

PENNSTATE



The Huck Institutes

OF THE LIFE SCIENCES

**Cell and Developmental Biology
Graduate Program**

Degree Requirements Booklet

Fall 2012

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Cell and Developmental Biology (CDB)

Course Requirements

Course requirements include Core Concepts in Biomolecular Science, Current Research Seminars, Benchmark Papers, the Huck Institutes' Colloquium and Ethics in the Life Sciences. Flexibility in curriculum design is a goal, so certain of these requirements may be substituted by other courses upon consultation with the CDB Chair, in order to optimize the educational experience of each student. Grading of lecture courses will be based on written examinations and, in some cases, assigned papers. The seminar and reading courses will be graded based on class participation as judged by the facilitator.

Responsible Conduct of Research Training Requirement:

Starting in Fall 2009, all new students in the Cell and Developmental Biology graduate program 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 provides the chair with a list of at least three preferred laboratories, and the chair facilitates the necessary arrangements to attempt to schedule the rotations, dependent on the prospective faculty member's willingness to provide this opportunity. At the end of the rotation period, the student provides the chair with a list of preferred laboratories and the chair will try to match the student with the best-fit laboratory.

Candidacy Exam

This exam should be taken by the end or during the student's third semester in the CDB program. The student will be assigned one scientific paper from the primary literature to read and analyze for approximately one week. The papers will be selected based upon the students' background and coursework. The analysis should involve exploring the relevant literature as well as the fundamental issues in Cell and Developmental Biology. Following this independent research the student will take an oral exam. The oral exam will be administered by at least three members of the graduate program. The overall goal of the exam is to assure that the student has an intellectual foundation in Cell and Developmental Biology. The exam is designed to evaluate basic knowledge in Cell and Developmental Biology and related disciplines as well as the students' ability to integrate this understanding to effectively evaluate experimental design, results, and the conclusions drawn. In the event that the student does not pass this exam, the student's committee will make a recommendation as to whether to offer another opportunity or to terminate the student's enrollment in the 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 three members of the IGDP in CDB and one faculty member who is not a member of the IGDP in CDB. 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 Degree Programs Bulletin ([http://www.psu.edu/bulletins/whitebook/\\$gradreqs.htm](http://www.psu.edu/bulletins/whitebook/$gradreqs.htm)) published by the Graduate School regarding Doctoral Committees. See page 12 of this book for specific committee member guidelines.

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 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.

Recognizing the importance of communication of one's research to other scientists, even those with very different areas of interest, in academe, government and industry; after the comprehensive exam, we will have review(s) of every student's progress in a **formal seminar** presented to all faculty and students in the CDB Program. Such seminars will provide the student with the opportunity and need to hone their presentation skills for a diverse audience, and faculty with the opportunity to criticize and help develop these skills, other students will have a chance to discover exciting areas at other levels of study in cell and developmental biology, facilitating interactions between themselves, and importantly, a chance for the student to realistically appraise their progress over the preceding year. This seminar may be combined with the annual meeting with the thesis committee, which is required by the Graduate School.

Teaching (optional)

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.

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.

Topics for Discussion Prior to Joining A Laboratory

1. Time Commitment Expected in the Lab
2. Funding Source and Grade Level
3. Vacation and Leave Policy
4. Possibility of Internship and/or TA
5. Access to Advisor
6. Possibility (expectations) for publications and conference presentations

Student-Faculty Compact

(adapted from the Recommendation of The Committee on Graduate Student and Faculty Issues, The Graduate Council, The Pennsylvania State University, 2009 and The Document approved by the Penn State Hershey Graduate Program Directors May 6, 2006 and updated April 22, 2010)

Purpose:

Student-Faculty Compacts are useful to encourage good communications and to enhance the working environment in student-advisor/mentor relationships. Compacts provide a basis for discussion between students and advisors/mentors regarding mutual responsibilities and future plans.

“The compact serves as both a pledge and a reminder to advisors and their graduate students that their conduct in fulfilling their commitments to one another should reflect the highest professional standards and mutual respect.”

Items that should be discussed by students and potential mentors prior to choosing a permanent laboratory situation.

Expectations of the Advisor towards Graduate Students in a Laboratory

1. Professionalism/Honesty/Ethics
 - a. The Graduate Student will:
 - i. Perform research and other educational activities conscientiously, maintain good research records and catalog and maintain all tangible research materials that result from the project.
 - ii. Respect all ethical standards when conducting research including compliance with all institutional and federal regulations.
 - iii. Show respect for and work collegially with my co-workers, support staff and other individuals with whom I interact.
 - iv. Do your best to satisfy all project deadlines outlined by the advisor.
2. Communication
 - i. Outline a defined program of research with the advisor that will include well defined goals and timelines. Organize time to meet these deadlines.
 - ii. Have open and timely discussions with the advisor on a regular basis regarding the status of the research.
 - iii. Seek regular feedback on performance and expect annual performance evaluations.
 - iv. Understand that you have a responsibility with the advisor to write up, in a timely manner, research findings for publication and presentation at professional meetings.

Expectations of the Graduate Students in a Laboratory of the Advisor

1. Training and Education

a. The Advisor will:

- i. Set a mutually agreed upon set of expectations and goals at the beginning of the outset of the student's admission to the laboratory. These will be reviewed and revised periodically as the student progresses through the program.
- ii. Acknowledge that the purpose of the training that graduate students receive is to prepare them to become independent professionals.
- iii. Work to prepare students for required program examinations and committee selections.
- iv. Read the student's thesis and other writing thoroughly and carefully and in a timely manner.
- v. Provide the student with the required guidance and mentoring as needed.
- vi. Encourage the interaction of the student with other students and faculty, both intra and extramurally and encourage attendance at professional meetings to network and to present research findings.

2. Communication

- i. Meet with the student periodically over the course of each academic semester and no less than once per semester to review goals and progress.
- ii. Acknowledge contributions to the development of any intellectual property and define future access to tangible research materials according to institutional policy.
- iii. Discuss, in advance, appropriate authorship and co-authorship roles on all relevant publications and presentations

Exiting a Student-Faculty Relation

“Student-faculty relations are sustainable in large measure because of a compatible fit between the student and the faculty member. On occasion, the fit may be less than either a student or a faculty advisor initially anticipated, resulting in one or the other seeking to end the relation, even though the student is making satisfactory progress based on the perspectives of all concerned. Neither party should view these situations negatively; rather they represent mid-course corrections intended to improve the student's academic and professional mentoring by faculty.

The party wishing to leave the student-faculty relation should request a meeting with the other party, and possibly the student's committee, to discuss his/her concerns and recommendations. If an alternative advisor has not been identified prior to this meeting, consideration of possible options would be appropriate. In the end, advancing the student's academic program should be the prime objective for changing advisors.”

Cell and Developmental Biology (CDB) Curriculum

Year 1 - Fall Semester

- IBIOS 590. Huck Institutes' Colloquium (2)
- IBIOS 592. Current Research Seminars (2)
- IBIOS 596. Independent Studies: Laboratory Rotations (3)
- BMMB 501. Core Concepts in Biomolecular Science (5)
- Fulfill prerequisites by taking appropriate courses
- Register for CITI on-line RCR course (see p.3)
- Submit CITI RCR Course Completion Report to Program Office

Spring Semester

- IBIOS 590. Huck Institutes' Colloquium (2)
- IBIOS 592. Current Research Seminars (2)
- IBIOS 600. Thesis Research (3)
- BMMB541. Molecular Biology of Animal Development (3)
- Electives. Appropriate courses may be selected by the student in consultation with the advisor and/or CDB Chair.

Summer Session

- IBIOS 595. Internship (1) (optional) or during summer of Year 2

Year 2 - Fall Semester

- IBIOS 591. Ethics in the Life Sciences (1)
- IBIOS 572. Benchmark Papers (2)
- IBIOS 600. Thesis Research (5)
- IBIOS 602. Supervised Experiences in College Teaching (1) (optional)
- Candidacy Examination

Spring Semester

- IBIOS 600. Thesis Research (9)

Summer Session

- IBIOS 600. Thesis Research (1)
- Comprehensive Examination

Years 3-5

- IBIOS 601. Thesis Preparation (0)

General Information

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 IBIOS 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](http://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 Cell and Developmental Biology Intercollege Graduate Degree Program (IGDP) who receive stipends must get permission for all absences from the laboratory. Vacation leave should be arranged with the Cell and Developmental Biology 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 Cell and Developmental Biology 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 Cell and Developmental Biology 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 Ms. Cynthia Nicosia (Director, 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 the appropriate staff member:
Janice Kennedy 101 Life Sciences Bldg.; 814-865-3155; jkk5@psu.edu**
- Please note- Graduate Programs may have additional committee composition criteria.

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>). Under Masters Degree Requirements click on Admission and scroll both directions to see all information about Masters Degree Requirements.

If pursuing 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 a Graduate Program offers a non-thesis option, graduate students should consult with their chair for details. 18 credits need to be in the major at the 500-600 level.

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.

IBIOS 595 (Internship) and IBIOS 596 (Rotations) credits all count toward the 30 credits. However, any IBIOS 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

This publication is available in alternative media on request.

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