

Five-Year Academic Program Review

Physiology and Pharmacology

Reviewed by: Karla Kent, Owen McCarty, Sean Molloy

Reviewed on: May 3, 2013

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Five Year Academic Program Review

1. Introduction

Program Name: ***Graduate Program in Physiology and Pharmacology***

1.1 Identify the participants in the self-evaluation process. Please select all that apply.

- Faculty
- Students
- Staff
- Alumni
- Employers
- Others, please specify

1.2 When were meetings held to complete this self-evaluation process? Add date fields as needed.

12/12/2012

Faculty input is also sought at monthly Departmental faculty meeting as matters requiring discussion arise (memorable e.g. stipends: 4/11/12; maternal leave/vacation policy: 1/9/13).

Student input is sought at annual get together/retreats with the program director and outside speakers, and informally before or after seminars, receptions following named lectures, meet & greet meetings, and other departmental activities.

1.3 Who prepared the document?

Robert Duvoisin, Director, Graduate Program in Physiology and Pharmacology.

1.4 Who reviewed the report?

Graduate Program Steering Committee and all Graduate Program Faculty.

1.5 Provide the faculty vote on the final draft of the report.

Number of faculty eligible to vote: *34*

Number Agreed: *19*

Number Disagreed: *0*

Number Abstained: *15*

2. Overview

2.1 Describe the program.

Use the box below to write the program mission

To prepare future biomedical scientists and educators to address the causes and possible treatment of disease by investigating the elemental components of living organism, how they contribute to the function of the whole, and understanding the principles of novel therapeutics development.

Use the box below to describe the program's purpose

The Graduate Program in Physiology and Pharmacology trains students to become biomedical scientists, capable of independent thought and research.

Use the box below to identify the program's goals.

All of our students will be able to:

- 1. Critically evaluate a defined body of knowledge relevant to their field*
- 2. Identify significant and original problems that will impact human health*
- 3. Design and conduct independent, innovative research in accordance with the scientific research method*
- 4. Collect and store data in accordance with good lab practices*
- 5. Demonstrate analytical skills*
- 6. Accurately and professionally communicate results with others verbally and in writing*
- 7. Produce written documents appropriate for publication*
- 8. Understand and comply with current policies on rights of research subjects, copyright, ethics, malpractice, data ownership and use of animals, hazardous materials and rDNA*
- 9. Maintain a safe workspace, adhere to all safety regulations and display responsible conduct in research*
- 10. Develop and maintain good working relationships with all faculty, students and staff*
- 11. Establish new connections within their field of research by attending seminars, meetings, symposiums or conferences*

2.2 How do these align with, and contribute to, the fulfillment of OHSU's mission, strategic goals and core themes?

Following is OHSU's mission statement as appears on OHSU's web site. Underlined are elements to which the Graduate Program in Physiology and Pharmacology contributes:

As part of its multifaceted public mission, OHSU strives for excellence in education, research and scholarship, clinical practice and community service. Through its dynamic interdisciplinary environment, OHSU stimulates the spirit of inquiry, initiative, and cooperation among students, faculty and staff.

Setting the example for integrity, compassion and leadership, OHSU strives to:

- *Educate tomorrow's health professionals, scientists, engineers and managers in top-tier programs that [to] prepare them for a lifetime of learning, leadership and contribution.*
- *Explore new basic, clinical and applied research frontiers in health and biomedical sciences, environmental and biomedical engineering and information sciences, and translate these discoveries, wherever possible, into applications in the health and commercial sectors.*
- *Deliver excellence in health care, emphasizing the creation and implementation of new knowledge and cutting-edge technologies.*
- *Lead and advocate for programs that improve health for all Oregonians, and extend OHSU's education, research and healthcare missions through community service, partnerships and outreach*

2.3 Describe the curriculum, and if more than one award is given, highlight the progression in difficulty. Use the "Attach File" button below to upload the curriculum.

The PH2 Graduate Program is a part of the Program in Molecular and Cellular Biosciences (PMCB) at OHSU. Didactic training includes the PMCB Core Curriculum, including CONJ650: Practice and Ethics of Science, CONJ661: Structure and Function of Biological Molecules, CONJ 662: Genetic Mechanisms, CONJ 663: Bioregulation, and CONJ 664: Cell Structure and Function. In addition, the PH2 graduate program requires taking CONJ 667: Organ Systems, or CONJ 669: Chemical Biology; two PH2 core courses in the principles of Pharmacology (PHPH617 and 618); and 2 elective courses selected from any courses offered at OHSU. Students with a very specific interest can generate an elective in collaboration with a faculty member and register for PHPH 605: Reading and Conference: Topics in Physiology and Pharmacology. This flexibility helps students individually tailor their training depending on their interests and the courses are selected with the advice of the student's mentor.

During all their training students are required to attend The Physiology and Pharmacology Departmental Seminar series (PHPH 607) and present their research once a year. They should also participate in a graduate level weekly Journal Club, e.g. PHPH 606.

Our Faculty teach in many of the conjoint courses. Since 2008, CONJ 650 (Ethics and Practice of Science) is co-directed by a PH2 faculty. CONJ 669(Chemical biology) is also directed and taught by PH2 faculty. Until 2012, the CONJ661 (Structure and function of biological molecules) was directed by a PH2 faculty. The two PHPH 617 (Pharmacokinetics) and PHPH 618 (Receptor pharmacology) are directed by PH2 and mostly taught by PH2 faculty. These classes have a majority of students from different programs taking the course (e.g. Behavioral Neuroscience)

(see Appendix 1-Faculty & Curriculum)

3. Faculty and Staff Resources (Use the State of the Program Reports from the last five years to address these questions.)

3.1 Describe the major research thrusts of faculty, areas in which the research is particularly strong, areas that need to be strengthened and current research support.

Our collective research interests are motivated by the desire to make a difference in the treatment of human diseases such as hypertension, cystic fibrosis, heart failure, cancer, endocrine and neurological disorders. We recently created a Program in Chemical Biology that emphasizes the design of novel small molecules that represent the first step in drug discovery. In our program, chemists interface with biologists who use physiological, biochemical, and biophysical techniques to study: Autonomic neurobiology, Ion channel biophysics, Neuroendocrinology, Molecular pharmacology, Signal transduction, Chemical biology, and Cancer. The current plan includes the recruitment of a faculty member with expertise in cardiac electrophysiology, who would complement our autonomic neurobiology group.

Current grant support is continuously evolving and available from the Research Grants & Contracts office at OHSU.

3.2 Describe how OHSU has maintained adequate qualified faculty members and staff members in relation to the program's growth over the last five years.

Our graduate training faculty currently consists of 34 faculty with either their primary appointment in the Department of Physiology and Pharmacology (19), or in either the Advanced Imaging Research Center (1), Anesthesiology and Peri-Operative Medicine (1), Biochemistry and Molecular Biology (2), Nephrology & Hypertension (1), Neurological Surgery (2), Molecular Microbiology & Immunology (1), Ophthalmology (1), Pulmonary and Critical Care Medicine (5), or at the Vollum Institute (1).

Since 2008, five faculty have: -retired (1),- left OHSU (2), or -have left the program because of their reduced interest in training graduate students (2). Seven faculty have been added to our program. Two, with primary appointments in Physiology and Pharmacology, were recruited following a national search.

3.3 How successful has the program been in attracting and retaining faculty and leadership from demographically diverse backgrounds?

The program is committed to recruiting and retaining the best scientists, regardless of race, sex, or ethnicity. Currently we have 10 women faculty, and 9 faculty with an international background.

3.4 If recruitment and retention efforts have not produced desired diversity, what are your plans to recruit diverse faculty? What resources will be used or are needed to achieve these results?

OHSU has developed a Diversity Strategic Plan and recently created a Center for Diversity Inclusion. The Center is available to help recruit a diverse faculty.

3.5 What services has the program utilized to increase program effectiveness and further the academic mission? Please choose all that apply.

Teaching and Learning Center
Provost's Office
✓Library

Center for Diversity and Inclusion

✓Student Health

✓Registrar

Financial Aid

ITG

Campus Planning and Development

None

✓Other, please specify

Research Funding and Development Services

If "None" was selected, please click here to elaborate.

4. Enrollment/Degree Production (Use the State of the Program Reports from the last five years to address these questions. Each question has an "Attach File" option where charts or tables can be uploaded to demonstrate or emphasize your analysis.)

4.1 Is the five-year enrollment trend appropriate to the program's resources and capacity?

Since the integration of the Physiology and Pharmacology Program into the Program in Molecular and Cellular Biosciences (PMCB) in 2003, the recruitment of students into the laboratories of graduate faculty has suffered. We have matriculated about 2 students/year, with 10 students graduating with PhDs in the last 5 years (2008-12). This is about half the number of graduates per year than when the Physiology and Pharmacology Program was separate and called Integrative Biomedical Sciences (IBMS) program, which graduated 18 students between 2003 and 2007.

see Appendix 2-Students

It is felt that the program should aim to enroll about 4 students/year.

4.2 Has the number and/or quality of matriculates changed in the last five years? If so, how? What is the impact?

The number and/or quality of matriculates has not changed in the last five years.

4.3 Is the five-year trend in awarding degrees and certificates appropriate to the program's resources and capacity?

As indicated above, It is felt that the program should aim to graduate about 4 students/year.

4.4 How successful has the program been in attracting students from demographically diverse backgrounds?

The program is committed to training the most promising students, regardless of race, sex, or ethnicity. We have admitted 16 women and 7 men. None are URMs.

4.5 If you have not achieved desired results, what are your plans to recruit diverse students that add value to the learning environment? What resources will be used or are needed to achieve these results?

Admissions is administered by the Program in Molecular and Cellular Biosciences (PMCB). Since 2012 OHSU School of Medicine offers five \$1,000 Promising Scholar Awards to outstanding students, that have been admitted to any PhD or Master's program in the SOM and who will enhance student diversity. It is felt that this is wholly insufficient to make a difference.

4.6 What is the evidence of regional, national or international need for additional qualified individuals such as the program is producing? Please specify.

All our graduates have promptly obtained postdoctoral positions in academia or government, or scientist positions in industry.

4.7 Program availability (please select all that apply):

- Full-time
- Part-time
- Evening
- Weekend
- Place-bound
- On-line

5. Other Resources

5.1 What is the current budget (present year) for this program?

see Appendix 3-Budget

5.2 What revenue sources does the program have access to? Choose all that apply:

- Tuition
- State Appropriations
- Clinical/Patient Care
- Grants/Contracts
- Philanthropy *Steinberg Endowment*
- Indirect Cost Return
- Other, please list

5.3 How does tuition (or graduate stipends) compare to similar programs at other institutions (ideally, compare against programs on the institutional peer list)?

Graduate stipends are set by OHSU School of Medicine Graduate Studies. A survey of similar programs at other institutions shows that our stipends are average when adjusted for Portland's cost of living.

5.4 Evaluate the adequacy of other resources necessary to support this program (e.g. library, computer equipment, facilities, research labs, clinical placements).

Our resources are excellent.

5.5 Has anything happened since the last review that has influenced expenditures?

Yes

No

Click here if "Yes" was selected.

N/A

6. Student Learning Outcomes and Assessment (Use assessment reports from the past five years.)

6.1 Summarize how faculty members engage in ongoing systematic collection and analysis of meaningful, accessible and verifiable data that are appropriate indicators of student and graduate achievement of student learning outcomes.

Required and elective courses are graded, and an online gradebook is kept with DegreeWorks (SunGard Higher Education).

Research Progress is evaluated at least yearly by a Thesis Advisory Committee composed of 4-5 faculty. After 4 years of training the TAC meets twice a year. The TAC Chair writes a brief report to the Program director, which is kept on file. Progress is also evaluated annually in writing by the student and his/her mentor. These reports are collated and reviewed by the Program's Steering Committee.

In addition to informal meetings, students meet once a year with the Program Director to discuss matters related to their training.

6.2 Summarize how the results are used to improve the program curriculum, learning experiences, instruction, student recruitment and/or academic and learning support.

Discussion among faculty and between faculty and students are used to improve the program when possible.

6.3 Describe briefly any other evidence considered in evaluating your program's effectiveness (student time-to-degree, retention and graduation rates, advisor/advisee relationships, mentoring).

The average time from matriculation at OHSU to PhD degree is 5.1 years. All students that passed the Qualifying Exam, graduated with a PhD or are still in the program. 4 students left the program before the Qualifying Exam, one failed the exam.

All our graduates met our requirement for at least one senior author manuscript, with an average of 4.1 publications per PhD graduate.

6.4 What evidence does the program have about employment and/or further professional or graduate-level activities of program completers? What and how are alumni doing (e.g., industry or self-employment, geographic location, job, success indicators)?

All our graduates have promptly obtained postdoctoral positions in academia or government, or scientist positions in industry.

7. Other Information (optional)

Click here to add any additional information

8. Analysis and Conclusions

8.1 What are the strengths and achievements of the program's faculty, students and graduates?

We are proud of our students' records. Their time-to-degree, publications, and capability to rapidly find a position testify to our training program's quality.

8.2 How will the self-study be used for improvement against goals and targets? How will it inform planning, decision making and allocation of resources and capacity for the next five years?

The self-study has confirmed that we are doing a good job training graduate students given the limited resources provided. A consensus was that we should try to increase the number of trainees and provide training in alternative careers.

There is some concern that the Steinberg endowment is getting depleted and that we will have to revise its distribution. This will be discussed in a future Faculty meeting as we plan the next fiscal year budget.

8.3 What new resources and/or support do you need to achieve these goals and improvement targets?

Some aspects of training, e.g. alternative careers, would benefit from a more centralized teaching organization. Recruitment of additional trainees is critical but dependent on additional resources, especially in light of dwindling federal grant support, which is the primary source of funding for our program.

9. Response to Previous Program Reviews

Click here to respond after at least one Academic Program Review has been completed.

N/A

10. Signature and Submission

The preparer's email address below acts as a signature verifying the report is complete and ready for submission.

Preparer's email address: *duvoisin@ohsu.edu*

Date Submitted: *March 6, 2013*

Physiology and Pharmacology Graduate Program Faculty and Primary Affiliations

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*Steering Committee, **Department Chair

The PH2 Graduate Program is a part of the **Program in Molecular and Cellular Biosciences**(PMCB) at OHSU. Didactic training includes the **PMCB Core Curriculum**, including CONJ 667: Organ Systems, and CONJ 669 Chemical Biology, plus two PH2 core courses in the principles of Pharmacology. In addition to these core courses, students are required to take an additional 8 credit hours of elective coursework and are able to select from any courses offered at OHSU. Students with a very specific interest can generate an elective in collaboration with a faculty member and register for PHPH 605: Reading and Conference: Topics in Physiology and Pharmacology. This flexibility helps students individually tailor their training depending on their interests and the courses are selected with the advice of the student's mentor.

The PH2 training program provides access to state-of-the art analytical instrumentation as well as in vitro and in vivo experimental models and prepares graduates to conduct independent research in an academic or industrial setting. In addition, the PH2 Graduate Program has a weekly Research Colloquium. This forum provides an opportunity for active participation in research discussions about recent findings, emerging new concepts, research strategies, and methodologies with scientists outside their own research laboratories.

For a current listing of course offerings, see the Graduate Medicine Basic Sciences Course Schedule at the **Registrar's Office**.

ACADEMIC GUIDELINES AND EXPECTATIONS FOR Ph.D. STUDENTS

Required Courses

PMCB Core Curriculum(First Year: Fall, Winter, Spring), including:

Course Name	Course Number	Credits	When
Organ Systems	CONJ 667	3	First Year: Spring
Chemical Biology	CONJ 669	3	First Year: Spring
Research Focus Group/Journal Club	PHPH 606	1	First Year: Spring; All Other Years: Fall, Winter, Spring
Seminar Series	PHPH 607	1	All Years: Fall, Winter, Spring

Second Year: Usually students take two required pharmacology courses and begin electives.

Course Name	Course Number	Credits	When
Pharmacokinetics	PHPH 617	2	Second Year: Fall
Receptor Pharmacology	PHPH 618	2	Second Year: Winter

Common Elective Courses

Course Name	Course Number	Credits
Readings and Conference: Topics in Physiology or Pharmacology	PHPH 605	2-3
Advanced Organic Synthesis	PHPH 630	4
Neurophysiology & Pharmacology of Pain	PHPH 614	2
Topics in Autonomic Physiology & Pharmacology	PHPH 619	3
Ion Channels and Genetic Diseases	PHPH 622	2
Cellular Neurophysiology	NEUS 624	4
Cellular and Molecular Neurobiology	NEUS 625	4
Topics in Neuroendocrinology	NEUS 633	3
The Visual System	PHPH621	2

CONJ 650: Practice & Ethics of Science

Term: Fall

Credits: 1

Course Directors: Bruce Schnapp and Robert Duvoisin

Required for all incoming graduate students. This course is designed to provide an introduction to basic principles of scientific conduct and practice for graduate students pursuing careers in biomedical research. Specific topics include: laboratory safety, professional standards, use of laboratory animals and human subjects, research funding and career development. Course material will be presented primarily in the form of lectures and panel discussions, with opportunities for student discussion.

CONJ 661: Structure and Function of Biological Molecules

Term: Fall

Credits: 4

Course Director: Dave Farrens

This course is designed to provide students with an in depth understanding of macromolecular structure/function including: 1) protein structure; 2) thermodynamic considerations of protein folding; 3) nucleic acid structure and topology; 4) the functions of proteins as enzymes and in macromolecular assembly, including quantitative analyses of ligand binding phenomena and enzyme kinetics; 5) structural and biochemical properties of lipids, membrane assembly and dynamics, and characteristics of membrane proteins; and 6) the principles of bioenergetics and metabolism. Prerequisites: Undergraduate organic chemistry and biochemistry.

CONJ 662: Genetic Mechanisms

Term: Fall

Credits: 4

Course Directors: Doris Kretschmar & Betsy Ferguson

This course is designed provide students with a deeper understanding of the mechanisms that underlie inheritance. The course will rely primarily on lectures and literature reading and a text will be suggested for any remediation the students might feel that they need. The lectures will cover prokaryotic transmission genetics and gene regulation emphasizing genetic approaches. They will also include discussions of mitosis and meiosis, DNA recombination (homologous, non-homologous and site specific mechanisms), mutagenesis, DNA repair, genetic dissection of biological processes (e.g., design of mutant screens, complementation and epistasis analysis, suppression, and synthetic enhancement in various model systems), developmental and cancer genetics, gene therapy, and population/quantitative genetics. Prerequisites: Undergraduate genetics or equivalent.

CONJ 663: Bioregulation

Term: Winter

Credits: 4

Course Directors: Amanda McCullough and Mitchell Turker

This course aims to develop a deeper understanding of gene regulation in eukaryotes and prokaryotes. Lectures will be based on textbook material and selected papers from the current literature, and will cover all aspects of gene regulation including: genome organization, chromatin structure, transcriptional regulation, RNA and protein metabolism, DNA synthesis, and cell cycle regulation. An important goal of this course is to provide insight into how research methods have been applied to achieve our current understanding of these processes.

CONJ 664: Cell Structure and Function

Term: Winter

Credits: 4

Course Directors: Peter Mayinger and Caroline Enns

This course is designed to introduce students to key aspects of cell structure and function as well as the macromolecular components and physiological mechanisms that underlie structure and function of cells. Lectures will focus on recent scientific discoveries involving: i) organelle biogenesis structure and function, ii) intracellular compartmentation and protein/vesicular transport, iii) cytoskeleton architecture,

cell motility and adhesion, iv) mechanisms of membrane transport and excitability, v) molecular mechanisms of signal transduction. In addition to addressing current scientific questions in cell biology, efforts will be made to familiarize students with recent technical advances in molecular, biochemical, microscopic, spectroscopic and electrophysiological techniques that have led to the explosive growth of this field.

CONJ 665: Development, Differentiation and Cancer

Term: Spring

Credits: 3

Course Directors: Marcel Wehrli and Molly Kulesz-Martin

Orchestration of development requires precise timing, spatial coordination, and reciprocal signaling between cells to result in proper tissue generation and remodeling. Disruption of these normal cellular homeostatic mechanisms occurs in cancer and in many cases has led to discoveries about the function of normal genes and interacting signaling pathways in development. In this class, mechanisms of growth and development of higher eukaryotes are covered, including important signaling events, pattern formation and cell movements resulting in the fully differentiated tissues and organisms. Consideration will be given to how stem cell population are positioned and maintained, as well as mechanisms that underlie the maintenance and function of individual tissues in the fully developed organism. Moreover, aberrations in these events are covered relative to their underlying contributions to the etiology and progression of specific cancers.

CONJ 667: Organ Systems

Term: Spring

Credits: 3

Course Directors: Owen McCarty

This course provides an introduction to the interactions between cells, tissues, whole-organism mammalian physiology, and immunology. During this course, the student is expected to gain a better understanding of the interplay and communication that coordinates cells into organ systems and complex organisms. Different biological systems including the hypothalamic-pituitary axis, nervous system, cardiovascular regulation, reproductive system, and the immune system will be discussed emphasizing how these systems interact and how physiological and immunological homeostasis is maintained or challenged under conditions of disease and stress.

CONJ 668: Molecular Biophysics and Experimental Bioinformatics

Term: Spring

Credits: 3

Course Directors: Ujwal Shinde, Klaus Früh

This course will cover the range of research using problem-based approaches. Topics will include 1) molecular biophysics: Introduction to the analysis of biomolecules in solution. Emphasis will be placed on widely used contemporary techniques, especially spectroscopic methods used for structural and dynamic studies. These lectures will provide a basis for the subsequent lectures in the class. 2) experimental bioinformatics: Theory of key bioinformatics tools and algorithms, their applications towards databases, data analysis and mining, alignments, 3-D structure prediction/visualization and genome analysis. Theory and application of approaches to analyze gene and protein expression using high-throughput methods.

CONJ 669: Principles of Chemical Biology

Term: Spring

Credits: 3

Course Directors: Francis Valiyaveetil, Xiangshu Xiao

This is a survey course designed to introduce students to the theory and practice of chemical biology - a modern merger of medicinal chemistry and pharmacology. The first two weeks will focus on review of the appropriate principles in organic chemistry and pharmacology needed for understanding the future topics. Next, various strategies for designing, discovering, and optimizing small molecule probes will be presented with an emphasis on the central principles of targeting biological macromolecules. This will lead into detailed discussion of the various important biological targets for small molecule intervention and drug design. The course will conclude with a discussion of detailed case histories of the discovery and development of selected drugs.

PHYSIOLOGY & PHARMACOLOGY
ACADEMIC GUIDELINES AND EXPECTATIONS FOR Ph.D. STUDENTS
(Years 2+)

The following pages outline the Guidelines governing all students electing to pursue the Ph.D. in the Graduate Program of the Department of Physiology and Pharmacology (PPH). All students must complete the requirements described for the Program in Molecular and Cellular Biosciences (PMCB) and the Graduate Council of the Oregon Health and Science University (OHSU) School of Medicine.

The Ph.D. program is organized as follows:

- Year 1:** Complete PMCB requirements
- Year 2:** Complete the PMCB Qualifying Examination
 Undertake the research leading to the Ph.D. thesis
 Complete required and elective courses
 Attend and participate in Departmental Seminars and a journal club of choice as approved by Program Director
- Year 3+:** Create a Thesis Advisory Committee
 Continue research leading to the Ph.D. thesis
 Attend and participate in Departmental Seminars and a journal club of choice closest to thesis work as approved by Program Director
- Year 5:** Attend Ethics refresher course (e.g. CONJ 607)

REQUIRED GRADUATE COURSES IN PHYSIOLOGY AND PHARMACOLOGY

*CON 667 Organ Systems	3 credits
OR	
*CON 669 Chemical Biology	3 credits

Fall Term Year 2:

PPH 617: Pharmacokinetics	2 credits
XXXX 606 Journal Club	1 credit
PPH 607 Departmental Seminar	1 credit
PPH 601 Research	8-12 credits
Elective courses	0-4 credits
<hr/> Second Year Fall Term Course Total:	16 credits

Winter Term Year 2:

PPH 618 Receptor Pharmacology	2 credits
XXXX 606 Journal Club	1 credit
PPH 607 Departmental Seminar	1 credit
PPH 601 Research	10-12 credits
Elective Courses	0-4 credits
<hr/> Second Year Winter Term Course Total:	16 credits

Spring Term Year 2:

XXXX 606	Journal Club	1 credit
CON 667 OR CON 669		0-3 credits
<i>(Taken in Year 2 if not selected during Year 1 as part of the PMCB required courses).</i>		
PHPH 607	Departmental Seminar	1 credit
PHPH 601	Research	7-14 credits
	<u>Elective Courses</u>	<u>0-4 credits</u>
	Second Year Spring Term Course Total:	16 credits

Summer Term Year 2:

CON 605	PMCB Qualifying Exam	8 credits
PHPH 601	Research	8 credits
	Second Year Summer Term Course Total:	16 credits

Terms after Admission to Candidacy:

XXXX 606	Journal Club	1 credit
PHPH 607	Departmental Seminar	1 credit
PHPH 601	Research	14 credits
	Course Total	16 credits

Thesis Defense – Term Requirement:

PHPH 603	Dissertation	16 credits
Journal club, seminar series and research waived during final term		

A minimum of 135 credits are required for the Ph.D.**PHPH SPECIFIC COURSE REQUIREMENTS:**

Students are required to:

- Register for and attend a 606 Journal Club Years 2 through the duration of the program (at least 9 credits required).
- Register for and attend the Departmental Seminar, PHPH 607 Years 2 through duration of program (total of at least 9 credits required). Students are required to give at least one 30-minute presentation on their research once per year in all post-qualifying years as part of the PHPH Graduate Student Seminar Series.
- Register for and complete CON 667 or 669 during the spring of years 1 or 2.
- Students are required to take two PHPH courses:

i. **PHPH 617:** Pharmacokinetics (2 credits, fall term) This course will provide students with an introduction to drug absorption, distribution, metabolism, and elimination.

ii. **PHPH 618:** Receptor Pharmacology (2 credits, winter term). This course will provide students with an introduction to the molecular mechanisms of drug action and the principles of drug – receptor interactions.

- e. Students wishing to be excused from taking a required course may petition the PH2 Steering Committee stating their reasoning. A majority vote of the Steering Committee is required for approval.
- f. Students must receive a grade of A or B in all required courses. Students not receiving an A or B in a required course must repeat that course the following year and failure to do so constitutes grounds for termination from the program. The required courses in PHPH for which this rule applies are PHPH 617 and 618.
- g. The grade of Incomplete is reserved for circumstances beyond the control of the student, (e.g. illness) preventing completion of the course requirements by the end of the fall term AND it is possible to complete the requirements within the subsequent term.
- h. Students failing a semester of research credits, (i.e. receives an 'NP- No Pass' on research) are immediately placed on academic probation. To return to good standing, the student must obtain a passing grade on the next term of Research (and all subsequent terms). Failure to do so constitutes grounds for termination from the program.

Pre-qualifier Students:

Students are required to notify and meet with their advisor immediately upon receiving an NP grade on Research. The advisor will suggest a course of action for correcting research performance.

Candidate Students:

After advancing to candidacy, students receiving an NP grade in Research will schedule a Thesis Advisory Committee meeting to take place within two weeks of receipt of the NP grade in Research. The Mentor and Thesis Advisory Committee will suggest a course of action that the student must follow in correcting research performance.

The courses PHPH 606 Journal Club and PHPH 607 Seminar require documentation of attendance in order to be considered for the grade of 'Pass.' Candidate students and their advisor may petition the PHPH Program Director to substitute another formal journal club. Only excused absences (e.g. for participation at scientific conferences, or illness) are allowed. A graduate student with more than one unexcused absence will receive a failing grade of 'No Pass' and will be placed on immediate academic probation. The student must receive a 'Pass' the subsequent term and every term thereafter.

Following receipt of the first 'No Pass,' a pre-qualifying exam student must immediately meet with their TAC advisor; a post-qualifying exam student must immediately meet with their thesis advisory committee. A plan for insuring the attendance goal for the next term should be designed.

Two NP grades results in the immediate initiation of dismissal proceedings from the PHPH Graduate Program.

ELECTIVE COURSES

A total of **two elective courses** from any program are required to be eligible for the degree. Students are strongly encouraged to complete the elective courses during their second year. Courses are listed in the course catalogue and graduate students are encouraged to speak to their mentor and/or graduate program director when considering other courses, as electives are subject to approval by the mentor and graduate director. The following are common electives taken by graduate students in PHPH.

Some courses are offered every other year; TBA courses are offered when there is sufficient student interest.

PHPH 614: Neurophysiology and Pharmacology of Pain (2 credits, TBA) Course focused on functional organization of nociceptive pathways.

PHPH 619: Topics in Autonomic Physiology & Pharmacology (3 credits, TBA) This advanced topics course surveys the function and regulation of the autonomic nervous system, and the basis for autonomic drug actions. Topics can include autonomic control of cardiovascular function, energy balance, thermoregulation, respiration, and others.

PHPH 621: The Visual System (2 credits, Fall) This course alternates between Cellular and Developmental Biology of the Visual System in odd numbered years, and Neuroanatomy and Neurophysiology of the Visual System in even numbered years.

PHPH 622: Ion Channels and Genetic Diseases (2 credits, TBA) The course introduces the basic concepts of ion channel function in the context of the origin of inherited diseases and consider how alterations in channel function produce pathophysiological states, such as cystic fibrosis, myotonias and cardiac arrhythmia and the potential bases for therapeutics and directed drug development.

PHPH 630: Advanced Organic Synthesis (4 credits, Spring) This course deals with advanced organic synthesis methods and synthetic planning and execution strategies for complex target compound synthesis. The goal of the course is that students will emerge with a practical understanding of how to apply the tools of organic synthesis to their research.

Ph.D. Thesis Advisory Committee Guidelines

Within **three months** of passing the Ph.D. candidacy exam, the advisor and student must submit a suggested thesis advisory committee to the Graduate Program Director for approval. The following guidelines for the composition of the committee should be followed.

- A. The committee should include the advisor and at least 3 other faculty members who represent expertise relevant to the student's thesis project.
- B. All members of the advisory committee must be members of the OHSU Graduate Faculty.
- C. At least one member other than the advisor must be experienced in advising a Ph.D. thesis student; that is, he/she must have been a mentor for at least one student who has successfully completed their Ph.D.
- D. The student's mentor will not serve as the Chair of the committee. The responsibilities of the chair are:
 - a. To schedule and coordinate the meetings
 - b. To submit a completed Thesis Advisory Committee meeting summary to the GSC. Copies of the summary will be distributed to the student and the advisory committee members and the Chair of the Graduate Education Committee and a copy will be deposited in the student's file in the Department Office.
- E. The student must meet at least once per year with the Thesis Advisory Committee. Following completion of the third year, the student should meet more frequently (every six months) on the recommendation of his/her committee. One week prior to each committee meeting, the student should submit a summary of research accomplished and proposed to committee members. A copy should also be submitted to the Graduate Student Coordinator.

F. The Steering Committee will be responsible for monitoring adherence to these guidelines.

Preparation and Submission of Thesis:

- A. All instructions and guidelines adopted by the Graduate Council By-Laws shall be followed carefully.
- B. The formatting of the thesis should comply with the standards set out by the SOM graduate council:
<http://www.ohsu.edu/ohsuedu/academic/som/graduate/upload/Guidelines-8-2008-rev-4-2009.pdf>
- C. In addition, the Department of Physiology and Pharmacology requires the following actions in order for the student to present their dissertation:
 1. The student must meet with their Thesis Advisory Committee and receive permission from the entire committee to begin writing their thesis.
 2. The student will work with their mentor to write the thesis, and re-write as necessary, prior to the committee receiving the draft thesis.
 3. The Graduate Student Coordinator will complete a Request for Oral Thesis Examination Form and submit it to the PH2 Program Director for approval. The PH2 Program Director will then forward it on to the Associate Dean of Graduate Studies. The submission of this form to the Dean's Office must be at least four weeks prior to the date of the exam. It is recommended that at this time, the student submit a copy of their thesis to the Thesis Examination Committee. The student must submit their thesis no later than two weeks before the examination in order for the exam to take place as scheduled.
 4. The Thesis Advisory Committee will submit to the Graduate Student Coordinator a list of suggested members for the Thesis Examination Committee along with a suggestion for the Thesis Examination Chairperson. The Thesis Examination Committee should include at least one member who was not on the Thesis Advisory Committee, at least one member who is not a member of the PH2 Program, and at least one {two?} member who has a primary appointment in the Department of Physiology and Pharmacology.
 5. The Thesis Advisory Committee Members shall review the thesis prior to the defense and return it to the student with their comments and guidelines for revision. The comments should be returned to the student no later than the oral defense date. Some revision is normally required.
 6. After the post-defense corrections and required revisions have been made, the student will re-submit the thesis to their Thesis Advisory Committee for a final review process that is to be completed within two weeks of committee members receiving the thesis.
 7. All members of the Thesis Advisory Committee must sign the Thesis Approval Form.

MISCELLANEOUS

Grievances:

The procedure for handling grievances is outlined in the OHSU Graduate Studies Handbook.

Extracurricular employment:

The Department of Physiology and Pharmacology considers employment as a graduate student in the Ph.D. program to represent full time employment. Students are strongly discouraged from seeking outside employment. Any student wishing to pursue outside employment must submit a written request to the TAC advisor and/or mentor, the Director of Graduate Education, and the Chairman of

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Physiology and Pharmacology. The student must receive written authorization from the above individuals prior to accepting employment.

Masters Degree

The OHSU Department of Physiology and Pharmacology does not routinely offer a Masters degree. Under special circumstances, a student may petition the Graduate Steering Committee in writing to allow the student to complete a terminal Masters degree. Approval of this request by the Graduate Steering Committee must be unanimous. A written thesis and oral thesis defense examination are required to earn a Masters degree. A minimum of 80 completed credit hours is required for the Master's degree. A thesis advisory committee is required, the composition of which is in keeping with section IV C of these guidelines.

Physiology and Pharmacology

Rubric for Student Assessment

Learning Activities	A-Level Work	B-Level Work	C-Level Work	Failing Work
Coursework	Student demonstrates full knowledge of the material (more than required) and can easily explain and elaborate.	Student is mostly at ease with content, but fails to elaborate, make connections, or extend the knowledge beyond the immediate context.	Student is uncomfortable with information, errs in some important facts or concepts, and is able to answer only rudimentary questions.	Student does not have grasp of information; commits substantial errors of fact or concept; cannot answer questions about subject.
Annual student seminar and Dissertation (pass/fail- A,B are passing)	Thesis was clear, student had data (including appropriate controls) to reinforce key claims; many indications of integration of primary literature into the experimental design and interpretation; the presentation was organized and unfolded in a logical way; writing style is clear, grammar and syntax correct.	Thesis was mainly clear, student usually had data and controls to support key claims; some integration of primary literature into the experimental design and interpretation; the presentation was mostly organized and unfolded in a logical way but had occasional lapses, writing style was mostly clear; grammar and syntax usually correct. <i>(a dissertation in this category likely requires substantial revision)</i>		Thesis was unclear, student provided insufficient data to reinforce key claims or was missing important controls; very few indications of integration of primary literature into the experimental design and interpretation; the presentation was disorganized and did not unfold in a logical way; writing style often contained errors of grammar and syntax.
Participation in seminars, journal clubs, lab meetings, other venues	Timely, appropriate and substantive comments; formulates input for others that helps drive their thinking deeper and clearer; thoughtful and reflective; responds respectfully to other students' remarks; provokes questions and comments from the group.	Volunteers comments, most of which are appropriate and reflect some thoughtfulness, some of their input leads to other questions or remarks from others. But some of the input lacks depth, and only occasionally assists others in refining their thinking.	Struggles but participates, occasionally offers a comment when directly questioned, may simply restate questions or points previously raised, may add nothing new to the discussion or provoke no responses or question	Does not participate and/or only makes negative or disruptive remarks, comments are inappropriate or off topic