Department Graduate Program Policy:** In an effort to ensure students are making timely progress on their degrees, a hold will be placed on your record preventing you from registering if this form is not submitted after completing 20 credits. This hold will remain there until the Degree Program Form has been submitted or until you have spoken with the Director of Graduate Studies.
- This form is used to assign the committee for the final exam.
- Takes 6-8 weeks to be approved by the Graduate School.
- Form can be downloaded from Graduate School's website at:
http://www.grad.umn.edu/current_students/forms/masters.html

Change of Degree Objective Form (Change of Status/Readmission)

- If the student was admitted as a Master's Degree candidate, he/she must file a change of degree objective form after passing the WPE in order to become a Ph.D. candidate.
- **DO NOT CHOOSE AN EFFECTIVE TERM OF SUMMER** -- you are **REQUIRED** to register for the effective term of the change. If you have an effective term of summer, you have to register for that term (otherwise you'll become *inactive* from the Graduate School).
 - You can register for GRAD 999 if the effective term for your Change of Status Application is summer.
- Submit application on-line with the Graduate School (http://www.grad.umn.edu/current_students/forms/index.html).

Written Preliminary Examination Report (WPE)

- Filed with the Graduate School once student:
 1. passes the WPE
 2. admitted into the Ph.D. program


- Form can be downloaded on the Graduate School's website:
http://www.grad.umn.edu/current_students/forms/doctoral.html

More information about the Written Preliminary Exam can be found either on the U of MN Graduate School website.

For the PhD degree go to:

http://www.grad.umn.edu/current_students/doctoral/index.html

for the latest information on all degree related procedures. Click on forms to find all needed forms.

-  [Doctoral Degree Forms Process Chart](#): Information on the forms and the order in which they should be submitted for a successful and timely completion of the doctoral degree program.

Applicable to: All students pursuing a doctoral degree.

Ph.D. Degree Program Form

- Filed after *4 semesters*** have been completed (as soon as the coursework for the Ph.D. is known, usually during spring semester of the second year).
 - **IBP Department Graduate Program Policy: In an effort to ensure students are making timely progress on their degrees, a hold will be placed on your record preventing you from registering if this form is not submitted after completing 4 semesters. This hold will remain there until the Degree Program Form has been submitted or until you have spoken with the Director of Graduate Studies.
- Allowed to use *most* of the coursework from the Masters degree.
- This form is used to assign the committee for the Preliminary Oral Examination (POE).
- Takes 6-8 weeks to be approved by the Graduate School.
- Form can be downloaded from Graduate School's website at:
http://www.grad.umn.edu/current_students/forms/doctoral.html

More information about Ph.D. Degree Requirements can be found in the Graduate School Catalog (<http://www.catalogs.umn.edu/grad/index.html>)

Preliminary Oral Examination (POE) & Doctoral Thesis Credits (AEM 8888)

- *Before you can schedule the POE*, you must have Ph.D. Degree Program Form and the Written Preliminary Exam Report on file at Graduate School. If submitting these forms right before completing the POE, allow **6-8 weeks** beforehand so they have time to be approved.
 - Both forms can be downloaded on the Graduate School's website:
http://www.grad.umn.edu/current_students/forms/doctoral.html
- To schedule the POE, submit the Scheduling Form found on the Graduate School's website at: http://www.grad.umn.edu/current_students/forms/doctoral.html

- In order to register for **Doctoral Thesis Credits (PHSL 8888)** you must have completed the Preliminary Oral Examination
 - *IF COMPLETING THE PRELIMINARY ORAL EXAM DURING THE SEMESTER YOU WISH TO REGISTER FOR DOCTORAL THESIS CREDITS, THE ORAL EXAM MUST BE COMPLETED WITHIN THE FIRST 2 WEEKS OF THE SEMESTER. OTHERWISE YOU CANNOT REGISTER FOR DOCTORAL THESIS CREDITS AND CAN ONLY REGISTER FOR PRE-THESIS CREDITS (AEM 8666)*
 - There are NO EXCEPTIONS to this deadline.

Thesis Proposal Form

- This form should be filed soon after the student passes the POE.**
 - ****IBP Department Graduate Program Policy:** In an effort to ensure students are making timely progress on their degrees, a hold will be placed on your record preventing you from registering if this form is not submitted after completing the POE. This hold will remain there until the Thesis Proposal Form has been submitted or until you have spoken with the Director of Graduate Studies.
- Form can be downloaded on the Graduate School's website at:
http://www.grad.umn.edu/current_students/forms/doctoral.html
- It is used to assign the committee for the final oral exam.

Graduate Student Services and Progress (GSSP)

Upon Graduate School approval of students' degree program forms, plans of study, and/or thesis proposal forms, Graduate Students Services and Progress (GSSP) will send a personalized email to students with a scanned copy of their milestone form and a link to an online checklist that outlines remaining requirements particular to their graduate studies. You may wish to bookmark this link http://www.grad.umn.edu/current_students/checklists.html for your own reference.

Roles and Responsibilities of the Thesis/Dissertation Advisor

Faculty and graduate students share complementary responsibilities in the maintenance of academic standards and the development of high quality graduate programs.

These are some basic roles and responsibilities guidelines that advisors typically follow:

- Provide clear direction for the requirements each student must meet and policies of the graduate program.
- Advise graduate students as to how to develop a program plan, including appropriate course work, research or project activity, and available resources.
- Ensure that each graduate student initiates thesis or dissertation research in a timely fashion.
- Provide training and oversight in creative activities, research rigor, theoretical and technical aspects of the thesis or dissertation research, and professional integrity.
- Create supervisory relations with students that stimulate and encourage students to learn creatively and independently respect the academic freedom for students to express options that may differ from those of faculty
- Encourage graduate students to stay abreast of the literature and cutting-edge ideas in the field.
- Help graduate students to develop professional skills in writing reports, papers, grant proposals and evaluating manuscripts and papers; encourage participation in professional meetings; help establish professional networks professional contacts for the benefit of students; learn interviewing skills.
- Provide regular feedback on the progress of graduate students toward degree completion, including feedback on research or creative activities, coursework, teaching, and constructive criticism if the progress does not meet expectations.
- Acknowledge student contributions in research presented at conferences, in professional publications, or in applications for copyrights and patents.
- Help graduate students develop into successful professionals and colleagues, including encouraging students to participate and disseminate results of research or creative activities in the appropriate scholarly or public forums.
- Facilitate career development, including advising graduate students on appropriate job and career options, as well as on the preparation of application materials for appropriate fellowship, scholarship, and other relevant opportunities.
- Write letters of reference for appropriate fellowship, scholarship, award, and job opportunities.
- Provide for supervision and advising of graduate students when the faculty advisor is on leave or extended absence.

Roles and Responsibilities of the Student

These are some basic roles and responsibilities guidelines that students should typically follow:

- Adhere and take responsibility to learn university and academic unit rules, procedures, and policies applicable to graduate study and research or creative activities.
- Meet university and academic unit requirements for degree completion.
- Recognize that in many disciplines, the faculty advisor provides the intellectual and instructional environment in which the student conducts research, and may, through access to teaching and research funds, also provide the student with financial support.
- Respect faculty member's need to allocate their time and other resources in ways that are academically and personally productive.
- Devote an appropriate amount of time and energy toward achieving academic excellence and earning an advanced degree in a timely fashion.
- Acknowledge the contributions of the faculty advisor and other members of the research team to the student's work in all publications and conference presentations.
- Follow disciplinary and scholarly codes of ethics in course work, thesis or dissertation research, and in creative activities.
- Practice uncompromising honesty and integrity according to university and federal guidelines in collecting and maintaining data.
- Seek regulatory approval for research in the early stages of thesis or dissertation work where applicable.
- Take initiative to communicate regularly with faculty advisor(s) on progress toward completion of the thesis or dissertation.
- Work cooperatively with supervising faculty and other teaching assistants to accomplish the tasks set out in TA assignments.
- Give adequate attention to the teaching role by conscientious efforts in planning, preparation, and implementation of TA assignments.
- Achieve an appropriate balance between teaching responsibilities and other essential activities.

Professionalism and Ethics Related Links:

[Professional Ethics and Conduct of Research](#)

[Educational Requirements for Grad Students and Postdocs](#)

[Teaching Ethics for Research, Scholarship, & Practice](#) (University of Minnesota, State & Federal Policies and Procedures)

[On Being A Scientist: Responsible Conduct In Research](#) an on-line book (local copy)

Preliminary Examination

Purpose

The Preliminary Examination (Prelim) must be passed before a student achieves candidacy for the Ph.D. degree. Students usually take the exam at the end of the Winter Term or during the Spring Term of their second year. There are three objectives of the Prelim in IBP:

- To evaluate a student's knowledge of physiology in his/her general area of interest and to test the student's ability to integrate this knowledge with other areas of physiology;
- To evaluate the student's capacity to think creatively and communicate effectively in both oral and written presentations;
- To provide students with a unique learning experience in written and oral communication and to foster development and expression of scientific creativity.

Process

The DGS and the student's advisor will help the student familiarize themselves with guidelines of the preliminary exam. Briefly, the process is as follows:

Prelim Committee. The student establishes a Prelim Committee consisting of at least five faculty members (at least four from the IBP Department and at least one cognate member from outside the Department). The Chair of the Prelim Committee must be a member of the Graduate Committee. A graduate student representative selected by the student is present at all functions as a non-voting participant. To avoid conflict of interest, the student's mentor cannot be a member of the Prelim Committee.

Research Proposal. The student writes a research proposal according to the guidelines of an NIH pre-doctoral fellowship (see: <http://grants1.nih.gov/grants/guide/pa-files/PA-09-207.html>). The student, in consultation with the mentor, selects a topic and develops the proposal. Its scope and area should be suitable for a Ph.D. thesis. The selected topic may represent the student's planned Ph.D. thesis research.

Seminar. The student presents a research seminar based on the written proposal. The seminar is open to all members of the Department, the Prelim Committee and other interested individuals. The presentation generally lasts 40-45 minutes and is followed by a discussion in which all present may participate in questioning.

The **Oral Preliminary Exam (OPE)** committee members: Note the adviser is normally the chair for the OPE. Approval is officially signified when the DGS and the advisor sign the Graduate School *Preliminary Written Examination* form.

The student's OPE committee typically serves as the doctoral thesis committee. It is the student's responsibility to schedule the exam with the committee members and the Graduate School.

Please keep in mind the following regulations regarding the *OPE*:

- Only OPE committee members may attend.
- The *OPE* determines whether the student has mastered the material in the major and minor/supporting fields at the level the committee deems appropriate for advancement to doctoral candidacy. Thus, the examination is not restricted to a discussion of the research proposal, but will include questions related to coursework in the major and minor/supporting fields.

- The adviser, who chairs the committee, is responsible for the conduct of the exam (i.e. ensuring that a line of questioning is appropriate as well as observing Graduate School procedures).

Following the seminar, the Prelim Committee meet with the student for further questioning. In addition to addressing issues related to the written proposal and seminar, questioning addresses the student's general knowledge of physiology, including both molecular and integrative aspects, using the research proposal as a point of departure. The mentor must not be present during this oral defense. *Outcome.* The Prelim Committee then determines the outcome: Pass, Conditional Pass (which required remedial action), or Fail.

Passing the *OPE* constitutes official candidacy for the Ph.D. There are no further examinations until the final oral defense of the dissertation.

Failing the *OPE* may result in either a recommendation to repeat the exam, or to terminate graduate studies with or without completion of the M.S. degree.

A Ph.D. student is deemed to be making satisfactory progress by completing most or all coursework, submitting the *written preliminary examination (WPE)*, and successfully completing the *oral preliminary examination (OPE)* within the first two academic years. Also, by the end of the second academic year of study (i.e. before the WPE), a Ph.D. student must file a Degree Program Transmittal, which is the formal statement of committee composition for inclusion in the degree. A supplemental departmental form available from <http://www1.umn.edu/IBP/info.html> must also be completed and submitted to the DGS for review along with the Degree Program Transmittal. After the second year, satisfactory progress is determined by your thesis adviser, who will inform you and the DGS if there are problems. A Ph.D. student in the IBPGP is expected to earn his or her degree within four-to-six years from the date of the initial registration in the Graduate School. A Ph.D. student is required to meet with his or her doctoral committee at least once each year, beginning with the second year of residence in the program. Meeting with the committee for the *OPE* and final defense constitutes two of the required meetings; during each intervening year, the student must schedule a meeting with the committee and the adviser must provide the DGS a summary of the sentiment of the committee regarding the student's progress, indicating the date the meeting occurred, and the committee members in attendance. The lack of satisfactory progress as defined above is due cause for termination from the IBPGP.

Input from Mentors

The Graduate Committee is aware that there may be some confusion regarding how much input students may receive from faculty (mentors and other faculty) in developing the Prelim research proposal. The primary objective of the mentor is to foster the development of scientific creativity and expression and to provide a unique learning experience in written and oral communication. Other objectives are to evaluate the students' knowledge in their area of interest, to assess the ability to integrate this knowledge to other areas of physiology, and to judge their capacity to think creatively and communicate effectively.

- **The student should exercise originality and independence in preparing the research proposal. Although proposed experiments and designs should originate with the student, each student is encouraged to seek critical input from his/her mentor, committee members, other faculty and students. It is acceptable for others to comment on the rationale and justification of the hypothesis, the clarity of the writing, as well as the feasibility of the proposed experimental design, techniques and interpretation of the results. *It is not appropriate for a student to copy or include specific aims and experiments that are part of a grant proposal developed previously by the mentor.***

Dissertation Research

Selection of a Dissertation Mentor

Each student selects a thesis advisor (dissertation mentor) from the IBP faculty to guide his or her dissertation research. See **IBP Graduate Program Advising**. The Director of Graduates Studies (DGS) is the default advisor for all new students. After completion of laboratory rotations, the student should submit his/her choice of thesis mentor to the DGS of IBP. The selection of the dissertation mentor should ideally occur by the end of the first academic year of study. Selection of the mentor is one of the most important decisions a graduate student must make. Students and mentors should have common interests, and students should be knowledgeable and comfortable with the mentoring style and overall atmosphere of the laboratory. The mentor must have a graduate faculty appointment in IBP and must agree to the mentoring relationship. In very special circumstances, a student in IBP may petition the Graduate Committee to select a mentor who does not have an IBP graduate faculty appointment. Such requests must be fully justified, and the student must select a co-mentor who has a faculty appointment in IBP and who agrees to work closely with the student as he/she progresses toward the Ph.D. degree. The Graduate Committee must approve these arrangements. Students supported by a training grant must have a co-mentor who is a member of the Training Grant.

Dissertation Research

The dissertation research should make an original and significant contribution to the student's field of research. The overall scope of the work will vary depending on the research area, but it should be of sufficient quality, depth and originality to be published in peer reviewed scientific journals. The dissertation committee, together with the student and mentor, determines when the research is of sufficient quality and quantity to be appropriate for the Ph.D. dissertation.

Dissertation Committee

It is the responsibility of the student to set up the dissertation committee and organize timely meetings. This committee is intended to monitor progress and help the student in several ways: 1) develop a research program suitable for obtaining the Ph.D. degree; 2) provide guidance during the course of the research and offer suggestions for future directions; 3) ensure that the quality and quantity of research is suitable for obtaining the Ph.D.; 4) help the student and mentor determine when sufficient research has been completed to prepare the dissertation.

Ideally, the committee is formed soon after students pass the Preliminary Exam and the first meeting should be held when the research is still in its early stages. Although the length of committee meetings can vary greatly, it is recommended that approximately 2 hours be set aside for each committee meeting. The following information is intended to help students, mentors and committee members take greatest advantage of the dissertation committee.

Forming the Committee. The committee must be formally established with the DGS prior to the first meeting. The Graduate Program Assistant is available to help students fill out the necessary forms. The Graduate School policy states that the dissertation committee must have at least four members, three of which are regular members of the graduate faculty and two of which are from the candidate's home program. Students are strongly encouraged to include a fifth committee member so that the committee will have a sufficient number in the event that one member cannot be at the dissertation defense due to scheduling conflicts, sabbatical leave, or other reasons. The committee must have a chair (student's mentor), or two co-chairs, and a cognate member who holds at least a 50% appointment in a doctoral program and does not hold any fraction of an appointment in the candidate's home program. Further clarification of criteria for committee membership is provided in the Graduate Student Handbook.

First Committee Meeting. This must be held within six months after passing Prelims (or before the December holiday break for students who take Prelims in the spring). The student should prepare a written proposal describing a potential line of dissertation research. This does not need to be a formal proposal in NIH style (as was prepared for Prelims) and it is not intended to be the final proposal, because the committee can help provide valuable input for developing the research plan. The proposal should contain a hypothesis and specific aims, sufficient background and preliminary data to justify the work, and a general outline of the experimental plan to accomplish the aims. Although the format and length will vary depending on the student and the project, 4 – 5 pages should generally be sufficient. The proposal should be distributed to the committee one week before the meeting to allow time for committee members to digest the information. The student should begin the meeting with an oral presentation describing the proposal and pertinent research conducted thus far (PowerPoint encouraged). This is followed by discussion and suggestions from committee members, and ultimately committee members expressing their view as to whether the proposed research would be sufficient for obtaining the Ph.D. Ideally, the meeting should end by setting the goals to be accomplished prior to the next meeting and the approximate time of the next meeting. The chair of the committee should prepare a written report of the meeting.

Subsequent Committee Meetings. *Subsequent committee meetings should be held at least once a year and more frequently if considered desirable by the student mentor, or committee.* The goal of these meetings is for the student to present progress and for the committee to provide input to the student and mentor as to whether satisfactory progress is being made, if the student is on course, and ultimately to help the student and mentor decide when sufficient research has been conducted for writing the Ph.D. dissertation. One week prior to the meeting, the student should distribute to the committee a progress report that includes the hypothesis and specific aims (updates as needed from the original proposal) and research findings and interpretations obtained since the last meeting. It would be helpful for the student to indicate in this report his/her publications, abstracts and presentations relevant to the dissertation research. The student should

begin with an oral presentation (PowerPoint recommended) reviewing the material in the progress report. This should be followed by a discussion and suggestions from the committee. The meeting should end by discussing next steps, goals and setting an approximate date for the next meeting.

Reports of Committee Meeting. The chair of the dissertation committee should submit a written report to the DGS within two weeks after the meeting. This report should be signed by both the mentor and the student and distributed to all committee members. The report should indicate the date of the meeting, committee members present (and absent), and a written narrative describing the events that took place at the meeting. For the first meeting, this narrative should be sufficiently detailed as to indicate what has been proposed and whether it is feasible and sufficient as dissertation research. For subsequent meetings, it should specify progress and if this is sufficient relative to the goals set at the last meeting. It should include any deficits that were identified and recommendations of the committee. This report should also include goals to be accomplished prior to the next meeting and the approximate date of the next meeting.

Role of the Mentor and the Committee. Although mentoring styles vary tremendously amongst faculty and depending on the student, a few general comments may be helpful. The Ph.D. research may be considered a collaboration between the student and mentor. It is appropriate for the mentor to provide substantial input and advice regarding development of the research plan, interpretation of results, and determination of next steps. Although this is a collaborative effort, the student should be the driving force. The committee should provide oversight and feedback, and should help the student and mentor in development and subsequent modification of the overall research plan. The committee should not force the student and mentor to conduct specific experiments; rather, it should serve in an advisory capacity, and ultimately pass judgment as to whether the research and written dissertation are sufficient for the Ph.D. The student is encouraged to seek input from individual committee members outside the scheduled committee meetings.

The DISSERTATION

Dissertation Preparation, Deadlines and Resources

The final step in obtaining the Ph.D. is writing the dissertation, defending it in front of the dissertation committee, and revising it as specified by the committee. Students must adhere to specified formats and timelines in preparing and defending the dissertation. They should understand these policies before writing the dissertation. Details are provided in the Graduate Student Handbook at: <http://www.grad.umn.edu/gradwriting/>.

Upon completion of the thesis, the Ph.D. candidate takes the *final oral examination* in defense of his/her thesis. The final oral exam may take place only after the thesis has been judged ready for defense by the readers. This exam consists of a public seminar in which the candidate presents the thesis and to which the scholarly community is invited.

(The student must provide a title, abstract, time and location to Jim Parker to announce at least one week before the exam.) A closed meeting between the candidate and the appointed examining committee immediately follows the thesis presentation. The candidate is then excused and a vote is taken. The final oral exam is limited to the thesis and relevant subject areas.

The advisor is responsible for ensuring the inclusion of appropriate modifications and required revisions, if any, in the final thesis. The *final oral exam report* form will not be signed and submitted to the Graduate school until all revisions have been made. Finally, Ph.D. candidates must have submitted a first-author manuscript to a peer-reviewed journal before completion of the program. Evidence of submission must be provided to the DGS.

University Policies

See: <http://www.policy.umn.edu/groups/ppd/documents/index/updatedpol.cfm>

AHC/Medical School Policies

See:

<http://www.ahc.umn.edu/privacy/hipaa/implement/home.html>

<http://www.ahc.umn.edu/faculty/hr/hrpolicies/home.html>

<http://www.ahc.umn.edu/about/admin/is/policies/home.html>

IBP Seminar Attendance Policy

Attendance during the first year is mandatory (you will be enrolled in PHSL 5095 and grades upon your participation). Attendance in the remaining years of the program is strongly encouraged.

Miscellaneous

Fees and Fee Payment

You are responsible for paying all fees by the due dates defined on the original fee statements. Fee statements are mailed, emailed, or printed for you shortly after you register. Your fellowship or graduate assistantship typically covers the cost of tuition, but not the cost of the student services fee and related fees, which are assessed to all students registered each semester. See the *Class Schedule* for current fee tables and payment policies (<http://onestop.umn.edu/Finances/tuitionrates/2002-03/index.html>).

Health Insurance for Graduate Assistants

All new and continuing students holding a fellowship or at least a 25% graduate assistantship will need to complete an application for coverage by the graduate assistant medical plan. See Molly Rochford for an *Application Packet*. Submit the *Enrollment Form* as soon as possible to the Graduate Assistant Insurance Office, N323 Boynton Health Service, 625-6936. The deadline for fall semester coverage for most students is September 30, 2003. If you hold at least a 50% graduate assistantship during both semesters of the academic year, you will be covered by the health insurance plan during the following summer, as well. When you register, you must provide the name of your health insurance provider and your policy number on your registration form, or you will automatically be charged for a University-sponsored hospitalization plan (not the same as the plan for graduate assistants). Read the *Class Schedule* and the graduate assistant health insurance *Application Packet* for more information. Should you suffer an injury while fulfilling your duties as a graduate assistant, you must complete an *Employee Incident Report* form to report the injury and file for worker's compensation. This must be done as soon as physically possible following the injury. Further information on the policy and the forms is available from Molly Rochford or at www.fpd.finop.umn.edu/groups/ppd/documents/policy/workers_comp.cfm.

Serving as a Graduate Assistant and Related Financial Matters

Until the date student-adviser pairings are announced, students without their own external or internal fellowships will be paid with fellowship funds provided by the department. There is no obligation other than to be enrolled, take a full course load (13-14 course credits or as advised by the DGS) and identify top choices for the adviser.

After that date (or the expiration of the external or internal fellowship), a student will be paid entirely from the adviser's research grant (while taking courses and performing research related to the project funded by the grant), except during semesters during which the student serves as a teaching assistant (TA).

All graduate assistants at the University of Minnesota should be familiar with the policies governing graduate student employment, available from Human Resources, Donhowe Building (<http://www1.umn.edu/ohr/gao/>).

Paychecks are issued every other Wednesday and will be put into your mailbox. The first paycheck of the fall semester will be issued on the Wednesday of the second week of September. Please complete a *Direct Deposit Authorization Form* if you would like to have your pay deposited directly into your bank account. Students who opt for direct deposit can view their pay statements on line at (<http://hrss.umn.edu/>). All payroll, health and tuition benefit questions should be directed to the department's payroll person, Molly Rochford in Jackson 6-120 Jackson Hall, 612-625-3687.

TA English Language and SPEAK Test Requirements

University policy states that all nonnative English speakers acting as TAs must pass the SPEAK test with a score of 55-60 (campus rating of 1). For more information about the SPEAK test, contact the Center for Teaching and Learning Services, 120 Fraser Hall, 625-3041 (teachlrn@tc.umn.edu; <http://www1.umn.edu/ohr/teachlearn/>). If you do not pass the SPEAK test, you will be required to enroll in supplemental English language skills coursework until you pass the test. Students who do not fulfill the departmental requirement to serve as a TA jeopardize their graduate appointment, so passing the SPEAK test is imperative.

Lab Safety Training

New graduate students in the IBPGP *must* complete two-hour lab safety training. This training will be offered twice at the start of each fall semester.

If you do not attend a training session, you will not be allowed access to the BSBE Building labs and Shepherd Laboratories.

Dates for training sessions can be found at: <http://www.dehs.umn.edu/training.htm>

Responsible Conduct of Research

The Graduate School mandates that all graduate students receive the equivalent of 8 hours of instruction in Responsible Conduct of Research (RCR). All full-time graduate students are required to attend RCR instruction. Date for RCR workshop sessions can be found at the link below: <http://cflegacy.research.umn.edu/first/CourseSchedReg.htm>. Beginning graduate students should also visit http://www.grad.umn.edu/ethics/ethics_brochure.html. This site is intended to introduce beginning graduate students to RCR concepts; to institutional expectations regarding intellectual honesty and integrity; and to our commitment to provide educational opportunities and resources for students to learn about these topics.

Transportation Options

Parking at the University can be difficult because of the high number of commuters to campus.

For questions and information about parking and public transportation options, please visit [Parking and Transportation Services](#). This web site has information on biking to campus also.

Parking Services also offers a Motorist Assistant Program for individuals who are legally parked in any of the University parking facilities; except the Hospital Parking Ramp. This service includes unlocking vehicles, changing flat tires, jump starts and a few other services. It is available on the Twin Cities campus from 7:00 a.m. to midnight, Monday through Thursday, and from 7:00 a.m. to 10:00 p.m. on Friday. Service is not available on weekends or official University holidays. You can call **612-626-PARK** to request assistance.

Transportation by Bus: Free Campus Shuttle: You can get wherever you need to go at the University on the campus shuttle system. For example, the St. Paul Campus is only a 10-minute ride using the Campus Connector. All campus shuttles are free and use a color-coded bus stop mapping system. Visit <http://www1.umn.edu/pts> for additional information, including maps and schedules. Metro Busses: The Metro Transit provides most of the regular route bus service in the Twin Cities and has excellent bus service. The Twin Cities Campus Busing Guide is available from Parking and Transportation Services and Metro Transit. To learn more about the buses available to your area, call the Transit Information Center at 612-373-3333 or visit one of the campus kiosks at: Phillips- Wangensteen Building, Williamson Hall Bookstore, Parking and Transportation Services, West Bank Skyway Store, and the St. Paul Student Center. Additional information can also be found at <http://www1.umn.edu/pts>.

University U-Pass (Unlimited bus rides):The U-Pass provides unlimited bus rides 24 hours a day. It's valid on all regular routes, as well as express, local, limited-stop or Downtown Zone routes. It may not, however, be used on some special event services. You'll have access to almost anywhere in the metro area. The cost is around \$62/semester (check web site for current price).

To order the U-Pass go to <http://buspass.umn.edu> and order the U-Pass online.

Useful Links

Boynton Health Service

625-8400

<http://www.bhs.umn.edu/>

Center for Teaching and Learning Services

120 Fraser Hall

612/625-3041

teachlrn@tc.umn.edu; <http://www1.umn.edu/ohr/teachlearn/>

Class Schedule

Available on the Internet at

<http://onestop.umn.edu/schedule/html/tc.html>

Council of Graduate Students (COGS)

405 Johnston Hall

<http://www.cogs.umn.edu/netscape.html>

Graduate Assistant Employment

1st floor Donhowe Bldg.

624-7070

<http://www.ece.umn.edu/information/finances/grad/>

Graduate Assistant Insurance Office

N323 Boynton

625-6936

<http://www.bhs.umn.edu/insurance/graduate/>

Graduate School Catalog and Forms Online

<http://www.grad.umn.edu/program/>

<http://www.grad.umn.edu/forms/list.html>

Graduate School Student Services

3rd Floor, Johnston Hall

615-625-0068

<http://www.grad.umn.edu/>

International Student and Scholar Services

190 Hubert H. Humphrey Center

Telephone: (612) 626-7100

isss@tc.umn.edu;

www.isss.umn.edu

Registrar, Student Services Center

200 Fraser Hall

625-5333

<http://onestop.umn.edu/registrar/>

Student Finance Office, 200 Fraser Hall

612 624-1665

<http://www.onestop.umn.edu/Finances/index.html>

UM Graduate Student Handbook

http://www.grad.umn.edu/current_handbook/

Appendix

Finding a Job After Graduation

There are several career service opportunities available to graduate students at the U of MN.

Whether looking for an academic, government or industry position, the [University Counseling & Consulting Services](#) can provide assistance with developing your resume or curriculum vita. The UCCS can also assist MS and Ph.D. students in developing industry contacts and getting industry interviews.

Another excellent resource for graduate students interested in the academic track is the [Preparing Future Faculty Program](#). PFF can help you to develop better teaching skills, identify institutional fit, discern the balance between teaching, research and service at different institutions, and prepare a job search portfolio.

The University Graduate School also has employment resources on their website:
<http://www.grad.umn.edu/career/>