Molecular, Cellular and Integrative Biosciences Graduate Program

Degree Requirements Booklet

Fall 2014
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Overview of major academic requirements

Totals:
24 credits of course work total (this means 400, 500 or 800-level)
6+ credits of 600 level (research)
Of the total credits 18 must be 500 or 600 level

Core courses:
First semester (take the courses listed below):

- BMMB 501 (5) Core Concepts in Biomolecular Science
- IBIOS 590 (2) Colloquium
- IBIOS 591 (1) Ethics in the Life Sciences
- BIOL 598A (2) Experiential Teaching in Biology
- IBIOS 596 (1) Individual Studies (for research rotations)

Second semester (take the course listed below, and start to take emphasis area courses):

- IBIOS 592(2) Current Research Seminars

Totals = 12 of the 24 course work credits met by core courses (core courses are the ones listed above)

Emphasis area courses (these are electives taken in addition to the core courses):

3 credits of a course with a quantitative basis (including statistics, population genetics, bioinformatics)
9 credits of other courses from the emphasis area list

Totals = 12 of the 24 course work credits met by emphasis area courses
Emphasis area course lists can be found on the MCIBS web site, and recommendations for electives should be discussed with your thesis advisor. You may also find it helpful to get course recommendations from the Emphasis Area representative or the Program Chair.

Other requirements (more information on each of these is presented later in the handbook):

TA- one semester in 400 level or lower undergraduate biosciences course

English competency as prescribed by the graduate school

Cumulative GPA of at least 3.0 to remain in good academic standing, and must be at least 3.0 to take candidacy, comprehensive and final oral examination

Candidacy, Comprehensive, Dissertation and Final Oral Examination
Responsible Conduct of Research Training Requirement:

All new students in the Huck graduate programs must complete an online Responsible Conduct of Research (RCR) training course during their first year. The online course is offered through the CITI (Collaborative Institutional Training Initiative) Program and supplements the in-class, discussion-based RCR training provided in IBIOS 591, Ethics in the Life Sciences, a required 1-credit course typically taken during the second year. Together, these two courses satisfy RCR training requirements mandated by Penn State’s SARI (Scholarship and Research Integrity) Program, an RCR initiative organized through the Office for Research Protections (administrative unit within the Office of the Vice President for Research).

First year students should register for the online CITI RCR course as soon as possible in the Fall semester. To register, go to the Penn State SARI website, Online Training Program page (http://www.research.psu.edu/training/sari/program) where you will find instructions and a link for the CITI Program website (http://www.citiprogram.org/). Select Pennsylvania State University as the participating institution and register for the CITI Biomedical Sciences course. Students must work on their own to complete the course modules and pass the on-line quizzes. All modules must be completed by the end of the first Fall semester; and a copy of the student’s Completion Report must be submitted to the Program administrative office before January 15th.

Rotations/Mentor Selection

All students are required to participate in three laboratory rotations. Laboratory rotations begin in the first semester of enrollment, each consisting of a five-week period during which the student participates in small research projects in a laboratory. Prior to the beginning of the semester, the student will receive a list of faculty who are interested in accepting rotation students. Students will have opportunities to meet with faculty at the program retreat and at short faculty talks at the beginning of the semester. Students will be required to attend these talks to learn about the breadth of research across the program. Students will let the program chair and administrative office know their first rotation after the first week of the semester. If help is needed to set this up, please contact the program chair right away. Mentors will be selected at the end of the first semester. The selection process is initiated by discussions between students and potential mentors. The mentor must agree to take on financial responsibility for the student after the first year.

Candidacy Exam

Students in the MCIBS graduate program must take a candidacy exam no later than the Fall semester of the second year. The purpose of the exam is to ensure that students have mastered the core concepts necessary to proceed further towards the Ph.D. The exam consists of both written and oral components, and is based primarily on the students' ability to critically read, understand, and communicate the key findings of a current research paper selected from the literature.

A Candidacy Exam Organizing Committee will oversee administration of the exams. At least one faculty member from each of the MCIBS Emphasis Areas, appointed by the elected Emphasis Area Representatives, will serve on the committee for 1-2 year terms. The Organizing Committee will assemble a three-member faculty Exam Committee for each student. In addition, the Organizing Committee will identify 3-5 scientific papers appropriate to the MCIBS program and its Emphasis Areas that will serve as the basis for the exams. Finally, the Organizing Committee will prepare a separate written exam corresponding to each of the papers. To facilitate this process, the Organizing Committee may seek input from the larger pool of Exam Committee members both during the paper selection process and for the purpose of formulating exam questions. Exam questions may include, but are not limited to, those that test knowledge of the background concepts underlying the paper and the
Emphasis Areas, test the understanding of methods and techniques used in the paper, test data interpretation skills, or test the ability to apply knowledge gained from the paper towards novel problems.

10 days prior to the written exam date, the Organizing Committee will forward to each student the 3-5 scientific papers that have been selected for the exams. Students may examine all of the papers, but must choose one that will form the basis of his or her candidacy exam. On the day of the Written Exam, each student will declare which paper he or she has selected, and will be provided with (1) the Written Exam corresponding to that paper, and (2) a printed copy of the paper. No other written materials or electronic devices may be used during the written portion of the exam. Students will be given three hours to complete the Written Exam. Copies of the completed exams will be provided to the Exam Committee members that have been assigned to each student, in preparation for the Oral Exam.

Oral Exams will take place within two weeks following the written exam. The Organizing Committee will notify each student regarding the composition of the three-member faculty Exam Committee that has been assigned to them. Students will be responsible for scheduling a date, time, and location for the Oral Exam. On the day of the Oral Exam, the student will provide a formal presentation of the paper, and answer questions raised by committee members related to the Written Exam, the oral presentation, and the paper in general. Upon completion of the Oral Exam, Exam Committee members will reach a consensus regarding whether the student has passed the exam. In the event that the student does not pass the exam, a second-chance exam will be provided. Within two weeks of completing the second-chance Written Exam, the student will take the second-chance Oral Exam. A new exam committee will be formed for the second-chance exam, drawing from faculty members who serve on the Organizing Committee and/or serve as Emphasis Area Representatives. Failure to pass the second-chance exam will result in termination of the student’s tenure in the MCIBS PhD program.

**Doctoral Committee**

Upon successful completion of the Candidacy Examination, the student in consultation with the mentors will, as soon as possible, select a doctoral committee. The committee will consist of at least three members of the IGDP in MCIBS, with at least 4 members total. One member of the committee must be from a different department from the home department(s) of the mentor(s). This committee is responsible for supervising the academic program and monitoring the progress of the student towards his/her degree. Doctoral Thesis Committee Composition is based on the Graduate School guidelines (http://www.gradsch.psu.edu/faculty-and-staff/faculty/ctaade/). After the comprehensive exam, students should schedule at least one meeting per year with their thesis committee.

**Comprehensive Exam**

The comprehensive examination will be administered by the student's Doctoral Committee. Taken within a year of the candidacy exam, it will consist of a written thesis proposal in grant format followed by an oral defense of the proposal and evaluation by the Committee of the student's knowledge of the area of research, assuring that s/he is competent in knowledge of the field to carry out the proposed studies and that s/he has developed investigation skills appropriate to planning a corpus of research. Students must be registered for classes (typically IBIOS 600) the semester they take this exam.

**Teaching**

In consultation with the program chair, students will be assigned a lecture, lab, or recitation class to help teach. Teaching will typically be scheduled during the second or third year. International graduate
students must pass an English proficiency exam (see English Proficiency section) before any teaching duties are assigned.

**Internship (optional)**
After the first or second year and in consultation with the Program Chair and thesis advisor, students may spend a summer in an internship at a medical center, government laboratory, industrial environment or a non-traditional setting.

**Thesis**
The committee will also evaluate thesis research progress annually, determine when research is sufficient for preparation of the thesis, and pass or fail the student based on the written thesis and an oral defense. Students must follow the thesis guidelines outlined by the Graduate School. Pointers for thesis preparation can be found on the MCIBS web site.
The following paragraphs are from the Graduate School Thesis Guidelines and provide a good overview of how thesis submission works:
From the graduate school:
"Final Oral Examination (Ph.D./D.Ed.)—Both the dissertation adviser/committee chair and the student are responsible for ensuring the completion of a draft of the dissertation and for adequate consultation with members of the doctoral committee well in advance of the final oral examination. Major revisions of the dissertation should be completed before this examination.

It is the responsibility of the doctoral candidate and committee chair/dissertation adviser to provide a copy of the dissertation to each member of the doctoral committee at least two weeks before the date of the scheduled examination. The dissertation should be complete and in its final draft, with correct and polished content and style, appropriate notes, bibliography, tables, etc., at the time it is distributed to the committee members. If a committee member finds that the final draft is not correct and polished with respect to content and style, it is his/her responsibility to notify the committee chair/dissertation adviser at least one week in advance of the final oral examination date. The committee member should indicate his/her concerns regarding the draft and may recommend consideration of postponement of the examination to the committee chair/dissertation adviser. The chair/adviser, in consultation with committee members, is responsible for notifying the student and assessing whether the student can make the necessary revisions to the final draft before the examination date. If it is determined that revisions cannot be made in time, the final oral examination must be postponed."

**Pointers for a positive student-advisor relationship**

**Topics for Discussion Prior to Joining A Laboratory**
1. Time Commitment Expected in the Lab
2. Funding Source and Grade Level (after the first year you are appointed by a department rather than by the Huck, and this means that the amount of your stipend may be different!! Find out the standard stipend level in the department ahead of time!)
3. Vacation and Leave Policy
4. Possibility of Internship and how much TAing is typical (one semester is required by program)
5. Access to Advisor
6. Possibility (expectations) for publications and conference presentations
Guidelines for Advisor/Student Interactions

Effective mentoring, open communication, and ethical professional conduct are essential for a high quality graduate education and research environment. Effective mentoring must be based on a commitment to provide every student access to supportive guidance on a range of professional, ethical and collegial issues. A productive mentorship requires that students are treated respectfully and fairly, and that the mentor serves as a role model - upholding the highest ethical standards. These guidelines embody many of the best practices used by the majority of our faculty here and elsewhere. They are intended to provide a heightened awareness of the need to consciously establish an effectual mentorship based on trust, courtesy, and shared expectations.

Faculty Advisors/Mentors will:

- provide an environment that is intellectually stimulating, emotionally supportive, safe, and free of harassment;
- be supportive, equitable, accessible, encouraging, and respectful;
- recognize and respect the cultural backgrounds of students;
- be sensitive to the power imbalance in the student-advisor relationship;
- avoid assigning duties or activities that are outside students' academic responsibilities or are detrimental to the timely completion of their degrees;
- respect students needs to allocate their time among competing demands, while maintaining timely progress towards their degree;
- advise graduate students on the selection of a thesis topic with realistic prospects for successful completion within an appropriate time frame;
- assist students on selecting and forming a thesis committee;
- set clear expectations and goals for students regarding their research and thesis;
- discuss policies and expectations for work hours, vacation time and health contingencies;
- meet regularly and individually with students to provide feedback on research progress and expectations (weekly meetings are recommended);
- provide students with training and oversight in the design of research projects, development of necessary skills, use of rigorous research techniques, and all other aspects of research;
- arrange for the on-campus supervision and advisement of graduate students during extended absences as well as regular contact (e.g. by phone) when possible;
- provide and discuss clear criteria for authorship at the beginning of all collaborative projects;
- encourage participation in professional meetings and try to secure funding for such activities;
- provide career advice, help with interview and application preparation, and write letters of recommendation in a timely manner;
- ensure students receive training in the skills needed for a successful career in their discipline, including oral and written communication and grant preparation;
- schedule at least one meeting each semester to discuss topics other than research, like professional development, career objectives and opportunities, climate, laboratory personnel relations, etc;
- be a role model by acting in an ethical, professional, and courteous manner toward students, staff, and faculty
Graduate Students will:
• acknowledge that they bear the primary responsibility for the successful completion of their degree;
• exercise the highest ethical standards in all aspects of their research, including collection, storage, analysis, and communication of research data;
• complete to the best of their abilities all tasks assigned by the program, including teaching duties;
• be informed about regulations and policies governing graduate studies at the program and graduate school levels and take responsibility for meeting program and graduate school deadlines;
• set up meetings with their mentor and communicate regularly with their thesis committees;
• prepare progress reports and request feedback from their full committee annually;
• be considerate of time constraints and other demands imposed on faculty and staff;
• take an active role in identifying and pursuing professional development opportunities;
• be proactive about improving their research skills, including written and oral presentation skills;
• inform faculty mentors of potential and or existing conflicts and work toward their resolution;
• seek mentoring and support resources beyond their faculty advisor, including other faculty mentors, peers, and organizations;
• consult outside help from graduate program chairs, ombudsmen, or other faculty if conflicts arise with your advisor;
• be aware that if they feel compelled to change advisors or research direction, they may have options and should consult with their program chair;
• always act in an ethical, professional, and courteous manner toward other students, staff, and faculty.

Programs will:
• provide students with up-to-date information that includes policies, practices, degree requirements, and resources;
• guide students through lab rotations (when applicable), assist students with selection of their advisor and resolution of student-advisor conflicts
• provide students with contacts and resources for potential conflict resolution in addition to the Program Chair (e.g. ombudsperson, director of graduate studies);
• provide pedagogical training and regular assessment of the teaching activities;
• monitor graduate student progress towards their degrees and professional development, including mentoring meetings, committee meetings, exam completions and other benchmarks appropriate to their discipline;
• provide and monitor training in the ethical conduct of research;
• provide appropriate infrastructure to allow students to complete their education and research in a timely and productive manner;
• establish and communicate policies for emergencies and unplanned situations that may disrupt the work of students and/or faculty;
• encourage and monitor student and faculty adherence to these guidelines

These Guidelines are endorsed by the Huck Institutes of the Life Sciences Graduate Education Office and were adapted from guidelines recommended by the Eberly College of Science Climate advisors.
Courses available for all Huck Institutes’ Graduate Programs

IBIOS 590. HUCK INSTITUTES’ COLLOQUIUM (2) Students typically take this course in the Fall and Spring semesters of their first year. In Colloquium, students are introduced to a wide variety of topics of contemporary and future importance in the life sciences. A particular focus is placed on topics where science is likely to impact on society (and society on science). Topics are drawn from the area introduced by the speaker and can span the entire spectrum from basic research to the social, legal, moral and ethical implications of the science. A significant challenge in Colloquium is to organize and coordinate a presentation using contemporary presentation software, such as PowerPoint, in an environment in which part of the audience is present at a remote site. Students are required to attend the lectures and the dinners following the lectures. Students also participate in the group presentations during discussion sessions and submit written reports. Reports may be submitted to the co-chairs of the graduate program/option who may add them to the student's permanent record. Students receive A-F quality grades.

IBIOS 591. ETHICS IN THE LIFE SCIENCES (1) Students examine integrity and misconduct in life sciences research, including issues of data collection, publication, authorship, and peer review. Students receive A-F quality grades.

IBIOS 595. INTERNSHIP (1, optional) For students interested in exploring academic, government, medical, law, or business corporate approaches to research. This is an external work assignment relevant to individual research or career goals. Students receive a R (satisfactory/passing) or U (unsatisfactory/failing). Only R credits are counted for credit totals. Students typically participate in an internship the summer of their first year. Contacts, positions, applications, course registration, course requirements, and grading are processed through the Eberly College of Science Cooperative Education Program (814-865-5000). Additional credits of MCIBS 595 are at the expense of the student. Interested Huck Institutes’ graduate students are to discuss the opportunity with their graduate program/option chair and/or their faculty advisor to help determine the best timing for this experience.

IBIOS 596. INDEPENDENT STUDIES: LABORATORY ROTATIONS (1-3 per semester pending graduate program) For students exploring potential Ph.D. projects and faculty advisors. Students receive a R (satisfactory/passing) or F (unsatisfactory/failing). Only R credits are counted for credit totals.

IBIOS 600. THESIS RESEARCH (1-9 per semester pending graduate program) For students who have been matched with a faculty advisor AND have not taken/passed their comprehensive exams. Students may receive A-F grades or R/F grades at any time. By the time students pass their comprehensive exams, up to 12 credits worth of IBIOS 600 may have the A-F quality grade.

IBIOS 601. THESIS PREPARATION (0 per semester) For those students who passed their comprehensive exams. This course appears on the transcript but does not have any grade or credit associated with it.

IBIOS 602. SUPERVISED EXPERIENCE IN COLLEGE TEACHING (1) Students receive either a lecture, lab, or recitation class to help teach. Students also participate in the Huck Institutes teaching assistant training sessions and receive A-F grades on their transcripts from their faculty course supervisors. Please note that these grades are not computed in with the overall GPA. International graduate students must pass an English proficiency exam before any teaching duties are assigned.
English Requirement for International Students
The English Requirement for International students is that prescribed by the Graduate School. Depending on the graduate program, all entering international students, whether or not they hold a Teaching Assistantship, will be required to take the American English Oral Communicative Proficiency Test (AEOCPT) which is administered by the University's Department of Applied Linguistics.

Given at the beginning of fall and spring semesters, international students are required to pre-register for the AEOCPT. The test scores from the AEOCPT are posted on the University's Administrative Information System (AIS) computer. Below is the course of action for the various AEOCPT score ranges.

NR = No Restrictions. This person should be allowed to teach with no restrictions based on ability to communicate in English.
(Penn State AEOCPT Score of 250-300)

WR = Take ESL 118G. This person should not be allowed to teach before completing and receiving a grade of "A" in ESL 118G - "American Oral English for ITA’s III."
(Penn State AEOCPT Score of 230-249)

TC = Take ESL 117G. This person should not be allowed to teach before completing and receiving a grade of "A" in both ESL 117G -"American Oral English for ITA’s II" and ESL 118G - "American Oral English for ITA’s III."
(Penn State AEOCPT Score of 200-229)

SL = Speaking/Listening. This person should enroll in ESL 115G - "American Oral English for ITA’s I" and receive a grade of "A" before taking ESL 117G and ESL 118G.
(Penn State AEOCPT Score below 200)

Students, who are required to enroll in ESL courses, must complete the ESL requirement by the end of the second semester of residency. Students who fail to satisfy this requirement may be terminated from the respective graduate program, at the discretion of the graduate program chair.

Safety Training Sessions / Examinations
Within the first semester of residence, all students are required to take/pass the radioisotope safety and chemical waste disposal training sessions offered at the respective campus.

Grade Point Average
Credit hours are earned only for the grades A, B, and C. However, all D and F grades are included in the computation of the grade point average. Grade points are assigned as follows:

A = 4 (above average graduate work)
B = 3 (average graduate work)
C = 2 (below average graduate work)
D = 1 (failing graduate work)
F = 0 (failing graduate work)

Grades D and F are not acceptable for graduate credit. If a course is repeated, then both grades are used in computing the cumulative grade point average.

 Unsatisfactory Scholarship
Students are required to have a minimum grade-point average of 3.0 for the doctoral candidacy examination, admission to the comprehensive examination, thesis defense, and graduation. One or more failing grades, a
cumulative grade-point average below 3.0, or failing any of the examinations may be considered evidence of unsatisfactory scholarship and be grounds for dismissal from the University (see the Appendix III of the Graduate Programs Bulletin www.psu.edu/bulletins/whitebook/Appendices.htm).

**Assistantships and Student Status**

Students with teaching or research graduate assistantships must be registered as full time students to maintain stipend eligibility. Full time status is considered either a minimum of nine credits each fall and spring semester (pre-comprehensive exam) or XXX 601 (0 credits, post-comprehensive exam). The assistantship appointments typically originate with the department of the faculty advisor. If no faculty advisor has been identified, as likely the situation with first year doctoral students, students should consult with their respective Graduate Program Chair.

**Thesis Submission and Exit Interview**

Upon completion of the degree, students are to provide the Graduate Program with an electronic copy of their thesis. Students also participate in both the University and Huck Institutes’ Exit Interview Process. For the latter, students may meet with the Graduate Program Chair or appropriate representative.

**Vacation and Sick Leave**

Full-time graduate students in the MCIBS Intercollege Graduate Degree Program (IGDP) who receive stipends must get permission for all absences from the laboratory. Vacation leave should be arranged with the MCIBS Graduate Program Chair (1st year students) or thesis advisor (2nd year and above students). Please consult with your thesis advisor for policies in place that restrict and or regulate both vacation and/or sick leave within the individual research laboratories. Students must formalize their vacation dates in writing and in advance two (2) months notice is desirable and, to alleviate any possible confusion, vacation requests should be made in writing. The MCIBS IGDP Chair or student’s thesis advisor will agree or disallow the vacation request in writing within 72 hours of its submission. All other reasons for leave (i.e. sickness, maternity/paternity leave, illness of a family member etc.) also require approval from either the Graduate Program Chair (1st year) or thesis advisor (2nd year and above students). It is the student’s responsibility to contact their thesis advisor or IGDP Chair when he/she is absent from the classroom or laboratory due to illness.

RESTRICTIONS: No vacations or other foreseeable leaves (maternity/paternity leave) can be taken unless approved in advance. Approval should be granted unless the leave is believed to seriously compromise the academic progress of the student; in such cases the disapproval must be confirmed by the MCIBS IGDP Chair. Students will not be routinely granted vacation leave while enrolled in formal class work.

**Activate Intent to Graduate**

Students must present their thesis in accordance with the Penn State University guidelines as described in the THESIS GUIDE Requirements for the Preparation of Master's and Doctoral Theses”. Current copies can be obtained from the Thesis Office:

115 Kern Building  
University Park, PA 16802  
Phone: 814/865-5448

Web site: http://www.gradsch.psu.edu/gs_overview/thesisguide

At the beginning of the semester that students wish to graduate, they are to either:

1) access eLion via www.elion.psu.edu, if in the PSU computer system
or
2) call Graduate Enrollment at 1-814-865-1795, if not in the PSU computer system
Doctoral Thesis Committee Composition

According to the Graduate Degree Programs Bulletin published by the Graduate School regarding Doctoral Committees: (http://www.psu.edu/bulletins/whitebook) then click on “Advisors and Doctoral Committees” under the heading “Doctoral Degree Requirements”

- 4 person minimum of approved PSU Graduate Faculty.

- 2 members must be inside the major and 1 member must be outside the major. Note - the outside member must be member of the approved PSU Graduate Faculty. The outside member for intercollege graduate programs may be inside the major but committee membership must have representation from more than one department. The outside field member represents a field outside the candidate’s major field of study and is expected to provide a broader range of disciplinary perspective and expertise.

- A person not affiliated with PSU may be added as a special member (beyond the 4 members of the approved PSU Graduate Faculty) upon recommendation of the head of the program and approval of the graduate dean. A memo plus the individual's C.V. must be drafted with approval signature spaces for the Graduate Program Chair plus the Director of Graduate Enrollment.

- Have committee chair or one of the co-chairs be a member of the approved PSU Graduate Faculty. Typically this is the faculty advisor or someone in the graduate program.

- The doctoral candidate and three committee members must be physically present for the comprehensive exam and defense. No more than one person may be present via telephone. Telephone or video conference arrangements must be approved by the Dean of the Graduate School. A form letter is available for this special request.

- Need approval of 2/3 of the committee members for passing comprehensive exam and defense dissertation.

- Need to submit paperwork 3-4 weeks prior to your scheduled comprehensive exam and defense. Please contact Terrie Young in:
  101 Life Sciences Bldg.; 814-866-3273; tly2@psu.edu
Masters (M.S.) Degree

Masters students must have a minimum of 30 credits and a 3.0 overall GPA (see Graduate Degree Programs Bulletin [http://www.psu.edu/bulletins/whitebook](http://www.psu.edu/bulletins/whitebook)). Under Masters Degree Requirements click on Admission and scroll both directions to see all information about Masters Degree Requirements. Students are not accepted directly into MCIBS for a Masters degree.

MCIBS only offers a masters thesis option, up to 6 IBIOS 600 credits may be A-F graded and 12 credits need to be in the major at the 500-600 level (excluding IBIOS 600). The students select a thesis committee (upon consultation with faculty advisor), write a thesis, and defend their work.

If pursuing a masters non-thesis option, the student must have a first authored manuscript (based on his/her research) that has been either accepted and/or published in a peer reviewed journal. 18 credits need to be in the major at the 500-600 level. The manuscript is given to at least the faculty advisor and the Option Chair for evaluation.

MCIBS 595 (Internship) and MCIBS 596 (Rotations) credits all count toward the 30 credits. However, any MCIBS 602 (Teaching) credits do not count toward the 30 credits. If all course credits and requirements are met, students do not have to be registered for classes while writing and/or defending their work.

Activate Intent to Graduate
At the beginning of the semester that a student wishes to graduate . . . . . .
. if in PSU’s computer system: access e-Lion at www.elion.psu.edu
  if not: call 1-814-865-1795 to reach Graduate Enrollment