A STUDENT GUIDE
TO THE
M.D./PH.D. PROGRAM

SAINT LOUIS UNIVERSITY
SCHOOL OF MEDICINE

2024 – 2025
ACADEMIC YEAR

TABLE OF CONTENTS

General Program Information:

Specific Curricula for Earning a Ph.D. degree in:

TRAINING

CURRICULUM TIMETABLE AND IMPORTANT MILESTONES

M.D. YEAR ONE

April (Before starting M.D. program): Choose first mentor and lab rotation.
Early June: Arrive in St. Louis to register, complete finance and health care forms, obtain ID and parking pass, locate housing, and begin first rotation (~ 7 weeks).
Early August: Begin M.D. curriculum Year 1.
December: Choose second mentor and lab rotation.
May: Complete all M.D. year 1 exams and begin second lab rotation (~ 7 weeks).

M.D. YEAR TWO (first semester)

Early August: Return to M.D. classes.
September: Select Ph.D. mentor and department. Complete all M.D. year 2 exams and study for USMLE Step 1
October: Request leave of absence from medical school effective January 1.
December: Take Step 1.
January: Start Ph.D. Program as full time Ph.D. student.

PH.D. YEARS

1. Complete all Graduate Education Requirements.
2. Submit at least one individual extramural pre-doctoral fellowship application.
3. Present research results at regional or national meetings.
4. Prepare and submit research manuscripts to peer-reviewed jou u,a5(pl.)]TJETQq0.00000912 0 612

TRANSITIONAL CLERKSHIPS

The M.D./Ph.D. Program Steering Committee at SLU concurs with the national recommendation that trainees complete non-graded transitional clerkships after completing their Ph.D. degrees and before commencing their required core clerkships. This policy has evolved because at least three years have elapsed since such trainees completed preclinical M.D. training and USMLE Step 1 and learned the skills necessary to perform a basic history and physical exam on patients. Thus, transitional clerkships provide a 2 – 3-week period of adjustment to the schedule, expectations, content, and

ACADEMIC STANDARDS AND PERFORMANCE REQUIREMENTS

All M.D./Ph.D. trainees are evaluated throughout the academic year to ensure their adequate performance in all required coursework and research activities. At least yearly, trainees meet privately with the Program Director to review their updated *curriculum vitae* (CV) and their individual development plans (IDPs) for the current academic year. Funded trainees must pass all courses, electives, and research rotations. Students who do not maintain these performance standards must meet with the Program Director to develop a revised IDP or remediation plan and are placed on academic probation for at least the next semester. Performance is deemed improved, and probationary status may be removed, if the student passes all major courses in the next semester. Students who do not improve to these standards in the next semester are interviewed by the Program Steering Committee. The Committee may decide to maintain a trainee's probationary status for another semester or to permanently revoke a trainee's tuition waiver and stipend support. Trainees who enter the program with non-funded M.D./Ph.D. status are subject to these same academic standards. Further, it is strongly recommended that non-funded trainees strive to rank highly among their medical school peers to be considered competitive applicants for any funded positions that are identified by the Program Steering Committee.

TUITION WAIVERS AND STIPENDS FOR M.D./PH.D. STUDENTS

In compliance with institutional policy at Saint Louis University, the tuition costs of funded M.D./Ph.D. trainees enrolled in M.D. Years 1 and 2 are paid in the form of loans, whose repayment is waived upon completion of the Ph.D. degree. When trainees who have completed their Ph.D. degrees return to the M.D. program,

THE M.D./PH.D. CURRICULUM IN BIOCHEMISTRY AND MOLECULAR BIOLOGY

Students accepted for the M.D./Ph.D. program are subject to the regulations and residency requirements of the Office of Graduate Education and the Medical School. Students are also required to meet the course requirements in the Department of Biochemistry & Molecular Biology. However, courses taken in the School of Medicine are accepted toward fulfillment of course requirements for the Ph.D. degree. These include 30 credits for coursework in M.D. Phases 1 and 2 (see p. 7). After successfully completing the M.D. Phases 1 and 2 curricula and USMLE Step 1, the M.D./Ph.D. trainee begins studies toward the Ph.D. in Biochemistry and Molecular Biology, commencing on or about May 1 of their second full year at SLU.

REQUIRED EXAMINATIONS

Each M.D./Ph.D. trainee in the Department of Biochemistry & Molecular Biology must pass written and oral examinations based on a research proposal written by the student in the form of an NIH Predoctoral Fellowship application (NRSA F31, without a budget). This proposal is written on the research topic to be undertaken for the Ph.D. degree, and is reviewed by the **Preliminary Exam Committee**, consisting of the student mentor (non-voting member), two course directors, BMB PhD Program Director, and two committee

THE PHILIP AND LILLIAN KATZMAN SCHOLARSHIP FUND

A second point of entry to the M.D./Ph.D. program follows the second year of the traditional medical school curriculum. Medical students who have strong scholastic

THE M.D./PH.D. CURRICULUM IN MOLECULAR MICROBIOLOGY AND IMMUNOLOGY

The Department of Molecular Microbiology and Immunology (MMI) offers a program in molecular microbiology and immunology leading to the Ph.D. degree. The goal of the MMI graduate program is to graduate exceptionally well-trained researchers who are prepared for a career in academic science or biotechnology. Research in the Program is diversified. Areas of research emphasis include cell and molecular biology, virology, immunology, cancer therapy and antiviral drug development. Graduate training in the Program includes advanced coursework, training in scientific writing and oral presentation skills, and performance of original biomedical research leading to the Ph.D. Dissertation.

Students in the M.D./Ph.D. program select a dissertation mentor in the MMI Graduate Program following laboratory rotations as part of the M.D./Ph.D. program. Although each Ph.D. candidate has a primary Ph.D. research mentor plus a dissertation committee of at

Candidacy Examination Committee) of the Graduate Faculty which includes the student's mentor as Chairperson plus four other faculty members appointed by the Graduate Program Directors, two of whom may have primary appointments outside of MMI if their scientific expertise is felt to be beneficial to the student. The Candidacy Examination will be taken for the first time before the end of summer session of the second year of studies in the MMI program.

The goals of the Candidacy Examination are to determine whether the student can formulate, test, and evaluate hypotheses at a level suitable for a Ph.D. scientist, and to evaluate the suitability of the student's proposed dissertation project. A pass in the Candidacy Examination requires a favorable vote from the majority of the Candidacy Examination Committee on both the Oral and Written Components. If the student fails either component, the Candidacy Examination Committee plus the Associate Provost for Graduate Education must approve a second attempt on the failed component. The

THE M.D./PH.D. CURRICULUM IN PHARMACOLOGY AND PHYSIOLOGY

The Department of Pharmacology and Physiology provides a Ph.D. program that trains students to be independent investigators in the interrelated disciplines of physiology and pharmacology. The department also contains the Institute for Translational Neuroscience. The overall goals of the Ph.D. program are to instill enthusiasm for discovery and the

committee members to clearly identify and remediate its deficiencies. Revision can be repeated twice before the student may be dismissed from the program. Once the written proposal is approved, the committee chairperson schedules an oral defense within two weeks. Following a 15-20 min PowerPoint presentation of the proposal by the trainee, committee members question the trainee both on the proposal's details and its broader scientific context. The oral exam is not a comprehensive test of all postgraduate coursework but probes the trainee's knowledge in scientific areas considered essential for a full understanding of the research topic. Committee members vote privately on the acceptability of the oral defense. Students that fail this process may be granted an additional opportunity to pass.

Dissertation Examination

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

The dissertation committee meets at least twice a year to evaluate, advise, and approve of progress being made. It is expected that students will submit completed segments of their dissertation research to peer-reviewed journals during their training.

When sufficient research progress has been determined, the Dissertation Committee will approve the writing up of the dissertation. Upon completion and submission of this document, the candidate will meet with the committee to conduct a private defense of their dissertation. The students will present their results, and answer any remaining questions asked by the committee. The candidate will then be excused from the meeting, after which the committee will discuss their evaluations of the candidate and complete the official results form. If the committee requires major revisions of the dissertation following the defense, the ballot form will not be completed until every committee member is satisfied. A unanimous positive evaluation of the dissertation committee is necessary for final approval of the dissertation.

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

SUMMARY OF COURSEWORK REQUIRED

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

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

· PPY-5110 Introduction to Pharmacology and Drug Discovery

· PPY-5140 Fundamentals of Effective Grant Construction

· PPY-6800 Pharmacology and Physiology Departmental Seminar

· PPY-6900 Pharmacology and Physiology Colloquium Journal Club

PPY-5110 Introduction to Pharmacology and Drug Discovery (1 credit). Taught in the fall semester, this course covers the topics of: binding theory; concepts of ligand efficacy and potency; partial agonists and antagonists; allosteric modulators; quantitative pharmacology (technology & statistical tools); biotransformation; drug pharmacokinetics; basic principles of medicinal chemistry; and structure/function relationships in drug

design. In class time includes two sessions of problem-based practice and review; two in-class exams comprise the final course grade.

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

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

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

PPY-6990 Dissertation Research (0 – 6 credits per semester; 12 credit hours required for graduation).

Responsible Conduct of Research. This is non-credit based but training in the responsible conduct of research is required of all Ph.D. students at Saint Louis University and by the National Institutes of Health.

THE M.D./PH.D. CURRICULUM IN HEALTH CARE ETHICS

The Department of Health Care Ethics offers a Ph.D. program in Health Care Ethics for the M.D./Ph.D. trainee. A minimum of 48 credits is required for the Ph.D. This ordinarily includes 33 didactic credits, three credits of practica, and 12 credits of dissertation research. The Department accepts 7 credits from Phase 1 and Phase 2 of the M.D. curriculum; the required courses HCE-6110 Introduction to Medicine for Ethicists (1 credit), one Topics and Scholars elective (3 credits), and HCE 6150 Practicum (3 credits) are waived based on medical school coursework in Patient, Physician, and Society I and II, and in Fundamentals of Biomedical Science. The 0-

will not provide positive feedback on how to fix the flaws. Students will have one full week to revise and resubmit the essay. Resubmitted essays will be graded as pass or fail.

• Fail. Essays will be failed if they contain fatal flaws, problems that cannot be remedied within the current framework for the essay. Students who fail will retake the written exam, on a new topic, the following semester. . The new essay will be graded using the same three grading options as the original submission (pass, revise and resubmit, or fail). In the event that the exam is failed a second time, the student will be ineligible to progress further in the PhD program. After the student has passed the written examination, an oral examination with the Board will take place, lasting 90 minutes.

The purpose of the oral examination is to assess the student's "integration of knowledge across the discipline." In particular, students are expected to demonstrate mastery of the PhD curriculum. To this end, as part of his or her application to the oral examination, the student must provide the Board with a comprehensive exam reading list comprised of all required readings indicated in the syllabus of each course completed in the PhD program.

After the oral exam, the Board will provide a grade of "Pass with Distinction" or "Pass" or "Fail". Students will not be told the number of pass or fail grades received. If students pass the written exam but fail the oral exam, the oral exam may be taken again. Ordinarily, students may take the oral exam twice with the permission of the Associate Provost for further , a [(e)-3(ve ET9)-1-3(r)81(rse)4ssr

SUMMARY OF COURSEWORK REQUIRED:

Pre requisites: MD/PhD students must complete a graduate level Foundations of Ethics and applied ethics course. Students may satisfy this requirement as a directed reading course during the summer between the first and second years of medical school. Applicants to the Health Care Ethics program must provide a sample of writing in health care ethics that demonstrates the ability to do doctoral level coursework in the field.

Required PhD Coursework:

HCE 6010: Methods in Philosophical Ethics (3 credit hours): A study of the methodological issues in philosophy that concern the nature and justification of fundamental ethical norms.

HCE 6020: Methods in Religious Ethics (3 credit hours): A study of the hermeneutical

significance of different religious methods in religious ethics and a critical analysis of the

hermeneutical implications of these methods for the development of ethical theory.

HCE 6040: Interdisciplinary Methods (3 credit hours): A study of the scope, concerns and methods of interdisciplinary research in Health Care Ethics.

One of the following: HCE 6050 Philosophical Foundations in Ethics

HCE 6060 Psychosocial Foundations in Ethics

HCE 6070 Foundations of Catholic Morality

HCE 6120: Bioethics and the Law (2 credit hours): This course examines legal issues in health care decision making in areas typically considered a part of bioethics.

HCE 6130: Clinical Ethics (3 credit hours): Fundamental skills and core knowledge essential for clinical ethics consultation, integrating process and outcomes to identify,

THE M.D./PH.D. CURRICULUM IN HEALTH & CLINICAL OUTCOMES RESEARCH

Saint Louis University's Department of Health and Clinical Outcomes Research, School of Medicine (HCOR) is a scholarly community of faculty, staff, and students committed to strengthening the delivery and outcomes of medical care through education and training programs, innovative research, and consulting services. We are engaged in state-of-the-science evaluations of the services, medications, devices, and diagnostics that can optimize individual health and well-being. HCOR is also committed to translating research into policies and practices to improve health outcomes across

prior to the exam. Grading of the written exam will be conducted by a committee of three faculty members. The author of the exam and one additional reader will independently grade the exam as Pass/Fail without any consultation and provide their grades to the Associate Director. In the event of a tie, the third reader will independently grade the exam and break the tie. In the event that the written exam is failed, the student may re-take the failed portion of the exam the following semester following the same procedure. In the event that the exam is failed a second time, the student will be ineligible to progress further in the Ph.D. program.

The purpose of the oral examination is to focus on the proposal of the dissertation. The oral exam presentation consists of a statement of the problem, literature review, and proposed research design for the dissertation. The exam is structured to assess the student's comprehensive knowledge of literature in the field of study, the ability to integrate and synthesize information across the discipline, and to design an appropriate analytic approach that expands the current body of knowledge. The oral exam cannot be taken until successful completion of the written exam. Once the student and his/her mentor have determined that the student is sufficiently prepared to take the oral exam, he/she will work to schedule the exam with his/her committee. The student is also responsible for reserving a room large enough to accommodate the committee and observers. In addition to the three committee members, the Associate Director will arrange for two at-large members to join the committee for the exam. After the oral exam, the committee will provide a grade of "Pass" or "Fail". If the student fails the oral exam, the oral exam may be taken again according to specifications of Graduate Education. If the student does not pass the second oral examination, he/she will no longer be allowed to progress through the program.

Students who have passed both the written and oral examinations are expected to request a dissertation director and two additional members to be apreM85(e)-3(st)1s(e)-to

Prerequisites: In addition to the 9 credits transferred from M.D. Phases 1 and 2 (see above), M.D./Ph.D. trainees must complete a graduate-level inferential statistics course. They may satisfy this requirement during the summer between the first and second years of medical school by taking ORES 5010 Introduction to Biostatistics for Health Outcomes Research.

Required Courses during Ph.D. Training Years:

Curriculum Requirements

The M.D./Ph.D. program includes 50 credit hours:

29 credit hours of coursework, drawn from required courses (23 credits) and electives (6 credits)

12 credit hours of dissertation research

9 credit hours accepted from MS1/MS2 of the M.D. curriculum

Required Courses (23 required credit hours)

HDS.5310 Analytics and Stats Programming (3)

ORES 5160 Data Management (3)

ORES 5300 Foundations of Outcomes Research I (3)

ORES 5320 Scientific Writing & Communication (3)

ORES 5430 Health Outcomes Measurement (3)

HDS 5320 Inferential Modeling (4)

PHS 6060 Applied Research Skills II: Grant Writing (3)

Elective Courses (Students choose 6 credit hours)

ORES 5400 Pharmacoeconomics (3)

ORES 5410 Evaluation Sciences

ORES 5260 Pharmacoepidemiology (3)

ORES 5440 Comparative Effectiveness Research (3)

HCE 6120 Bioethics and the Law (3)

A representative of the Office of Graduate Education is assigned to attend each presentation to ensure that the examthed co2 re

MD PhD Steering Committee

Member	Department	Term
Daniel Hawiger, M.D., Ph.D.	Molecular Microbiology & Immunology	7/23-6/25
Vincenza Cifarelli, Ph.D	Pharmacology & Physiology	7/23-6/25
Leslie Hinyard, Ph.D.	Health &Clinical Outcomes Research	7/23-6/25
Paula Buchanan, Ph.D.	Health &Clinical Outcomes Research	7/23-6/26
Ryan Teague, Ph.D.	Molecular Microbiology & Immunology	7/23-6/26
Yuna Ayala, Ph.D.	Biochemistry & Molecular Biology	7/23-6/26
Kyle Karches, Ph.D.		