

PH.D. GRADUATE PROGRAM FOR STUDENTS IN THE DEPARTMENT OF MEDICINAL CHEMISTRY AND MOLECULAR PHARMACOLOGY

Introduction

The Department provides unparalleled opportunities for students to become expert scientists in areas that lie at the interface of chemistry, biology, and medicine. Graduate students are admitted into the Department of Medicinal Chemistry and Molecular Pharmacology for full-time study towards the Ph.D. degree with the expectation that they will gain the ability to perform across discipline boundaries while focusing on the development of skills in one or more specialized areas. The following areas of research specialization are available within the Department:

1. Medicinal Chemistry & Chemical Biology
2. Cancer Research
3. Molecular & Cellular Biology
4. Molecular Pharmacology
5. Neuropharmacology, Neurodegeneration, and Neurotoxicology
6. Immunology and Infectious Disease
7. Biophysical & Computational Chemistry
8. Systems Biology & Functional Genomics

Registration and Course Requirements

Proficiency in core areas is established during the first year of graduate school through examination and courses. All students must demonstrate proficiency in Biochemistry. Students who have had prior courses in Biochemistry should take the Biochemistry Proficiency Examination upon arrival. Those students whose scores indicate that they need further work in Biochemistry or those who have not taken a previous Biochemistry course must enroll in and pass with a grade of B or better 6 credit hours of approved Biochemistry coursework (MCMP 20800-PHRM 83600, BCHM 56100-56200, other BCHM 500 or 600 level graduate courses, or other Biochemistry courses approved by the graduate advisory committee).

All students will take the Organic Chemistry Proficiency Examination upon arrival. Students whose scores indicate that they would benefit by additional exposure to Organic Chemistry may be advised to audit MCMP 20500 (Organic Chemistry II) in the Fall semester of their first year. Alternatively, a student may elect to take CHEM 65100 (Advanced Organic Chemistry) for credit.

Entering students will register for *at least* nine (9) hours of courses during the first semester. They will also register for MCMP 59800 (Research Rotations) for 3 credit hours. Students should enroll in any courses required to demonstrate proficiency plus advanced courses selected for their areas of interest. A roster of such courses will be provided to the Graduate Advisory Committee who will guide the new graduate students during the first semester in residence.

For second-semester registration and going forward, students should consult with his/her research advisor for course requirements and suggestions in completing the plan of study.

General Course Requirements

All students in the Ph.D. program will take the following courses:

MCMP 59800 Introduction to Research (laboratory rotations course) 3 credits

Fall semester year 1.

CHEM 60500 Laboratory Safety 0 credit

First semester year 1

MCMP 57000 Chemical Actions on Biological Systems 3 credits

Fall semester year 1

MCMP 69600 Seminar 1 credit

Dissertation defense semester

MCMP 690 Journal Club 1 credit P/NP

Fall semesters of years 1-4

MCMP 62500 Grant Writing (prerequisite to Ph.D. oral preliminary exam) 1 credit

Fall semester year 2

Grad 61200 Responsible Conduct of Research or equivalent (prerequisite to Ph.D. oral preliminary exam) 1 credit (8 week course)

Spring, Fall and Maymester (years 1 or 2)

There are no other specific course requirements for the Ph.D. degree in MCMP. However, the student should expect additional course requirements under advisement of his/her major professor and their Ph.D. graduate advisory committee.

Unless advised otherwise by the Graduate Advisory Committee, a student must have a minimum of 18 credit hours of didactic coursework (excluding Pass/Fail credits).

Introduction to Research and Selection of a Major Professor

During their first semester new graduate students will carry out three four-week rotations by registration in MCMP 59800. Rotations will begin in week 3. Each rotation must be carried out in a different laboratory. During rotations students should familiarize themselves with the lab members and research taking place in potential thesis research labs. In addition, the rotation allows the potential thesis advisor to assess if the student has the research skills, scientific interest and communication style that are suitable for the lab. The goal is for students to find a permanent laboratory for thesis research at the end of the first semester. Appropriate safety clearance may be required for certain types of research.

Prior to the first week of classes, students should begin to reach out to faculty they are interested in rotating with. During orientation, two sessions are programmed for students to gain an overview for the ongoing research programs for faculty accepting students. Students should also be aware that, posters on specific research projects are typically available for review on a continuous basis in proximity to the individual laboratories. *All*

new graduate students are expected to complete a faculty meeting form after conducting discussions with at least five (5) faculty regarding graduate student research. The student should rank their top (3) faculty they would like to carry out rotations with when the faculty-meeting form is submitted to the program coordinator (barbmullenberg@purdue.edu) before Tuesday (5pm) during the second week of classes. During each subsequent rotation, students enrolled in MCMP 59800 will need to again *select and rank three (3) faculty names with whom they wish to carry out the subsequent rotation.* The student must have met with each faculty selected and the faculty must agree to the potential rotation. Faculty typically limit the number of rotating students they will accept and therefore students must be flexible in their rotation selections. The student must communicate with each selected faculty before the names are submitted for rotation. Faculty must agree to the proposed rotation and will set expectations. The Department Head will arrange these rotations and will inform students and faculty of the rotation schedule based on funding and how many rotations a faculty agrees to accept. While the offer of a rotation is not an obligation of a laboratory to ultimately accept that student, the student should seek rotations in laboratories that are willing and able, considering space and financial capacity, to accept new students.

During the 2nd week after the final lab rotation has concluded, new graduate students will submit a ranked list of choices for a dissertation advisor to the Graduate Program Advisor (barbmullenberg@purdue.edu). *The selection of a major professor requires a mutual agreement between the student and the professor.* Therefore, students should discuss their choice with the professor prior to submitting their list. Although every effort will be made to accommodate the students' preferences, a student is not guaranteed placement in their preferred laboratory. Professors will indicate the number of openings available in their laboratories and students will be assigned to laboratories by the Department Head. Every effort will be made to accommodate the students' preferences.

The graduate student should meet on the first day of the rotation period with the professor, who will inform the student of his/her expectations for the rotation (e.g. attend lab meetings, meet with research mentor on a periodic basis, record keeping for experiments, research goals, and oral presentations/written summary on a research project). Each professor will evaluate and inform the Chair of the Graduate Advisory Committee and Department Head of the student's performance during the rotation. The Department Head will assign a composite grade (Satisfactory/Unsatisfactory) in MCMP 598 based on the evaluations.

A student that receives an "unsatisfactory" rating in an MCMP 598 rotation must immediately schedule a meeting with the Graduate Advisory Committee via contacting the Graduate Advisory Chair (ahudmon@purdue.edu) to discuss remediation going forward. One unsatisfactory rating in MCMP 598 rotations (plus two passing grades) is considered an overall passing grade. A student that cannot find a match in the first semester or that receives two or more unsatisfactory ratings during their rotations will need to petition the Graduate Advisory Committee for a fourth rotation in Spring semester. Students who fail a fourth rotation or cannot find a dissertation advisor after their fourth rotation will be dismissed from the program at the end of the Spring semester (second semester in the program).

Selection of Dissertation/Thesis Research Committee; Plan of Study

During the second semester in residence, each student will, in consultation with his/her major professor, select his/her dissertation/thesis research committee and file a Plan of Study. Each student's dissertation/thesis research committee must be comprised of at least four (4) faculty, one of whom is the student's major professor; with at least two additional members from MCMP Faculty. The courses listed on the Plan of Study will be those suggested by the student's major professor, the student's dissertation/thesis research committee, and/or the student's own interests. In event a student elects to have co-mentors, the committee must be comprised of at least five (5) members with four (4) being from the MCMP Faculty.

The Plan of Study needs to include courses required to achieve proficiency and noted in "*Registration and Course Requirements.*" An MCMP plan of study demonstrates a balance of breadth and depth in exposure to multiple scientific areas. Unless advised otherwise by the Graduate Advisory Committee, a student must have a minimum of 18 credit hours of didactic coursework (excluding journal club credits).

The Plan of Study is an official Graduate School document that must be approved by the student, his/her graduate committee, Chair of the Graduate Advisory Committee, the Department Head, and the Dean's Office. In effect it is an academic contract that recognizes appointment of the student's dissertation/thesis research committee and specifies the coursework obligations of the student. The thesis research committee can insist that the student add courses to the Plan of Study, but normally such additions should occur no later than the time of the original proposal/examination. A student who has not filed a Plan of Study by the end of the summer following the second semester in residence will not be allowed to register for the following fall semester and will therefore receive no financial support until this requirement has been met.

English Proficiency

The Purdue University Graduate Council has delegated to individual departments the responsibility of assessing whether a student has demonstrated proficiency in written English appropriate to the Ph.D. degree. *Proficiency in written English is essential to good scientific communication.* Several demonstrations of this proficiency are built into the MCMP program: oral presentations in journal club, reports for the student's annual committee meetings; submission of questions for journal club; research reports required by the major professor; grant writing course; the original proposal for the Preliminary Exam; papers prepared for submission to research journals; and the dissertation. A student who is not deemed to be proficient in written English at any point during his/her Ph.D. program may be required by his/her major professor and/or committee to seek remediation either through private tutors or through various programs offered by the University.

All students are required to serve as a teaching assistant (TA) for at least one (1) academic semester (see *Teaching Assistantship Requirement*). All graduate students at Purdue for whom English is not the first language must demonstrate oral English proficiency before serving in a TA position that involves meaningful student contact. Non-native English speakers must pass the Oral English Proficiency Exam (OEPT) during orientation and achieve a passing score to have TA with student contact.

Taking the Practice Exam web-based test through the online OEPT is highly recommended.

<https://www.purdue.edu/oepp/index.html>

This online video is also helpful:

<http://tutorial.ace-in-testing.com/Default.aspx?p=videos>

If the score requires remediation, then a student must remediate this deficiency before the end of their first year. TA support cannot be guaranteed for students who do not meet the oral English proficiency requirement. *Students must fulfill the oral English proficiency requirement during the first year in residence to remain in good standing.*

All students are welcome to use the Writing Laboratory (https://owl.purdue.edu/writinglab/the_writing_lab_at_purdue.html) in Heavilon Hall, and students for whom English is not the first language may take ENGL 620 as an elective.

Grade-Point (GPA) Requirement

Graduate students in MCMP are required to maintain a “B” average in *all* courses taken for a grade. A student whose cumulative grade-point average (GPA) drops below 3.0 (out of 4.0) will be placed on probation and must achieve a “B” average in the subsequent semester. To be released from probation the student must restore his/her cumulative GPA to 3.0 or better within one year. Any student who fails to meet the GPA requirement will be reviewed by the Graduate Advisory Committee and may be dropped from the program.

A course on the Plan of Study that has been completed for a grade cannot be dropped from the Plan of Study.

Individual Development Plan (IDP)

Every PhD student in MCMP is required to complete an Individual Development Plan (IDP) form, in consultation with his/her advisor. The IDP form should be completed in consultation with the advisor by the end of the student’s first year in the PhD program. Subsequently, the IDP form should be updated at least once a year with the PhD advisor and Dissertation/Thesis Research Committee. The student’s Dissertation/Thesis Research Committee will certify that the requirement to complete and update the IDP form has been met during the preceding year when filling out the student’s committee report form, as outlined in the next section.

The IDP forms to be used by all students in the College of Pharmacy are accessible at the following website:

<O:\MCMP\PRIVATE\MCMP Graduate Students>

Select the IDP folder and complete the form based on year in the program.

Dissertation/Thesis Research Committee Meetings

Every student is required to hold a meeting of his/her dissertation/thesis research committee at least annually. The first required meeting of the committee will be no later than the end of the fall semester of the second year. Subsequent annual meetings must be scheduled no later than the end of the fall semester of each year. The committee may require meetings to be held at shorter intervals.

The student's progress will be assessed by the committee and will be reported in writing. Though the student assessment is one purpose of the committee meeting, another equally important purpose is for the student (and his/her professor) to receive feedback from outside the student's immediate research group. The goal of this feedback is to lay out the best and most productive approaches possible to the research problem.

In preparation for the first committee meeting, the student, in consultation with his/her research advisor, will prepare a written report (minimum 300 words in length, not including figures, tables, and references) outlining the student's research project. The report will focus on (i) the questions addressed by the project, (ii) the project's central hypothesis, (iii) the approach used to address this hypothesis, and (iv) preliminary data.

In preparation for each meeting in subsequent years, the student, in consultation with his/her research advisor, will prepare a written report not exceeding five (5) pages in length (plus figures, tables, and references) describing his/her research aims and results.

For all committee meetings, the written report and the most recent IDP must be submitted to the committee no later than five (5) days prior to the meeting. During the meeting the student is expected to make an oral presentation and discuss research progress with the committee. A report form will be filled out by the committee during the meeting. The committee members will comment on the student's IDP form and certify (by checking a box on the committee report form) that the requirement to complete or update the IDP form during the preceding year has been met. The student may then add his/her comments to the committee report form and should return the form immediately to the MCMP.

A student who fails to hold a required annual meeting will not be allowed to register for the semester following the one in which his/her meeting was to be held, and financial support may also be withheld until the meeting is held.

Agreement for Deliverables for Research Credit

Students are required a minimum of 90 research credit hours to complete the Graduate School's PhD requirement (Course # 699900). Faculty are required to communicate to each student the specific requirements to satisfy the research objective(s) of the course for each semester. Each student should work with their faculty mentor and agree to the defined objective(s) for each semester of 699 research credit. While the faculty mentor is solely responsible for identifying that the research agreement has been completed for 699 research in their MyPurdue, the faculty and student are responsible for maintaining the record of these objectives and for discussing the research progress at the end of each semester.

Preliminary Examination

Once the student has completed the grant writing course (MCMP 625) and the mandatory training in Research Conduct and Ethics (Grad 61200 Research Conduct and Ethics), he/she may schedule the Oral Preliminary Examination (OP), in which the student defends his/her original proposal. The initial examination must be held no later than the end of the second semester of the second academic year without prior approval from the Graduate Advisory Committee. *The student is expected to continue laboratory research during the time that he/she is preparing the original proposal.*

The OP examination is designed to test the student's ability to formulate and address research questions on a contemporary topic of biomedical relevance. Students will also be examined on their basic knowledge related to their research and coursework during the OP exam. An expectation is that students learn by formulating a meaningful research objective for which they can show competence in establishing an experimental design. The ability to anticipate the types of results to be obtained from a selected approach will be evaluated through both the written and oral components of the exam. In the process, foundational knowledge learned in coursework will also be assessed in the context of how best to interpret the results of any study under a given experimental design, as well as the overall chemical and molecular mechanisms related to the proposed work. In addition to the scientific content and core knowledge, the examination will assess the quality of the writing and oral presentation skills.

For additional guidance, see Appendices 1-4.

Proposal Topic: Students may elect to develop an original proposal on a subject of their choice. *The originality of the proposed research plan* will be an element for student evaluation before and during the written and oral components of the OP exam. A degree of originality is expected to be exhibited in both the written and oral defense of the research proposal. *It is the responsibility of the student to articulate originality in both the written proposal and oral exam.*

The topic may or may not be related to the dissertation/thesis research or the ongoing research in the laboratory of the major professor. If a subject related to the student or major professor's research area is selected, the criterion for satisfactory performance will be adjusted by the examination committee to ensure appropriate depth of knowledge and adequacy of feasibility in the proposed research plan.

Students are guided through the MCMP 625 course experience and during the preparation of the OP exam to develop an original proposal. The scope and style of the proposal will be consistent with an NIH R21 application. The proposal should include two specific aims consisting of experiments that could be accomplished by a single individual in a period of two (2) years.

The major professor may advise the student on whether a dissertation/thesis-related or non-dissertation/thesis related topic would be most appropriate before preparation of the proposal. Ultimately, topic selection for the proposal will be the decision of the student and the major professor is not involved beyond advising the student on potential topics of selection.

Format of the Original Proposal

The proposal document should consist of:

- 1) The **MCMP Departmental Oral Prelim Cover Sheet** found at:
<http://www.mcmp.purdue.edu/graduateprogram/forms/MCMPOralPrelimCover.doc>
- 2) A **summary of the student's current dissertation/thesis research** (1-2 pages)
- 3) The **Research Plan**.

The **Research Plan** should include enough information for evaluation of the project and follow NIH guidelines regarding page formatting as stated in section below. The research plan cannot use a specific aim previously used in proposals or provided by the major professor.

Current NIH Guidelines for Page Formatting.

Font

- Use an *Arial, Helvetica, Palatino Linotype or Georgia* typeface and a font size of 11 points or larger. (A Symbol font may be used to insert Greek letters or special characters; the font size requirement still applies.)
- Type density, including characters and spaces, must be no more than 15 characters per inch.
- Type may be no more than six lines per inch.
- Use black ink that can be clearly copied.
- Print must be clear and legible.

Page Margins

- Use *standard size (8 ½" x 11")* sheets of paper.
- Use at least one-half inch margins (top, bottom, left, and right) for all pages, including continuation pages.

Application Paging

- The application must be single-sided and single-spaced.
- Consecutively number pages throughout the application. Do not use suffixes (e.g., 5a, 5b).
- Do not include unnumbered pages.

Figures, Graphs, Diagrams, Charts, Tables, Figure Legends, and Footnotes

You may use a smaller type size but it must be in black ink, readily legible, and follow the font typeface requirement.

The proposal document should consist of:

- | | |
|-----------------------------|---|
| A. ABSTRACT | one paragraph (15-25 lines) separate page |
| B. SPECIFIC AIMS | 1 page maximum |
| C. RESEARCH STRATEGY | 6 pages total |
| 1. Significance | 0.5-1 page maximum |
| 2. Innovation | 0.5 page maximum |
| 3. Approach | 4.5 – 5 pages |
| D. LITERATURE CITED | no limits |

These sections should include:

A. **Abstract (Project Summary).** It is meant to serve as a succinct and accurate description of the proposed work when separated from the application. State the application's broad, long-term objectives and specific aims, making references to the health relatedness of the project. Describe concisely the research design and methods for

achieving the stated goals. This section should be informative to other persons working in the same or related fields and insofar as possible understandable to a scientifically or technically literate reader.

B. Specific Aims. The research plan cannot use a specific aim previously used in proposals or provided by the major professor.

In the Specific Aims section, one should state concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

C. Research Strategy. Must include Significance, Innovation, and Approach. For the first two sections, you can lump all aims into one Significance and one Innovation section (most popular choice) or you can repeat each section individually for each aim. Preliminary data can be included here if available.

1. Significance. Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses. Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields. Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

2. Innovation. Explain how the application challenges and seeks to shift current research or clinical practice paradigms. Describe any novel theoretical concepts, approaches or methodologies, instrumentation or intervention(s) to be developed or used, and any advantage over existing methodologies, instrumentation or intervention(s). Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation or interventions.

3. Approach. Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Unless addressed separately, include how the data will be collected, analyzed, and interpreted. Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims. If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high-risk aspects of the proposed work. Point out any procedures, situations, or materials that may be hazardous to personnel and precautions to be exercised.

D. Literature Cited. List all references. Each reference must include the title, names of all authors, book or journal title, volume number, page numbers, and year of publication. The **Literature Cited** section is NOT included in the page limitations for Sections C.

PAGE LIMITATIONS: Do not exceed 6 pages for the Research Strategy (Item C). All tables, graphs, figures, diagrams, and charts must be included within the 6 page limit. There is no requirement to use all 6 pages.

Failure to follow these guidelines may lead to an OP failure.

OP Procedure

Upon selection of the original proposal for the examination, the proposal title and summary (or an abstract) must be submitted in writing to the Graduate Program Director (barbmullenberg@purdue.edu) as described in Appendix 1 submission deadlines. The Graduate Advisory Committee will appoint an Examination Committee consisting of 4 members, one of whom will serve as the chair of the committee (the Chair). When possible, two members will be selected from within the student's dissertation committee. The student's major professor will not serve on the Examination Committee but may attend the presentation as an observer and must leave the room during committee deliberations.

Overview: First the student will work with the Chair to construct a viable Aims page. The Chair is to guide the student during this process and provide suggestions. However, it is the job of the student to devise a working-viable set of aims. Once the aims page is completed, the student will focus on completing the proposal. Once the written proposal is completed, the student should turn in 1) the written proposal and 2) dissertation research summary for prescreening by the Examination Committee. The examination committee will determine if the proposal is acceptable to move forward to the Oral examination. The examination committee may also provide written comments on the proposal. Because FORM 8 requires a minimum of 3 weeks for processing within the Graduate School, the student should work with the Chair to identify potential dates ahead of the final approval for the Oral examination. The Chair will coordinate and distribute the materials to the committee members both for the preliminary evaluation and the final submission ahead of the Oral examination. The student should meet as needed with the Chair for guidance in developing the aims page, as well as to discuss any edits received in the preliminary evaluation. It is also reasonable that a student makes use of resources in the Purdue environment including peers to further refine the development of the proposal as well as the Oral Presentation.

When the Chair assess the proposal to be ready for review, the committee will be asked to evaluate the written document and the proposed study. The Chair will request review and feedback by the other committee members (within 7 days). If the proposal is acceptable as written or only requires minor revision, the student will be advised to proceed with the official request for examination. Once approval is granted by the Chair, the student may request an official examination date. All examination dates must be requested at least two weeks in advance of the examination to the Graduate School in Young Hall.

If substantial revision of the written proposal is requested by the Examination Committee, the student will need to return a revised proposal to the Chair. The Chair of the Examination Committee will again request review and feedback by the other committee members once the Chair deems the proposal is ready.

There are three possible outcomes to the examination. (1) The student passes outright and is admitted to candidacy for the Ph.D. degree. (2) The student meets expectations if specific remediation recommendations are met. For example, a student did quite well on the majority of the examination but failed to explain specific elements essential for the background or interpretation of an experiment. The committee may ask the student to address the deficit with a written document that will be evaluated by the committee within a specific time-frame. The Chair with recommendations from the Examination Committee will contact the student with the final outcome of the OP attempt (pass or fail). (3) The student does not pass the examination and can repeat the defense in the following semester (University regulations stipulate that a reexamination cannot be scheduled within the

same semester). A student who does not pass his/her defense upon a second attempt will not be allowed to continue for the Ph.D. degree.

It is strongly advised that students arrange an examination date which can be completed in the second semester of the second academic year as *students who do not schedule their original proposal/examination by the required deadline will be considered to have not passed their first attempt. Students in this category must schedule their second attempt during the following semester and will forfeit a subsequent attempt in the event that they do not pass this examination.*

MCMP Journal Club

Overview: All first through fourth year students must register for MCMP 690 (MCMP Journal Club). This seminar series is designed to emphasize data analysis and critical thinking by creating both formal seminar and informal journal club environments. Select students will present instructor selected manuscripts that represent fundamental techniques and discoveries in three different areas of the pharmaceutical sciences, including: 1) Medicinal Chemistry & Chemical Biology (section 23053), 2) Molecular and Cellular Pharmacology (section 23054), and 3) Biophysics & Computational Sciences (section 23055). Students in MCMP JC 690 will develop a knowledge base in one of these three research areas while also enhancing their critical thinking and public speaking skills.

Grading and class attendance: This course will be graded as Pass/Fail, with the hope that all students will feel comfortable participating in the group discussions without feeling that their grade will be based on their knowledge of any topic. Presenters will be expected to (a) provide well-articulated presentations, within the defined time limits, and (b) capably lead the group discussions. In addition, attendance and group presentation, presenting students will also be evaluated based on the quality of their presentation.

- A Pass/Fail grading system will be used for all enrolled students.
- Attendance is mandatory. You are permitted one unexcused absence. Two unexcused absences (absence not cleared with instructor prior to class) will lead to a failing grade.
- You are expected to be in your seat before the speaker starts their presentation. Repeated failure to be on time will result in a failing grade for the seminar.
- Instructors may elect to not pass a student based on participation (attendance, handwritten questions, tardiness to class and overall group participation).
- In addition to group participation and attendance, students who present journal club articles will be graded on their presentation.

Seminars

All students are expected to participate in seminar programs while in residence at Purdue. Attendance at MCMP sponsored seminars on regular basis is considered a pre-requisite for consideration in departmental teaching, research and travel awards.

Teaching Assistantship (TA) Requirement

The faculty of the MCMP Department believes that a teaching experience is a vital part of the Ph.D. program. Each Ph.D. student must serve as a half-time teaching assistant for at least one semester in a position that involves meaningful student contact. (Laboratory TAs, recitation instructors, and the like are considered to have meaningful student contact;

TA positions that involve *only* grading papers, lab preparation, or instrument maintenance do not involve meaningful student contact.) Students entering the MCMP graduate program already having significant teaching experience may be exempt from this requirement as determined by the MCMP Graduate Advisory Committee.

A student for whom English is not the native language must, of course, meet the University requirement for proficiency in spoken English prior to his/her serving as a TA with “meaningful student contact.” Graduate students who cannot meet this requirement will be unable to fulfill the TA requirement and hence, cannot receive a Ph.D. degree from the MCMP Department.

Graduate students *may* serve as TAs for more than one semester, and, of necessity, some of these positions may involve tasks that do not involve student contact.

Students who display excellence in teaching can be nominated for the School’s Kinley Award for Teaching Assistants. In addition, TAs who express an interest in college teaching as a career may be given the opportunity to prepare and conduct occasional regular classes under the close supervision of a faculty mentor.

Dissertation/Thesis and Final Examination

Each student will prepare a dissertation/thesis that describes his/her original research. This will be a document written entirely by the student and must adhere to the dissertation/thesis-format rules of the Graduate School. When the major professor is satisfied that the dissertation is satisfactory in all respects, the student will present the *complete* dissertation to his/her committee at least two weeks prior to the final oral examination.

In the final examination, the student’s graduate committee will examine the student’s dissertation for both scientific rigor and appropriate presentation, including use of written English. Upon passing this examination, the student is certified for the Ph.D. degree.

Time and Progress to Degree

The offer of financial commitment in the form of stipend, tuition and benefits from MCMP comes with the expectation that all students will commit full-time to their education, teaching, and research efforts while in residency. In doing so, there is every intention that the progress toward degree within the expected five-year time frame can be accomplished.

The student’s graduate committee, through its annual meetings, is charged with monitoring the student’s timely research progress toward his/her degree. In addition, the MCMP graduate office will monitor the student to assure that he/she meets the various deadlines: filing the Plan of Study, holding the yearly committee meetings, taking and passing the written assessment and original proposal, etc.

Failure to meet departmental requirements as outlined in this document may result in dismissal from the program.

To expedite the progress towards degree completion, students who are supported by MCMP are expected to devote full-time effort to their graduate courses and dissertation/thesis research.

A student's major professor and/or graduate committee are always charged with determining whether a student is making reasonable progress toward the degree. A student who is not making satisfactory research progress will be given a "U" grade in research for an academic semester. Any student receiving a "U" in research will be placed on probation. A student must hold a graduate committee meeting soon after receipt of the "U" grade for review of the probationary status. A student who fails to remove probationary status by exhibiting satisfactory research performance in the subsequent semester (i.e. receives another "U" grade) may be dismissed from the program following a review of the student's record by the MCMP Graduate Advisory Committee. Probationary status in research may also be considered grounds for withholding financial support.

Any student who is in the sixth or seventh year of study toward a Ph.D. degree must be reviewed semiannually by their dissertation/thesis committee for progress toward the degree. Such students are obligated to schedule an advisory committee meeting every six months or more frequently at the committee requests. The student's major professor and graduate committee should be prepared to show why that student should continue in the program. The Department is under no obligation to provide financial support to any student past his/her fifth year of graduate study, and financial support will terminate after seven years of graduate study.

The Purdue College of Pharmacy rules state that any student who fails to complete all requirements for the Ph.D. degree within eight (8) calendar years will be dismissed from the program unless an appeal is made to the Associate Dean for Graduate Programs.

Inclusion Statement

The College of Pharmacy "is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University, the College of Pharmacy and MCMP seeks to develop and nurture diversity. We believe that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life."

Document Version

This document was originally approved on August 2, 1996. The current document is revised and amended to reflect the intent of the faculty for the Department of Medicinal Chemistry and Molecular Pharmacology. Updated Summer 2021 by the Advisory Committee with changes ratified by the MCMP faculty.

Appendix 1: OP Process and Rubric

The Graduate Advisory Committee along with the MCMP Faculty works to ensure excellence in all dimensions of the graduate program. The program is responsible for oversight on the level of rigor and quality of efforts by the graduate students and the participating faculty. The outcomes of the Ph.D. Preliminary Exam will dictate if a student can matriculate into the PhD program. Thus, this is a key step in the maturation of the candidates. Along with the MCMP Faculty, our collective efforts are to adhere to guidelines that promote and ensure excellence while providing highest value to students and the engagement of Faculty. The Guidelines documents, the associated Appendices and Evaluation Rubric are expected to set the expectations for performance of graduate students and their evaluation by the Faculty.

PRELIMINARY EXAMINATION TIMELINE	
Before November 24, 2021	<ul style="list-style-type: none"> • Student will submit OP grant summary to Grad Chair • Student will be assigned an OP Chair/Committee before the end of fall semester
Before January 22, 2022	<ul style="list-style-type: none"> • Student submits OP Grant Specific Aims page to OP Chair • Student must defend novelty in all Aims to OP Chair • OP Chair will work with the student to finalize the Aims Page • Student should become familiar with instructions for submitting online graduate School Form 8; "Request for Appointment of Examining Committee"
Before February 7, 2022	<ul style="list-style-type: none"> • Specific Aims page finalized • Student should be focused on completing grant
No later than March 15, 2022	<ul style="list-style-type: none"> • Student will turn in completed grant (plus current research writeup) for committee evaluation
10 days after proposal is received	<ul style="list-style-type: none"> • Committee chair will return feedback to the student and notify the student if the proposal is defensible. If defensible, proceed to oral exam date. If not defensible, student must return the edited document by April 1 for re-evaluation
No later than May 14, 2022	<ul style="list-style-type: none"> • Student must complete their Oral Defense by May 14 (unless OP Chair and committee approves the delay)

Oral Preliminary Examination Report
 Department of Medicinal Chemistry and Molecular Pharmacology

Student: _____ **Date of OP Exam:** _____

Proposal Originality (circle one): Moderately Original, Original or Highly Original in relation to the student's dissertation research.

Criteria	Does Not Meet Expectations 1	Meets Expectations 2	Exceeds Expectations 3
1. Problem Definition: States the research problem clearly, provides motivation for undertaking the research, generates viable hypothesis			
2. Core Knowledge and Literature Interpretation: Demonstrates sound knowledge in the literature and core fundamentals (coursework) relevant to the specific research problem			
3. Research Methods/Research Plan: Applies appropriate research methods to address hypothesis, anticipates problems and considers alternative approaches			
4. Data Analysis/Interpretation: Provides a sound plan for analyzing and interpreting research results			
5. Quality of Written Communication: Communicates research proposal clearly and professionally in written form, demonstrates good organizational skills			
6. Quality of Oral Communication: Communicates research proposal clearly and professionally in oral form			
7. Critical Thinking: Demonstrates capability for independent research, demonstrates creativity and insight			
8. Ethical Conduct: Written document adheres to appropriate ethical standards of originality			N/A

CRITERIA (1-9)	PERFORMANCE RATINGS		
	DOES NOT PASS	PASSES PRELIMINARY EXAMINATION	
OVERALL PERFORMANCE	1. Does not meet expectations	2. Meets expectations upon remediation	3. Meets expectations

Please report additional comments/recommendations on the back of this page and return this form to the committee chair (not to be shared with student). Return forms to Departmental Graduate Coordinator (barbmullenberg@purdue.edu). If a student requires remediation, recommendations/tasks and timeline should be clearly outlined by the examination committee.

Committee chair should provide a written summary of comments and recommendations to the student (via email) from each member of the OP Committee.

Appendix 2: Graduate Student Expectations

MCMP Graduate Program Ph.D. Preliminary Exam

To: Second Year Graduate Students

Subject: What to Expect from the Written and Oral Exam

Congratulations! You have reached the next step in the process toward your pursuit of a Ph.D. degree. This next step is a key turn point for all of you in your path forward toward excellence in your professional pursuits.

The intentions of this exam are to motivate and enable you to elevate your thinking and understanding to conduct research at a level that makes independent contributions to a field of inquiry. You will be evaluated using a new set of expectations of your present knowledge (as related to previous coursework) and integrative thinking skill sets to function as Ph.D. level scientist. It will establish how well you have prepared yourself to move on with excellence in the graduate program toward the Ph.D. degree. For most students, this is not a simple linear transition in your knowledge like taking courses and exams.

This is typically a time when you will challenge yourself to reveal and address both your strengths and weaknesses in your scientific knowledge, communication skills, and independent thinking skills. For those students who fully engage the process, it will serve as an avenue for self-improvement and achievement that will inspire your future successes.

The individual efforts of the student will take dedicated time and focus different than any course you may have previously taken. To assist you in preparation of the both written proposal and oral defense, the following evaluation topics and associated questions to be asking yourselves are offered.

A. Problem Definition:

- Is this project worth doing? Is this a new or ongoing question or problem in the field?
 - What will be the overall impact on the field of study?
- Is the scope of the project achievable in a 2-3 year time frame?
- What about the project is original and unique to your proposed contribution to the field?
- Do you anticipate alternative perspectives or directions of inquiry based upon your proposed research problem?

B. Literature and Background:

- Have you read and mastered the basic background of the disciplines as they relate to the scientific area? What are the gaps or unanswered questions you envision in the field of study?

- Have you read and critically analyzed the prior work in the specific subject area?
What are the pros/cons of the prior work?
 - Are you able to recall and define the key experiments, data, and/or observations that establish the premise of your proposal research question?
 - What is your depth of understanding of the associated methodologies in the field to be able to defend their utility or deficiencies?

C. Research Methods/Research Plan:

- Are you using the most effective methods to address the hypothesis, question or technology gap you propose to research?
- Do you have a complete grasp and depth of knowledge on the methods or technologies proposed?
- Do you anticipate where a method may fail or be deficient and do you have alternative strategies in hand?

D. Data Analysis and Interpretation

- What data do you anticipate from your proposed research plan and are you prepared to fully understand how to analyze the content?
- How will you interpret the results of the proposed experiments?
 - How will the results inform you about the central question or proposed problem?
 - Do you anticipate any results different than those you have stated and if so how will that inform your next steps of the research plan?

E. Quality of Written Communication

- Is the content of the proposal formatted and referenced in a complete but concise manner?
 - Are all the key references that demonstrate your grasp of the field cited in an appropriate context?
- Is the document presentation carefully organized and annotated with graphics and/or data to fully communicate the problem to be addressed?
- Does the specific aims page articulate a clear gap, question, or problem to address?
 - Are the individual aims clearly stated and have a stated rationale?
 - Does the one-page document provide a suitable succinct overview of what the proposed research will attempt to accomplish?

F. Quality of Oral Communication

- Is the content of the audio/visual well prepared and organized to address the key components of the proposed research?
 - Is all content appropriately acknowledged?
 - Is there an effective use of graphic and written content?

- Is the accuracy of the verbal communication effective in conveying the intent?
- Are you able to anticipate and/or listen to questions and provide careful answers?

G. Critical Thinking

- Are you able to integrate knowledge and existing information to arrive at a meaningful conclusion?
- Are you able to think beyond your immediate proposed work to understand implications for the immediate research field?
 - Are you able to make connections of content in meaningful ways to lend insight to a question that may or may not have a known answer?
- Are you able to provide new or original insight on a question or problem in the research area?

H. Ethical Conduct

- Are you able to properly identify original and nonoriginal content?
- Do you properly acknowledge the work of others than yourself?

Appendix 3 : Roles of the Chair of the Examination Committee in the OP Process

The Chair of the Examination Committee will serve as both a student mentor and as the member of the committee who will be responsible for reporting the outcomes of the examination. The roles will involve several critical activities throughout the process.

- Primary point of contact for the student during preparation of the written and oral exam components.
 - Meet with the student as early as possible in the process to review logistics and timelines.
 - Review with the student what will be evaluated in the OP exam process.
 - Clarify the distinctions between thesis-related and non-related projects and include a discussion of the differences in expectations.
 - Establish a rapport with the student to better understand their interests and career directions.
 - Review and guide the refinement of the Specific Aims for the proposed project.
 - Hold the student accountable for meeting timelines and expectations of quality of the written document.
- Primary point of contact for the Faculty Committee.
 - Hold Faculty accountable to criteria for review including both written and verbal feedback to the student.
 - Hold Faculty accountable to timelines for review and examination scheduling.

Appendix 4: Roles of Major Professor in OP Process

- Establish with the student that the mentor role for the process resides with the Chair of the Examination Committee.
- Discuss as early as possible in the process the pros/cons of a thesis-related or non-related proposal.
- Ensure fidelity of the process by avoiding any discussions with the student regarding the written documents and oral presentation.
- Serve as an observer to the examination process if deemed appropriate.