

# GRADUATE HANDBOOK FOR THE INTEGRATED BIOLOGY PROGRAM

Guide to University and Department regulations, practices, and policies that have an impact on graduate students in the Integrated Biology (iBio) graduate program. Revised, August 2022; BTP.

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## I. FIRST-YEAR REQUIREMENTS: GETTING THROUGH THE FIRST YEAR

### A. Advisors

#### 1. *Ph.D. Candidates*

The Associate Chair for Graduate Education/Director of Graduate Studies (DGS) serves as the primary advisor for entering Ph.D. students until they affiliate with a mentor. Students should consult the advisor to choose courses to meet specific departmental requirements, to discuss rotations (see below) and areas of research interest, and outline the nature of courses and programs available. They may also help with the choice of a permanent advisor for thesis research, or with any academic concern. Students entering directly into a laboratory are not assigned a temporary advisor. All students should feel free to ask the Graduate Program Coordinator, the Graduate Affairs Committee (GAC) or the Departmental Executive Officer (DEO/Chair) for advice at any time.

#### 2. *M.S. Candidates*

Entering M.S. students must choose a permanent research sponsor prior to admission. This individual is the primary advisor throughout the student's time in the M.S. program.

### B. General academic requirements for iBio students (M.S. and Ph.D. students)

#### 1. *Graduate College Requirements*

The Manual of Rules and Regulations of the Graduate College may be found here: <http://www.grad.uiowa.edu/graduate-college-manual>. This source specifies in detail the Graduate College's general degree requirements and provides guidelines for preparation of theses, deadlines for applications for degrees, and requirements for submission of theses (first and final drafts). All degree-granting departments and programs must adhere to the requirements of the Graduate College as *minimum* requirements. Departmental requirements may be different as long as these requirements are more stringent or extensive.

#### 2. *GPA Requirements*

**Requirements for Ph.D. and M.S. candidates.** A cumulative grade point average (GPA) of at least **3.0 in formal course work** must be maintained by Ph.D. and thesis M.S. candidates, and a GPA of 2.75 must be maintained by non-thesis M.S. candidates. Courses numbered below 3000, courses not related to the graduate degree, and non-science (e.g., education or writing) courses are not counted in calculation of the Departmental GPA. Letter grades for research or independent study (graded S/U) are not given and are not used in establishing the Departmental GPA. If a course is repeated for credit, both the original grade and the second grade are included in calculating the GPA.

#### Academic probation

If the Departmental cumulative GPA falls below 3.0, Ph.D. and thesis M.S. candidates are placed on academic probation. Students on academic probation are then required to earn at least a 3.0 GPA in formal course work in the following semester (in the academic year), and to restore the *cumulative* Departmental GPA to 3.0 or above by the end of the second semester following the decline. Failure to restore the GPA to the required level means the student can no longer be a degree candidate in the department.

For non-thesis M.S. students, if the Departmental cumulative GPA falls below 2.75, candidates are required to earn at least a 2.75 in formal course work in the following semester and to restore the cumulative Departmental GPA to at least 2.75 by the end of the second semester following

the decline. Failure to restore the GPA to the required level means the student can no longer be a degree candidate in the department.

**Important Notes:** The Departmental requirements for minimum GPA/academic probation differ from those of the Graduate College:

(1) The department does not allow grades for research or independent study to count in the GPA, although this is allowed by the Graduate College.

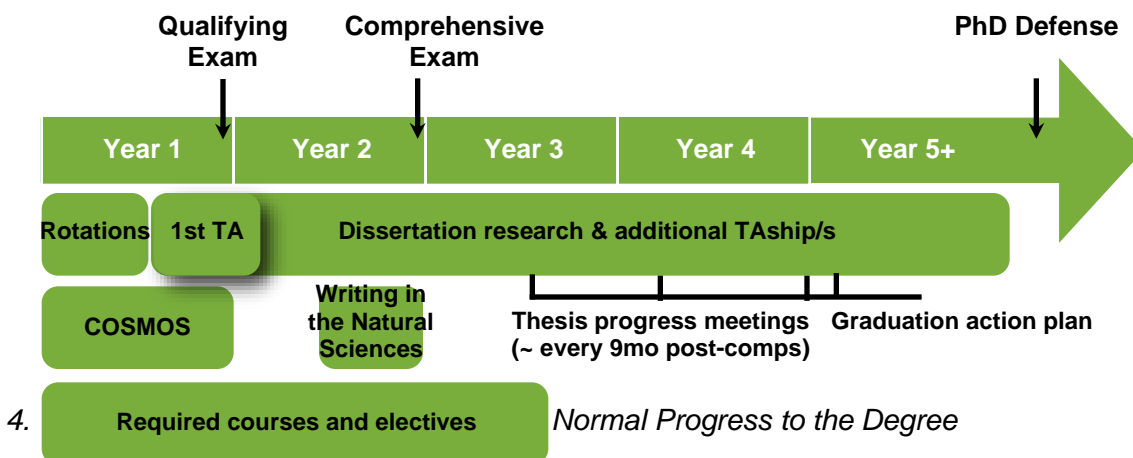
(2) The Graduate College will place students on academic probation if the student falls below the required minimum (3.0 or 2.75 GPA) after completion of nine semester hours (9 s.h.) of graded graduate work. Following the decline below the minimum, the student will have an additional nine hours to raise the cumulative GPA above the minimum. iBio students may be placed on probation in the first semester of sub-standard GPA and have another semester to restore satisfactory cumulative GPA.

(3) The Graduate College requires only a 2.75 GPA for M.S. students but the Department requires 3.0 GPA for thesis M.S. candidates.

### 3. Semester Hour (s.h.) Requirements

Students (except for post-comprehensive students) are expected to maintain full-time status by registering for at least **nine s.h.** during each semester of the academic year but up to 12-15 s.h. is preferred. Students are requested to register during the early registration period (early-mid Nov.). This is for financial reasons based on when enrollment is calculated in the Graduate College.

If a student drops a course, meeting the semester hour requirement may be jeopardized. Summer registration is required only for students supported by Graduate College Fellowships and students who intend to graduate during the summer session. In some cases, graduate students who are very close to meeting the semester hour requirement for their degree (30 s.h. for the M.S. or 72 for the Ph.D.) may register only for the number of semester hours needed to reach the required total. In such cases a “short hours” form must be submitted to the Graduate College.



Normal progress toward the degree includes: a) timely enrollment in required courses, b) successful completion of the qualifying and comprehensive examinations, c) steady progress in research and in meeting the expectations of the thesis lab, and d) timely completion of the thesis requirements for the Ph.D.

## C. Curriculum

### 1. Deficiencies on Admission

**Cognate Requirements for the PhD program.** Students who have not completed the following requirements should complete them *for a letter grade by the close of summer of the 1st year*

- One year of college physics, or clearly identified equivalent approved by the Graduate Affairs Committee (GAC).
- One year of organic chemistry (or one semester each of organic chemistry and biochemistry).
- One semester of calculus (Calculus I; e.g. MATH:1850 in the University of Iowa catalog).
- One semester of fundamental genetics (e.g., BIOL:2512).

**Masters students:** Masters students affiliate directly with a lab/advisor and therefore any prerequisite course requirements are established by **mutual agreement with the advisor, but must include at least genetics and one more of the above courses.** However, should an M.S. student wish to advance to the Ph.D. program, any remaining deficiencies in the above requirements would need to be satisfied.

**Biology Requirements:** Entering PhD and MS students will typically have 20 s.h. of coursework in biology, including genetics. Students with deficiencies in biology background may be required to take courses specified by the Graduate Recruiting and Admissions Committee (GRAC) as a condition for admission.

### 2. Specific courses for the first two years (M.S. and Ph.D.)

**COSMOS** (BIOL:6298). In the first fall semester, 1st-year students enroll in COSMOS (Concepts, Models, and Systems in Biology: Monday Student Seminar) for 1 s.h., which requires attendance at the Monday student seminar series and the Friday afternoon guest seminar series.

In the spring semester, 1st-year students enroll in BIOL:6298 (COSMOS Seminar) for 2 s.h., and engage in a vertically integrated critical analysis of single topic over many levels of basic biology (from molecular to ecological).

All continuing iBio students (Ph.D. and M.S.) enroll in the COSMOS Fall Graduate seminar series (1 or 2 s.h.) each Fall semester, and must participate by giving research seminars as scheduled.

**Readings in Genetics** (BIOL:5512). First-year graduate students are required to enroll in Readings in Genetics (BIOL:5512) for 2 s.h. and, if the undergraduate Genetics requirement is not met, the 3 s.h. graduate section of Fundamental Genetics (BIOL:5412) reserved for graduate students. A grade of B or better must be earned; a lower grade requires re-taking the course. A second grade lower than a B will result in dismissal from the program. Students may petition the GAC to excuse them based on prior training or experience.

Ordinarily, students will be exempt based on a strong performance in an undergraduate fundamental genetics course taken at a major research university within the preceding three years. Students who are excused from BIOL:5412 are **still required to take BIOL:5512.**

**Principles of Scholarly Integrity: Bio** (BIOL:7270). 1 s.h. Incoming students are required to receive training in the responsible conduct of research, as mandated by national funding agencies. This course consists of an online component and a series of lectures/discussions



during orientation. This course is co-taught with Psychology and Brain Sciences.

**Practicum: College Teaching for Biol TAs** (BIOL:5110) 2s.h. Students teaching BIOL:1411 or 1412 are required to take this class. Class consists of weekly laboratory preparation meetings including review of materials, learning new techniques, and sharing best practices.

**Seminar: Writing in Natural Sciences (WINS)** (BIOL:6188). 2 s.h. This course is required of all 2<sup>nd</sup> year iBio students (Ph.D. and M.S. w/thesis) and will focus on enhancing students' writing and critiquing skills. Inspired by the Iowa Writer's Workshop, students will submit original writing for critique by the class. iBio students will typically work on their Ph.D. research proposals for the comprehensive exam or their MS thesis. Students retaking WINS should plan to work on a different writing project, such as an original paper, grant application or review article.

**Monoclonal Antibody Technologies** (BIOL:5286). 2 s.h. In some years, incoming students may be required to take this course, offered through the Developmental Studies Hybridoma Bank housed in the Department of Biology. Students will work with DSHB staff to learn the basic methodology behind this powerful technology. Would typically be offered during the Winter session.

**Other** Additionally, during Fall rotations students should enroll in 3 s.h. of Research: Biology, BIOL:6199. During either semester of the first year, students may also begin taking other lecture or seminar courses listed below.

### 3. Electives

**Seminar Courses.** During the first two years in residence, all **iBio** students are required to take at least two 2-s.h. seminar courses with a significant writing and/or oral presentation component; these are typically COSMOS and WINS). M.S. students are required to take one additional 2-s.h. seminar course before graduation. Following comprehensive examinations, Ph.D. students must take at least two additional 2-s.h. seminar courses. Seminar courses from other departments may be approved by the Graduate Affairs Committee in consultation with the faculty advisor to satisfy the requirement.

**Advanced Lecture Courses.** During the first two years in residence, all graduate students are required to take at least two advanced 3-4 s.h. **biology-based lecture** courses. These courses must be 3000-level or higher and must be designed primarily for seniors and graduate students. A list of some possible courses is shown in Appendix II.

**Data Informatics Courses.** Also, during the first two years, students will take at least one course (3+ s.h.) in large-scale data informatics, including bioinformatics, advanced statistics or other informatics with some programming component. A list of some possible courses may be found in Appendix II.

**Free Elective.** An additional elective is also required and can be fulfilled with either a third advanced lecture course or a second data analysis course.

## D. Research Rotation Program (Ph.D. program only)

### 1. Description of the Program

Research rotations provide newly admitted Ph.D. students the opportunity to gain experience in three research labs during their first semester in residence, thereby providing them with information necessary to choose a permanent advisor for thesis research. Students admitted

directly into a laboratory are exempted from rotation.

- Students choose the first rotation lab by **July 15th** of summer before the 1st semester.
- Graduate credit is obtained for rotations by enrolling in Research: Biology (BIOL:6199) maximum 3 s.h. the first semester).
- During the rotation, the student is an active participant in the laboratory.
- The Graduate Affairs Committee (GAC) oversees the program.
- Each rotation period lasts 6 calendar weeks and is followed by group research presentations on the rotation research. These are evaluated by the GAC, who provides the students with feedback and encouragement.
- Students select a research mentor/advisor after the third rotation, by mid-December. Those who have not found a permanent faculty advisor after three rotations may request a fourth rotation in the winter break of the first year. Approval of this option is relatively rare.

## *2. Mechanism of Scheduling Rotations and Laboratory Affiliation*

**First rotation selection.** Based on their interview visit and reading of various faculty websites and publications, students should contact faculty and determine availability for the first rotation. Reprints of representative publications of faculty in whose research a student is interested can be obtained by requesting them from the faculty members, or accessing them through journal web sites or PubMed and Google Scholar.

**Faculty accepting rotation students.** Prior to the beginning of the fall semester and before the new graduate students arrive, the faculty are surveyed to determine the number of students they will accept and the number they can ultimately accommodate in their laboratory. Students are notified which faculty are accepting rotation students.

**Consultation with prospective rotation sponsors.** During the first rotation, students must consult with faculty members in whose research they are interested to discuss the possibility rotating later in the semester. These allow students and faculty to become better acquainted and to evaluate possible mutual research interests.

**Assignment of subsequent rotations.** After students meet with prospective rotation sponsors, faculty and students indicate their preferences for rotations to the Program Coordinator. These preferences will be used by the GAC in consultation with the Chair to schedule rotations. Rotations are scheduled on a rolling basis, about halfway through the previous period. If problems in scheduling rotations arise, the Chair and the GAC will assist students in exploring additional options.

## *3. Evaluation of a Student's Performance During Rotations*

**Faculty expectations.** Faculty should make their expectations clear to prospective rotation students at their first meeting. Expectations are also established by completing the pre-rotation "Roadmap to Development" form together during the first week of the rotation.

**Presentations.** At the end of each rotation, each student is to present a short (~12 minute) seminar based on the work done during that rotation. The seminar should address the goals of

the research, the background to the problem, the approach taken, and any progress made. Students are provided with written evaluations by the GAC and other faculty in attendance are expected to improve their presentation skills over the three rotations.

**Grading.** Students are graded only on a S/U basis to emphasize that the rotation is primarily a means of acquainting students with research generally and with specific areas in chosen rotation laboratories. Recording of grades and communication with the registrar are the responsibility of the GAC. Once a student affiliates with a laboratory, grading in BIOL:6199 becomes the responsibility of the faculty sponsor. Grades in BIOL:6199 will also be S or U.

## **E. First-Year Teaching Training and Teaching Requirement**

One of iBio's requirements is that every PhD student spends two semesters during their graduate career as a half-time TA. Students will undergo intensive TA training during the Spring semester of their first year and will TA in our foundational undergraduate Biology classes. Students do not need to register and will be contacted with details of this training during the first semester. Additional TA requirements are detailed below ([Section IV.A](#)). The Integrated Biology Graduate Program is not unique in having a TA requirement, however we are distinguished by our strong commitment to train our graduate students in effective teaching techniques. Students may of course TA additional semesters depending on the lab and training environment and with approval from the advisor.

## **II. ADVISING**

### **A. Toward Best Practices for Graduate Students and their Research Advisors**

The progress, development and success of a graduate student hinges on the commitment of both the student and the research advisor. Basic principles of best practices in mentoring and graduate student life appear in the two lists that follow. Graduate students should be aware of what is necessary for their success and their advisors likewise should be aware of practices that promote their students' best interests.

Although the concepts of commitment and responsiveness underlying the lists of expectations apply to all disciplines, the specifics of these principles vary considerably among the biological sciences, physical sciences, social sciences, and humanities (*UI Graduate College, August 2010. Adapted from "Compact Between Biomedical Graduate Students and Their Research Advisors," Association of American Medical Colleges*). Thus, these guidelines are intended to be modified, appended or reduced to fit specific departments, programs and disciplines. The Graduate College feels that graduate programs and their students can benefit from a concerted effort to incorporate these best practices, but we do not intend to mandate, monitor, or enforce them in any particular way. Some potential uses of these lists of expectations could include:

- Presenting these expectations in orientation sessions for new graduate students.
- Introducing expectations at orientations of new faculty members.
- Incorporating the expectations into a program's graduate student handbook.
- Discussing the expectations during graduate seminars and faculty meetings.

- Creating a formal agreement signed by both the student and the advisor when the mentoring relationship commences.
- Establish guidelines for the regular evaluation of graduate student progress.
- At least once each year (in Dec/Jan) the student should fill out/update their individual development plan and discuss with their advisor. email signed form to the grad coordinator.

## **B. Permanent Advisor/Thesis Advisor**

After the first semester, advice concerning formal course work and supervision of research are the responsibility of the Thesis Advisor and Thesis Committee, who help design, review, and approve of the program of course work.

### *1. Choosing a Thesis Sponsor*

**Informal Discussions with Faculty.** Toward the middle of the third rotation at the latest, each first-year Ph.D. student should begin discussing possibilities for permanent laboratory affiliation with one or more of his/her rotation research advisors. Students are free to seek the advice of any faculty member in making this choice, including the temporary advisor, members of the GAC, DGS or DEO. The student must inform the faculty member that he/she is interested in affiliating with that faculty member's laboratory, **but no commitments are made at that time.**

**Statement of preferences.** By the end of the rotations, each first-year Ph.D. student submits their affiliation preference, with the agreement and permission of the prospective advisor, to the Graduate Program Coordinator. This choice is typically ratified by the the GAC, in consultation with the department Chair, except in extraordinary circumstances. The results of the matching will be made known by the end of the fall semester and the new thesis advisor replaces the temporary advisor.

### *2. Changing Thesis Sponsors*

In extraordinary circumstances, a student may change sponsors with approval of the new sponsor and the GAC, in consultation with the DGS and DEO.

## **C. Graduate Affairs Committee (GAC)**

### *1. General Responsibilities of the Graduate Affairs Committee*

All guidelines, requirements, and procedures followed by graduate students are supervised by the Graduate Affairs Committee. Students are encouraged to seek clarification or guidance either formally or informally from the GAC, its Chair (who is the Departmental Associate Chair for Graduate Studies and Director of Graduate Studies (DGS)), or from the Graduate Program Coordinator, who acts as an agent of the GAC. The Associate Chair and the GAC review all plans of study to ensure that they meet specified requirements of the department and the Graduate College. The GAC is intended both to provide guidance for first-year graduate students and to monitor students' progress after the first year.

### *2. Responsibilities of the GAC to First-Year Students*

**Monitoring the rotation program.** The GAC oversees the rotation program and with the temporary advisor assists students in scheduling rotations. In addition, the GAC monitors the written faculty evaluations of each student at the end of each rotation. If these evaluations reveal potential problems, the GAC initiates a meeting with the student to discuss them. *Students should also feel free to initiate a meeting with the temporary advisor, the GAC, or the departmental Chair at any time and for whatever reason.*

### 3. Responsibilities of the GAC to students after the First Year

- Each year, the Graduate Program Coordinator, acting on behalf of the GAC, insures that each student's progress has been evaluated by the thesis committee and that a written report has been communicated to the student; a copy is provided to the GAC, and a second copy is placed in the student's file (See Permanent Advisor/Thesis Advisor.)The GAC is also responsible for certifying that students are eligible for continuing registration (see Specific Requirements for the Non-Thesis M.S. Degree in Biology ).
- The GAC is responsible for designing/soliciting topics for the Qualifying Exam (see Section IV.B), and for keeping track of deadlines that exist during the exam procedure. The GAC also writes/solicits questions for the Qualifying Exam and grades the answers.
- All degree applications (for Ph.D. and M.S. with thesis) must be submitted to the Graduate Program Coordinator prior to a thesis defense or written examination for the M.S. The Graduate Program Coordinator and the DGS insure that all degree requirements have been met before the degree application is forwarded to the Graduate College.

## III. THESIS/EXAMINATION COMMITTEES

### A. Ph.D. Students

Ph.D. candidates are required to establish a five-member thesis committee no later than Feb. of the second year. At least one member of the committee, but no more than two, must be from outside the department. The composition of the thesis committee must be approved by the Associate Chair for Graduate Education/Director of Graduate Studies. The thesis committee is responsible for creating and administering the student's Comprehensive Examination, for advising the student and for administering the Final Examination. The thesis committee will meet approximately once a year to review the student's progress, after which a written summary of its findings is made available to the student (with copies to the GAC and the student's file). **The following timetable is recommended for post-comps progress meetings:**

**Year 3: May --> Year 4: February --> Year 5: November (final/sufficiency meeting) --> Defense in April/May (Final single thesis deposit is in mid-April).**

### B. Thesis M.S. Students

M.S. candidates are required to establish a committee of three faculty members, two of which must be from inside the department, in consultation with their faculty sponsor, who serves as chair of the committee. The committee is responsible for approving the thesis and M.S. plan of study, for providing and administering the M.S. exam, and for ensuring that all other requirements are met. Students who enter graduate school as candidates for the M.S. degree with thesis should have selected a sponsor prior to admission.

## IV. Ph.D. DEGREE: REQUIREMENTS AND PROCEDURES

### A. Teaching Requirement

#### 1. General Teaching Requirements for Ph.D. Students

Candidates for the Ph.D. degree must serve as a teaching assistant (TA) for at least two semesters on a ½-time basis, one semester of which must be in Foundations of Biology or Diversity of Form and Function (BIOL:1411 or BIOL:1412). TA training will be provided in the Spring semester of the First year. This TA requirement is intended to broaden the student's background in biology, improve communication skills, and prepare the student for future positions for which teaching is a required component. The teaching requirement cannot be met by informal teaching assignments, such as grading, which require less than the B level of language competency. One semester of BIOL:1411 or BIOL:1412 requirement must be met prior to taking the Comprehensive Examination.

#### 2. Language Requirements for Non-Native Speakers

**English Language Competency.** Non-native speakers (except those who hold undergraduate degrees from U. S. universities) must achieve at least B level certification in English Language Competency for teaching assignments to satisfy the teaching requirement. Students not certified at the B level, who are in good standing otherwise, are still eligible to be supported by grant funds, or other assignments that might be identified. However, because it is a requirement that all students in the Ph.D. program teach for at least two semesters, students who have not achieved B level certification cannot earn a Ph.D. in the Department of Biology.

**Achievement of B-Level Certification.** Because one semester of the teaching requirement must be completed before students take the comprehensive examination, international students should concentrate on improving their language skills very early in their graduate career. At a minimum, B-level certification in the TAPE Program must be achieved before taking the comprehensive examination. In addition, some departmental TA assignments may require A-level certification. A fuller understanding of the English language concordant with attaining higher TAPE certification will enhance the student's scientific education and improve the student's performance in courses and on the comprehensive examination.

### B. The Qualifying Exam

#### 1. Purpose and Nature of the Examination

The main purpose of the qualifying exam (QE) is to ensure that first-year students (Ph.D. and M.S. with thesis\*) have acquired sufficient basic knowledge of various aspects of biology and possess the intellectual rigor and work habits necessary to proceed in the program.

Students will be given a total of 6 "topics" from which the exam questions will be derived (each student must pick 3 topics from the department's research foci: Genetics, Genomics, Ecology, Cell/Development, Evolution, and Neurobiology). Each topic will be accompanied by a thorough review article that covers a wide range of research on that topic, and a primary research article whose focus will provide a "hint" as to the direction the question will take. Multiple papers may be provided if the topic is sufficiently broad.

Students will not receive the actual questions in advance. They may wish to study the topic by carefully reading the review article to get an idea of the field; then read the research article; then go back to other key references on the same sub-topic mentioned in the review. As noted above, the questions will be in the general sub-topic area as the research article, though they might or might not ask about that article

directly. **Students are encouraged to study together and to discuss the topics with their peers.** Topics will be disseminated on or about May 15th of each year.

## *2. Details of the examination and grading*

The exam will be held on or about **July 1st**, and will consist of six questions (one from each topic handed out in May). Each student **must** answer three of the six questions. Any three may be chosen, regardless of research foci. The exam will start at 9 AM and run until Noon. Thus, there will be about one hour to write each question, the answer for which should be at least one page, single-spaced, each. Students will answer the questions using designated computers without internet access. They will not be allowed to bring in any flash drives, cell phones, personal computers, or paper notes. A five-minute break will be given after each hour, should students wish to stretch their legs or use the rest room. Coffee, donuts, and water will be provided in the room.

Students will receive their graded exams on or before **July 10th**, or 10 days after the exam, whichever is later. Each question is to be written and graded by the GAC member affiliated with the appropriate research area and ad hoc faculty members as needed to cover remaining research areas as determined by the DGS. Five grades are possible A: 4 points, B: 3 points, C: 2 points, D: 1 point F: 0 points. Maximum of 12 points and a total number score from 0-12 (**no partial points or decimal grades**). The following outcomes will result from this total score:

### **Exam results for PhD students**

- 7-12 points: Student passes the Qualifying Exam.
- 6 points: Reservations remain about the student's Qualifying Exam. They must write, within two weeks, a 10-page paper (double-spaced text with single-spaced references) on one of the questions of GAC's choosing (this could be one that they failed, or one that they chose not to answer on the test day). This paper must both answer the question and provide some of the background information that the student should have known on the test day. The paper will be due two weeks after the student is given notification of the reservations. If GAC determines that this paper is acceptable, the student will pass. If not, at the GAC's discretion, the Ph.D. student may be offered the chance to go on to complete an M.S. degree, with or without thesis in the department. If GAC decides against this, however, the student will leave the Graduate Program (see below for documentation and appeals process).
- 0-5 points: Student fails the Qualifying Exam. In most cases the student will leave the Graduate Program immediately. Any student in the failing category, either initially or after the reservations paper, may be asked to leave the program if GAC and/or the DEO and/or the research advisor no longer have confidence in the student being able to successfully complete the degree requirements. In this case, the case against the student should be fully documented and the student shall have the right to appeal the decision to the DGS. The DGS will confer with the rest of GAC and the student's advisor who will consider the totality of the student's record and may together sustain the decision to dismiss or decide that the student may stay and specify appropriate remedial work. At the GAC's discretion, a Ph.D. student with a score of 4 or 5 may be offered the chance to complete/continue an M.S. degree, with or without thesis, in the department.

### **Exam results for MS students**

- 7-12 points: Student passes the Qualifying Exam. M.S. students who earn a Pass (7-12) would represent a recommendation (the strength of which corresponds to their QE score) from GAC to GRAC in case the students requests a transfer to the iBio Ph.D. program.
- 6 points: As with Ph.D. students, M.S. students who receive 6 points would write the reservations paper (see above) and they would not receive the GAC recommendation, even with successful completion of the paper.

- 0-5 points. Student fails the Qualifying Exam. If an M.S. student fails the QE, either initially or after the reservations paper has been deemed unsatisfactory, this will typically result in the continuation in the M.S. program. However, any student may also be asked to leave the program instead if GAC and/or the DEO and/or the PI no longer have confidence in the student being able to successfully complete the degree requirements. In this case, the case against the student should be fully documented and the student shall have the right to appeal the decision to the DGS. The DGS will confer with the rest of the GAC and the student's advisor who will consider the totality of the student's record and may together sustain the decision to dismiss or decide that the student may stay and specify appropriate remedial work.

\*M.S. students not intending to enter the iBio PhD program need not take the QE.

## C. The Comprehensive Exam

### 1. Purpose and Nature of the Examination

The purpose of the comprehensive examination, as described by The University of Iowa Graduate College, is to serve as an inclusive evaluation of the candidate's mastery of the field and related fields of study, including the tools of the relevant research discipline in which competence has been certified. The exam must be completed in a timely fashion at the end of the student's 2nd year. It is the responsibility of the students and the respective thesis advisors to ensure that all deadlines are satisfactorily met.

**Timing of the Comprehensive Exam.** The Comprehensive Examination is expected to be completed no later than the first semester of the third year of residence. The exam may be postponed for up to one semester if a valid appeal is submitted by the student, with the support of the thesis sponsor, and approved by the GAC before the first semester of the third year. Failure to start the Comprehensive Examination at the appropriate time or failure to meet other scheduled deadlines may result in dismissal from the Ph.D. program.

**Required Forms.** Prior to taking the examination, the student must complete an approved "Plan of Study Summary Sheet" and a "Request for Doctoral Comprehensive Examination" form. These forms are available from the Graduate Program Coordinator.

#### **Timeline for the comprehensive exam for second year students:**

- November: Enroll in Writing for the Natural Sciences, (BIOL:6188:0001).
- December-February: Assemble the Ph.D. Thesis Committee /Examination Committee.
- 3rd Friday in February: Report Ph.D Thesis Committee composition to the Graduate Coordinator (Marlys Boote) and the Graduate Affairs Committee (GAC) for approval.
- Two weeks prior to Oral Examination date: Written Comprehensive Exam proposal must be handed out to the committee. This should be a revised version of the document turned in at the end of the Writing for the Natural Sciences course, incorporating any improvements suggested by the instructors of that course.
- August: Completion of the Oral Comprehensive Examination.



## 2. Composition of the Thesis and Examination Committee

The examination committee is the same as the thesis committee and should be determined primarily by the student, in consultation with the advisor. This committee should be chosen carefully, including faculty with varying but related expertise. There must be no fewer than **five** members on the committee, four of whom must be University of Iowa tenure-track faculty, with at least one member from outside the Biology Department. For the comprehensive exam, the thesis advisor designates an ad hoc chair. The outside member may serve as the ad hoc chair. The chair is responsible for ensuring that the comps guidelines are followed during the exam and facilitating discussion during the oral examination. *The thesis advisor should not participate in the discussion during the oral examination, except when minor clarification is required.*

## 3. Written Component

During the spring semester of the second year, students develop an up to eight-page NIH-F31 or NSF-DDIG-style or equivalent grant proposal about their own thesis research ("on-topic"). Second-year Ph.D. students are required to take the course, *Writing in the Natural Sciences* (BIOL:6188:0001), during that spring semester in which they will focus on writing this proposal. Students will hand this in for grading at the end of the *Writing in the Natural Sciences* course in May.

However, students must continue to revise the proposal in response to the comments of the instructors in the course and following scientific discussions over the course of the summer. Students are encouraged to discuss their scientific ideas with their thesis advisor, their committee, and other scientists. However, the writing must be the student's own, and the thesis advisor should not extensively re-write the document or significantly alter the direction or scope of the proposal, especially in the last weeks approaching the exam.

## 4. Format

Students are required to follow the following format for proposals, which approximates the format for NIH individual predoctoral fellowships (F31) and NSF DDIG grant applications (\*broader impacts are required for the actual DDIG grant but should NOT be included in the comps exam). The specific aims and research strategy sections can total no more than eight pages, and should follow the following format:

**Specific Aims (1 page):** broad statement addressing the basic problem, state of current knowledge, preliminary studies and hypotheses to be tested.

**Research Strategy (6-7 pages)**

**Background, significance, or introduction (1.5-2 pages)**

**Preliminary data (1-2 pages)**

For each aim (2-3 aims):

Rationale: why the study is being done, critical hypotheses to be tested (1/4 page)

Experimental design and expected results (3/4 -1 page)

Expected results and possible caveats (1/4-1/2 page)

Expected outcomes (new knowledge), implications and future directions (1/4 page)

- The first specific aims page giving the broad statement and aims need not include references.
- The remaining sections will contain citations to relevant primary literature and specific recent reviews. The literature cited list should be included at the end of the proposal and is not included in the page count.
- Figures and tables should be embedded in the text and are included in the page count. Figure legends and tables may use 9-point font.
- Proposals must use 10-11 point Arial or Palatino font for the main text, single line spacing, and 0.5-1.0 inch margins all around. *Please see specific formatting instructions for the actual grant applications when submitting these for F31 and DDIG funding, as each application has specific font and margin requirements (11pt for NIH, 10pt for NSF, etc..).*
- Students are required to distribute the proposal to the committee exam chair no less than two weeks prior to the scheduled oral examination. The chair will then forward to the rest of the committee. *Failure to meet this timetable may result in a rescheduling of the exam to give all committee members adequate time to review the document.* Also, if the written document is deemed unacceptable by one or more of the committee, the chair in consultation with the comps committee and the DGS may require that the exam be rescheduled and a new proposal written.

Pre-exam interactions: If there are committee members generally unfamiliar with the student's area of work, it may be appropriate to schedule a "pre-comps" meeting with the committee. This may be an informal meeting to introduce the general research area and scope of the student's work. Other informal meetings with individual committee members may also be appropriate. Although part of the goal of iBio's "on topic" comps is to help the students plan their work around logical hypotheses and biological questions, this is also an exam to judge whether a student can understand and communicate a research project in sufficient depth to progress to a PhD. It is therefore expected that 1) these pre-comps meetings should take place no later than four weeks prior to the exam date, and 2) that the student not solicit feedback on the proposal from faculty after the submission to exam committee. Students may continue to consult their advisor during the preparation of the oral presentation, but the advisor should not extensively re-work the talk on behalf of the student.

## 5. Oral Component

The student will provide a 20-30-minute formal oral presentation of the written proposal at the beginning of the oral examination. Typically, the student should be allowed to give this presentation in full without extensive interruption by the committee, except to clear up minor points.

Following the oral presentation, the student will be questioned about the content and experimental design of the proposal. The student should demonstrate expertise in their field and knowledge of their proposed experiments. And, they should be able to answer questions on general scientific knowledge, as well as on detailed experimental design and rationale. Committee members will question the student about the proposal to ascertain that the student understands the background to their thesis question, has formulated solid aims with clear expected outcomes and alternate strategies, and has a sufficient grasp of the experimental methodology to perform the planned work. The entire Oral Examination should not take more than two hours.

## 6. Criteria for Judging Performance on the Comprehensive Examination

**Clarity of Written Proposal.** Is it easy to see what is being presented? Is the background information clear enough to understand the problem? Is the proposed solution to the problem developed in a logical sequence? Are highly specialized terms or abbreviations explained?

**Creativity.** Is the approach new and/or innovative? Are the ideas novel and imaginative?

**Knowledge of the Subject and Methods.** Does the student have an in-depth understanding of the biology of the problem area: what is known and what is not? Is the student sufficiently aware of the limitations of the experimental methods used so far to address the problem?

**Suitability of Methods.** Are the proposed experimental methods the best possible? What are the alternatives? Does the student recognize experimental difficulties in the selection or use of the proposed methods? Would these methods be suitable for solution of the problem in a reasonable period?

**Reasoning and Data Interpretation.** Can the student interpret the data so as to come to a conclusion or to suggest another approach? Have alternative interpretations been considered sufficiently? When presented with a set of data, can the student interpret it properly?

**Ability to Explain Difficult or Unusual Concepts.** This pertains to the student's oral performance rather than the written proposal that was evaluated according to criteria listed above. Is the student understandable or confusing in explaining difficult material?

**Knowledge of Material Peripheral to the Proposal.** Are there serious gaps in the student's knowledge of biology when questioned about material somewhat removed from the proposal?

## 7. Possible Outcomes of the Exam

The Ph.D. thesis committee will determine the outcome of the exam. Each member votes Satisfactory, Reservations, or Unsatisfactory. This determination can be made based on the written exam, oral exam, or both at the discretion of each committee member. For Reservations, specific instructions must be given by the committee to the student for what is needed to rectify the problems. Committee members should use this option only if the deficiencies are relatively minor. Two votes of Reservations are sufficient to require rectification. Limitations on the nature of such conditions are outlined in the Manual of Rules and Regulations of the Graduate College. There must be a time limit by which the conditions must be met and the student, the Graduate College, and the GAC must be notified in writing what those conditions are and what the time limit will be. Usually, the time limit will be less than 60 days, so that if the conditions are not met by the student (and the student fails the examination), the student will be able to re-take the examination in the time-frame outlined below. If a student is required to take more courses, the time frame can be modified. If the committee is satisfied with the rectification, the reservation is removed and the student passes.

Two Unsatisfactory votes will result in a failing grade for the exam. Should this occur, the exam is rescheduled to occur within four months, but before the end of the Fall semester if possible (four months after the first exam/defense date is in accordance with Graduate College rules). If the second exam cannot be scheduled to occur in the same semester as the first exam/defense, then it must be scheduled for the semester immediately following (except in cases where new coursework would continue beyond this point). If the committee determined that the student still does not demonstrate a grasp of the research topic, the student would incur a second failure and be dismissed from the program on the grounds of unsatisfactory progress to

degree. For further details concerning outcomes of the Ph.D. examination see: <http://www.grad.uiowa.edu/manual-part-1-section-xii-doctors-degrees>.

## D. Post-Comps Status

### 1. University Registration Requirements

The student must meet the registration requirements of the Graduate College:

“The doctorate is granted primarily based on achievement rather than on the accumulation of semester hours of credit; however, the candidate is expected to have completed at least three years of residence in a graduate college. At least part of this residence must be spent in full-time involvement in one's discipline, at this University, beyond the first 24 semester hours of graduate work; this requirement can be met either by: (1) enrollment as a full-time student (9 semester hours minimum) in each of two semesters, or (2) enrollment for a minimum of 6 semester hours in each of three semesters during which the student holds at least a one-quarter-time assistantship certified by the department as contributing to the student's doctoral program. (For purposes of record and assessment of fees, student registration should reflect accurately the amount and kind of work undertaken in the Graduate College. All doctoral programs, including acceptable transfer credit, will contain a minimum of **72 semester hours of graduate work.**)”

### 2. Doctoral Continuous Registration

All students who have passed the Comprehensive Examination, and have completed the 72-s.h. residency requirement, are required to enroll for Doctoral Continuous Registration (GRAD:6002, for 1 s.h.) or for a minimum of 2 s.h. of formal coursework or research credit each semester in the academic year.

### 3. Seminar Course Requirement

All students are required to register for at least two 2-s.h. seminar courses prior to completion of the comprehensive examination (one is Writing in the Natural Sciences (BIOL:6188:0001)). At least *two additional 2-s.h. seminar courses* must be completed post comps. Tuition and fees are the same whether students enroll in GRAD:6002 or in a 2-s.h. course. This requirement may also be fulfilled by taking Biology Department “Topics” courses when available, by taking Fall COSMOS (BIOL:6298) for 2 s.h. as a seminar course, or by re-taking Spring COSMOS. Appropriate seminar courses with a substantial writing or presentation component may be taken in other departments with the approval of the DGS/GAC.

## E. Final Examination/Thesis Defense

### 1. Seminar

The Ph.D. final examination consists of a one-hour formal seminar and a thesis defense. The seminar is presented to a general audience, including any member of the University who wishes to attend. Please note that the talk should be scheduled at a time that would permit maximum attendance by all members of the Department. It does not have to immediately precede the thesis defense, although this is most often the case.

### 2. Thesis Defense

In the thesis defense, the Thesis Committee examines the student on the details of the thesis and on the relevant areas of biology. Students must (except in unusual circumstances) submit

their approved Ph.D. theses to the Graduate College within five years of passing the comprehensive exam. Final Ph.D. examinations are open to the public. All members of the Graduate faculty are eligible to attend and, subject to the approval of the Thesis Committee chair, to participate in the examination. The report of the final examination is due in the Graduate College office within 48 hours after the examination. Each member of the Thesis Committee evaluates the final examination. The same outcomes as those outlined for the comprehensive exam (see above) pertain to the thesis defense.

### 3. *First-author Publication*

PhD students in the iBio program are *expected* to have at least one first-author manuscript related to their original thesis work. This manuscript should be either accepted or undergoing minor revisions at a peer-reviewed journal at the time of their defense. In cases where this is lacking, a statement outlining the circumstances for the absence of a publication should be communicated to the Graduate Coordinator and DGS.

## F. Summary Time-Table for the Ph.D.

### 1. *Students Entering with Bachelor's or Master's Degree, Proceeding Directly to the Ph.D.*

**First Semester.** (a) Consult with temporary advisor, choose 1st rotation (July-pre semester); (b) perform laboratory rotations; (c) take core graduate courses and seminars; (d) choose research advisor and begin thesis research (end of Fall Semester).

**Second Semester.** (a) Correct all deficiencies (if any) in chemistry-physics-mathematics; (b) take additional core graduate courses (COSMOS); (c) undergo TA training and one-semester of the teaching requirement; (d) prepare for and take qualifying exam (summer).

**Second Year.** (a) Establish thesis committee; (b) formulate a plan of study toward the Ph.D.; (c) continue research; (d) complete advanced course requirements, WINS; (d) Take Ph.D. comprehensive examination (end of summer).

**Third Year (at latest).** (a) continue research; (b) finish all required courses; (c) take 2-s.h. seminar course to satisfy the four-seminar course requirement.

**Subsequent Years.** (a) Finish thesis research; (b) write and defend thesis; (c) take at least one 2-s.h. seminar course until you have satisfied the minimum requirement; (d) write and submit work for publication.

### 2. *Students Entering as M.S. Candidates and Proceeding to Ph.D. after Obtaining M.S.*

Same as above except that a Master's degree must be obtained by the end of the third year, the Ph.D. Dissertation Committee must be established within the first semester after obtaining the Master's degree, and the Ph.D. comprehensive examination must be taken within one year after obtaining the Master's degree.

## V. M.S. DEGREE IN BIOLOGY, WITH THESIS: REQUIREMENTS AND PROCEDURES

### A. Core Requirements

All requirements listed in Section I.B must be met.

### B. Thesis Sponsor and M.S. Thesis Committee

A student admitted to M.S. candidacy must identify a thesis sponsor prior to admission and form an M.S. Thesis Committee no later than the second semester of residence. This committee consists of three members, one of whom is the thesis sponsor. Students who change their degree objective from the Ph.D. to the M.S. with thesis may be granted an extra semester in which to identify a thesis sponsor. Failure to do so by the end of the one-semester grace period will result in dismissal from the program.

### C. Plan of Study

The student must submit to the Thesis Committee a complete plan of coursework for the M.S. degree. The committee must approve the plan, which will be placed in the student's file, with the signature of the chair of the committee. It is the responsibility of the sponsor to discuss changes in the plan with the committee and seek the committee's approval for the changes. The committee also should be consulted, at the sponsor's discretion, about progress of the student's thesis research.

### D. Course Work

At least 30 s.h. (in Biology or cognate disciplines) at the 3000-level or above must be taken, **not including courses taken to make-up deficiencies** (under I.A. and I.B, above). Specific courses, and areas in which courses are taken are to be determined by the thesis sponsor and/or M.S. Thesis Committee in consultation with the student as part of the **plan of study** (part 3). Credit for Research: Biology (BIOL:6199) pertaining to the thesis is limited to **9 s.h.** Among the courses included in the plan of study, at least two must be graduate level seminar courses for 2 s.h. credit (not including WINS or the 1 s.h. version of COSMOS). These seminar courses should include a writing requirement.

### E. Qualifying Exam

M.S. with thesis students may take the qualifying exam along with Ph.D. students ~ July 1 following the first year. The format will be identical and is described in Section IV.B. Students receiving passing scores or completing Reservations requirements will remain in the program. Students with a failing score may, at the discretion of the GAC (in consultation with the advisor and DGS), remain to finish the M.S. (with or without a thesis), but may not then advance to Ph.D. if desired.

### F. Laboratory Affiliation

Entering students who elect to pursue the M.S. degree with thesis must identify an M.S. thesis sponsor prior to admission. Notification that the affiliation is agreeable to the advisor must be sent to the Graduate Recruitment and Admissions Committee who will review the student's application and verify that all entry criteria have been met prior to admission. The student immediately affiliates with that faculty member's laboratory. Such a student will be supported either by teaching assistantships or by research assistantships funded by their research

sponsor's grants.

## **G. Thesis**

### *1. Evaluation and Approval of Thesis*

The student must prepare a thesis with the aid and criticism of a faculty sponsor and the thesis committee. The completed thesis must first be approved by the student's sponsor, and then by the student's thesis committee.

### *2. Guidelines*

- *Thesis Problem.* The thesis problem is ordinarily identified by the research sponsor, but the problem, hypotheses, and approaches should be sufficiently well understood by the candidate that the thesis describes them clearly.

- *Student's Contribution.* The thesis should contain intellectual input from the student, in addition to a significant amount of laboratory, computational and/or field work. The thesis should include technically competent experimentation and other approaches, exhibiting a reasonable standard of sophistication.

- *Significance of Research.* The research findings should be significant enough that there are plans to publish them, though not necessarily as a complete paper.

## **H. Deadlines**

The Graduate College Plan of Study Form (approved by sponsor and DEO) must be filed before mid-term (the Graduate College establishes deadlines each semester) in the semester or session in which the degree is expected. The student must also file for the Degree and for the Final Examination before deadlines established by the Graduate College in the semester in which the degree is expected. Forms for these purposes are available from the Graduate Program Coordinator.

## **I. The M.S. Final Examination**

The thesis defense consists of an oral examination administered by the Thesis Committee. Should this be failed, the student may try again in the next semester or summer session. A second failure will make the student ineligible to continue as a graduate student in the Department of Biology.

The exam procedure is the same for all students, including entering M.S. candidates, Ph.D. candidates in good standing who choose to change their status to M.S. with thesis, and Ph.D. candidates who fail the Comprehensive Examination and change their status to M.S. [In accordance with the rules of the Graduate College, students who have failed the Comprehensive Examination twice will be ineligible under any circumstances for readmission to the Department as a Ph.D. candidate.] The oral examination will mainly be a defense of the thesis. This oral examination is intended to indicate that the student both comprehends the nature of the research accomplished and can analyze and interpret experimental and other relevant data.

## **VI. NON-THESIS M.S. DEGREE IN BIOLOGY: REQUIREMENTS AND PROCEDURES**

### **A. Core Requirements**

All requirements listed in Section I.B must be met.

### **B. Sponsor and Examination Committee**

Students must identify a faculty sponsor prior to admission to non-thesis M.S. candidacy and must establish an Examination Committee no later than the end of the semester in which the student is admitted to M.S. candidacy. The committee consists of three members including the sponsor (who will chair the committee).

### **C. Plan of Study**

The student must submit to the Examination Committee a complete plan of coursework for the M.S. degree. The committee must approve the plan and the plan should be placed in the student's file, with the committee chair's signature. It is the responsibility of the sponsor to discuss changes in the plan with the committee and seek the committee's approval for the changes.

### **D. Course Work**

At least 34 s.h. of 3000-level or higher course work must be taken, not including courses taken to make up deficiencies from I. B. or C. (see note 2). Up to 8 s.h. of supervised Research: Biology (BIOL:6199), though insufficient to form the basis of a Master's Thesis, can be used to satisfy the total requirement for 34 s.h. of coursework. No more than 4 s.h. may be assigned to the required "report" (see below). Among the 34 s.h., the student must take at least two graduate level seminar courses for 2 s.h. credit (not including WINS or the 1 s.h. version of COSMOS). These courses should include a writing requirement.

### **E. Qualifying Exam**

M.S. without thesis students are not required to, but may take the qualifying exam along with Ph.D. students, around July 1 following the first year. The exam format is the same and is described in Section IV.B. Students receiving passing scores or completing Reservations requirements will remain in the program. Students with a failing score may, at the discretion of the GAC (in consultation with the advisor and DGS), remain to finish the M.S., but may not then advance to Ph.D.

### **F. Written Report**

The student must prepare a written report based on library research, on a topic chosen by the student in consultation with his/her sponsor. No more than four hours of credit may be submitted for this report, using BIOL:6899, toward the necessary total of 30 hours. A copy of the report is to be deposited into the student file.

### **G. Written Examination**

After the report has been approved by the faculty sponsor, the student is eligible to take the written examination (prepared and administered by the three-member Exam Committee, covering the student's graduate program in Biology, including the area of the required report).



The examination should emphasize breadth of knowledge and the ability to work with knowledge acquired to answer broad, as well as narrow, questions of biological importance. If this examination is failed the student may be re-examined in the following semester or summer session. No oral examination is required. In the event of marginal written examination performance, however, the Exam Committee or its appointed subcommittee may ask the student, in an interview, to expand upon, or explain answers not fully satisfactory, after which the Committee will determine whether the student has passed or failed the examination. A grade of pass completes requirements for the degree.

**Students who pass the Ph.D. Comprehensive Examination and later change their degree objective to M.S. (without thesis) need not take a written examination, since the Comprehensive Examination includes an oral examination that can substitute for the M.S. written examination.**

## **VII. Advancing from the M.S. to the Ph.D. program**

Transitioning from the M.S. program to the Ph.D. program can be approved for qualified students who have passed the qualifying exam seeking to pursue a Ph.D. with the **same faculty sponsor, with mutual agreement between student and sponsor. This transition can be made any time prior to the defense of the M.S. degree and does not require completion of the M.S. degree.**

The application process to advance directly to the PhD program does not require a formal on-line application. Statements from the student seeking advancement and from the advisor confirming support according to direct lab affiliation guidelines are submitted to the iBio DGS, coordinator and Biology DEO. (Historically students have been supported as an RA for the first semester as a Ph.D. student as well as the first summer semester, with Spring semester support through TAsip). Once advancement is initiated, the Graduate Recruitment and Admissions Committee (GRAC) would vote on admission to the Ph.D. program and be ratified by the DGS. A "Change of Status" form is signed by the DGS and submitted to the Graduate College. Courses 3000 level and above taken as an M.S. student, including Research Biology and the Qualifying Exam, would transfer toward the Ph.D. Any cognate course deficiencies remaining from entry to the M.S. program need to be addressed within the first year in the Ph.D. program.

Students wishing to leave the M.S. program (with or without completion) and enter the Ph.D. rotation program must reapply to the Integrated Biology Ph.D. program and may be required to retake the Qualifying Exam, at the discretion of the GAC and DGS.

## **VIII. FINANCIAL SUPPORT**

Reviewed: June 2021

### **A. Conditions of Support**

#### *1. Ph.D. Students.*

**All Ph.D. students are guaranteed full 12-month stipends, tuition, and fees as long as they remain students in good standing and are making satisfactory progress toward the degree and are qualified for teaching assistantships.** Salary is at the level negotiated by COGS. Ordinarily, this means that support will be guaranteed for up to five years. Support following the fifth year will depend on the availability of funds and an assessment of the likelihood that degree requirements will be completed in an acceptable time-frame.

## *2. M.S. Students (w/ or wo/ Thesis).*

Thesis M.S. students may be supported by research grants or Teaching Assistantships during the academic year. Salary is that negotiated by COGS. TAs generally receive the minimum academic year tuition scholarship required by the Graduate College. Support of any kind is generally not provided to M.S. wo/thesis students.

## **B. Sources of Support**

### *1. Research Assistantships.*

Funds for nearly all research assistantships come from faculty research grants. Usually, research assistantships are designated as half-time appointments and they are designed to permit students to devote themselves full-time to their own research.

### *2. Teaching Assistantships.*

Teaching Assistantships are usually half-time appointments, but may be  $\frac{1}{4}$ -,  $\frac{3}{4}$ -, or full-time. Half-time service usually requires 6-8 contact hours in laboratory or discussion class sessions a week. Additional time is required to attend class lectures, attend staff sessions, prepare and administer quizzes, and grade exams and homework assignments. Students with officially designated  $\frac{1}{2}$ -time appointments may register for a maximum of 15 s.h. per semester, but are advised to register for fewer hours in the first semester as a teaching assistant. With  $\frac{3}{4}$ -time appointments, registration is limited to 9 s.h. A few summer appointments may be available (1 or 2 months). M.S. candidates who hold an academic year teaching assistantship are guaranteed a tuition scholarship at the level specified in the existing University agreement with COGS. Non-native speakers must attain B-level language certification to be eligible for teaching assistantships.

### *3. DSHB Fellowships*

In some years, depending on availability of funds, some students may be supported through fellowships from the Developmental Studies Hybridoma Bank (DSHB). These fellows will receive training in monoclonal antibody production and characterization, either through an off-semester course or by directly working with DSHB personnel, and usually work to produce an antibody relevant to their thesis research.

### *4. Other University-Wide Appointments and Support.*

The Department participates in externally funded training grants and interdepartmental programs/science outreach internships. Support from these programs and their requirements vary widely and in most cases the requirements are not applicable to entering students.

### *5. External Fellowships.*

The Department encourages graduate students to apply predoctoral fellowships from all sources including the NIH, NSF, and private funding agencies.

## **IX. GRADUATE STUDENT PARTICIPATION IN THE DEPARTMENT**

### **A. Graduate Student Steering Committee (GSSC)**

Graduate students in the Department of Biology collectively act within the department as a constituent organization that jointly sponsors certain activities, both professional and social (i.e., holding practice talks for students, and organizing the yearly graduate student retreat), and elects its own Graduate Student Steering Committee (GSSC). The elected members of the GSSC serve as officers of the organization. Incumbent members of the GSSC arrange for annual elections and maintain a list of alternate members who become members of the GSSC in the event vacancies develop. To be elected, students must be in good academic standing. Re-election is possible. The elected members of the GSSC may also serve as student representatives in Department of Biology faculty meetings.

### **B. Graduate Student Input in Departmental Matters**

Students influence departmental practices informally through day-to-day contact with each other and with faculty and staff. In addition, general faculty meetings are open to all members of the department community. Agenda notices are distributed in advance. Any person recognized by the chairperson may speak. Attendance at meetings dealing with evaluation, retention, and promotion of personnel are restricted to faculty and essential staff members; however, graduate student input relevant to candidates for tenure track positions is solicited. Graduate students may also have a representative on the GRAC.

### **C. Graduate Student Travel Awards**

Enabling graduate students to travel to academic conferences contributes to both their professional development and to the visibility of the department. Therefore, to the extent possible, and within the financial constraints of an approved annual budget, the department will support graduate student travel according to the following guidelines. To be eligible for departmental funds, students must:

1. be invited to present a research paper at the conference (simply attending a conference does not count);
2. be enrolled in the Integrated Biology (iBio) program (Ph.D. or M.S.), in good standing, at the time of the conference;
3. have the support of his or her advisor/mentor to participate in the conference.

Funding is limited. It is therefore expected that students will use personal funds and/or funds from other sources for many of the travel costs. Some sources include:

Graduate Student Senate, <http://gss.grad.uiowa.edu/funding/gss-travel-funds>; Executive Council of Graduate & Professional Students, <http://ecgps.uiowa.edu/grants/travel-grants/>; International Programs (for travel outside the U.S.), <http://international.uiowa.edu/grants/students/funding/graduate/international-travel.asp>; relevant research or training grants

Travel awards are limited to one conference per student per fiscal year. The number of awards and the annual award amount is determined by the availability of funds and the number of applications.

## **Travel award application procedures:**

Application due dates: For travel occurring between January 1st – May 31st, applications are due by December 1st of the previous year; for travel during June 1 – December 31st, applications are due by May 1st of that year. Applications received after the deadline will be considered only if the maximum # for that year has not been met, and may be awarded retroactively in some cases.

Process: Students complete a graduate student travel request form (available on iBio website), have it signed by the advisor/mentor, and submit it either electronically or in paper form to the department accountant. The application will be reviewed by an accountant for availability of funds and by the departmental DEO for other eligibility requirements.

Students are generally notified by email as to the status of the award no later than 2 weeks after the deadline. If approved, an email message is sent including a departmental MFK used for travel expenses, up to the total amount of the award.

## **X. GRADUATE STUDENT DISMISSAL PROCEDURES**

### **A. Graduate College Policies**

Graduate Policies on Academic Standing, Probation, and Dismissal [including grievance procedure] may be found [here](#).

### **B. Department Procedures**

#### *1. Dismissal Due to Inadequate GPA.*

A student who does not meet the departmental GPA requirements (see Section I.B) can no longer be a graduate student in good standing in the Department and will be dismissed. In very unusual cases involving extenuating circumstances, the GAC may recommend to the Chair that a student be given an extra semester to meet the GPA requirement.

#### *2. Dismissal Due to a Second Failure of the Comprehensive Examination, the Final Ph.D. Examination (Thesis Defense), or the Final M.S. Examination.*

Graduate students may appeal the decision of the thesis committee by requesting action by the Chair. If on appeal, the Chair feels there is reasonable cause, the matter will be referred to the GAC or to an ad hoc committee to consider the appeal, during which time the student will be allowed to present evidence that would justify granting of the request for reconsideration.

#### *3. Dismissal Due to Failure to Make Satisfactory Progress.*

**Causes for Dismissal.** Unsatisfactory progress includes any of the following:

Failure to meet departmental deadlines for completion of formal course requirements or satisfactory completion of the comprehensive examination. Voluntary disaffiliation from a research laboratory and inability to identify a new research sponsor within four weeks. Dismissal from a research laboratory by the research sponsor because of unsatisfactory performance or unsatisfactory progress in research, and inability to identify a new research sponsor within four weeks.

**Appeal of Dismissal Due to Failure to Meet Departmental Deadlines.** Students may petition the GAC in writing for extension of a deadline. The request for an extension must provide sufficient information to allow the GAC to decide whether an extension is justified. If the request for an extension is denied, the student can no longer be a graduate student in the Department.

**Appeal of Dismissal Due to Failure to Identify a Research Sponsor Following Disaffiliation or Dismissal from a Laboratory.** If a student leaves a research laboratory for any reason, the student should immediately consult with the DGS and/or DEO to determine an appropriate course of action, which could include mediation by the Associate Chair/DGS and/or the Chair. The decision to dismiss a student for failure to identify a new sponsor within 4 weeks can be appealed to the GAC in writing.

## XII. FACILITIES AND RESOURCES

### A. Departmental Facilities

**Research Facilities.** Department-sponsored facilities exist to facilitate your research. Descriptions of these and other department facilities and instructions for their use can be found on the Biology homepage. Among the available facilities are the following: the Carver Center for Imaging, Developmental Studies Hybridoma Bank (DSHB), Electronics Shop, Greenhouse, Information Technology and Computer Services, and the Carver Center for Comparative Genomics (DNA sequencing, Microarray Analysis, Software).

**Copying/Printing Privileges.** Students may use copiers in 125 BB or 108 BBE (or elsewhere in the Department) or copiers in the Biology Library, subject to the following conditions: a) Copying related to official teaching duties may be charged to a department account. b) Copying directly related to research may be charged to a specific laboratory account with prior approval of the supervising faculty member. c) Copying of material for use in courses taken by the student and other copying not related to official teaching duties or supported by grant accounts must be paid for by the student; such copying should ordinarily be done so as not to inconvenience other users, preferably on one of the library copiers. Students will also be supplied with specific codes for printing research or teaching related jobs.

### B. Libraries

#### 1. *University Libraries.*

University libraries including the Sciences Library can be accessed online.

#### 2. *Sciences Library Access.*

Biology graduate degree candidates are assigned electronic access to the Sciences Library. This permits access to the Library after regular hours. Acceptance of electronic access is with the explicit understanding that it will be used only by the student to whom it is issued. The access holder is not to admit any other person to the Biology Library or to take books or journals out of the library without signing out for them.

### C. University-Wide Facilities

See: [The Carver College of Medicine's Core Research Facilities webpage.](#)

**Office of Animal Resources** The husbandry and veterinary care of all research animals is

the responsibility of the Office of Animal Resources. It is centrally managed by staff of trained animal caretakers, veterinary technicians and veterinarians. Animal facilities are located in multiple campus locations and can accommodate multiple species of animals.

**Biochemistry Stores** Biochemistry Stores stock a broad range of research chemicals, labware, glassware, expendables, and other necessary research supplies and uses purchasing experience and high sales volume to negotiate the purchase of high quality inventory at the lowest possible prices. The store dispenses on a walk-in basis in a quick, efficient manner.

**Bioengineering Services** Bioengineering Maintenance provides professional maintenance of the University of Iowa Hospital and Clinics' patient-care equipment and the College of Medicine's research equipment. Bioengineering Design offers custom electronic design and fabrication services. Capabilities include (but are certainly not limited to) embedded micro-controllers, Digital Signal Processing, custom programmable logic devices, computer interface hardware and software, and high-performance analog amplification and signal conditioning.

**Biomedical Research Store** The Biomedical Research Store provides University of Iowa research investigators easy procurement of common molecular and cell biology enzymes, reagents and kits. Large volume contracts enable the store to negotiate very low prices as well as eliminate all shipping and packaging fees.

**Central Microscopy Research Facilities** Widely regarded as one of the best university biomedical microscopy resources in the country, the Central Microscopy Research Facilities provide instrumentation and technical assistance to research programs involving the use of light and confocal microscopy, scanning and transmission electron microscopy, freeze fracture and elemental analysis.

**Crystallography Facility** The goal of the Crystallography Facility is to provide necessary support and infrastructure to enable individual investigators to initiate structural studies. This includes facilities for protein characterization, crystallization, data collection and structure determination and refinement.

**Flow Cytometry Facility** The Flow Cytometry Facility has one magnetic-based and six laser-based instruments whose major purpose is the identification and isolation of various cell populations. The laser-based instruments accomplish this by the use of antibodies to which various colors or dyes have been attached and are directed at molecules known to exist on the cell surface. By using several colors attached to different antibodies, one can identify and purify cells that express any given configuration of various molecules.

**Genome Editing Core Facility** The Gene Targeting Facility provides technical and research services to investigators on the University of Iowa campus and elsewhere for the generation of gene knockout mouse models.

**Viral Vector Core Facility** The Viral Vector Core Facility's (VVC) overall objective is to support investigators in the use of gene transfer technologies. The GTVC utilizes molecular biology techniques to engineer and develop viral vectors based on multiple vector systems necessary for gene transfer in research experiments or pre-clinical studies. Vector core staff and investigators allow for cross fertilization of ideas, technical advancements, and innovations in vector design.

**High Resolution Mass Spectrometry Facility** The High Resolution Field Mass Spectrometry Facility provides information pertaining to the molecular weight, elemental composition, and molecular structure of a compound. The Facility performs high resolution mass

spectrometry experiments or accurate mass measurements to determine the elemental formula of a new synthetic molecules and natural products. The HRMSF can also perform tandem mass spectrometry experiments which are used to assist in the structure determination of unknown molecules.

**Proteomics Core Facility** The Carver College of Medicine Proteomics Facility is located on the third floor of Eckstein Medical Research Building. The Facility will feature a linear ion trap mass spectrometer with ETD capabilities and an incorporated Eksigent nanoHPLC. The College anticipates both "discovery" proteomics and in-depth analysis of peptides for post-translational modifications can be performed. Full proteomics software will be available as well as an automated tryptic digester.

**Tissue Procurement Core** The goal of the Tissue Procurement Core Facility is to make available human tumor tissue for current cancer research studies. The core provides research and infrastructure in the form of a well-characterized bank of frozen and, routinely processed, neoplastic and normal tissues suitable for molecular genetic, bio-chemical and pathological studies.

**Transgenic Animal Facility** The Facility provides centralized instrumentation and expertise in the generation, breeding and analysis of transgenic animals in support of research initiated by Collegiate investigators. The main goal of the Facility is to generate and subsequently identify transgenic mice requested by investigators in the biomedical sciences at the University of Iowa and Iowa State University.

### XIII. ETHICS

#### A. Scientific Misconduct

##### 1. *Consequences.*

Scientific misconduct is grounds for dismissal from the Department of Biology.

##### 2. *Published policies.*

A statement of NIH policies on Research Integrity may be found [here](#). This statement includes a list of practices that involve scientific misconduct. The policies of NIH regarding academic misconduct are to be adhered to at all times. It is extremely important for students to understand these policies and their implications for their own research. Note that misconduct does NOT include honest errors of judgment or differences of opinion regarding the interpretation of data.

#### B. Academic Misconduct

Any form of cheating, plagiarism or misrepresentation of one's work in respect to curricular and research requirements is grounds for dismissal. **Plagiarism is "cheating" and is not tolerated.** It is taking another's ideas, words, or creative works and presenting them as your own, or presenting them intentionally without proper attribution (see Appendix I for clarification and [the Graduate College Manual](#) for an outline of Graduate School Policy regarding Academic Misconduct).

## C. University Policy on Sexual Harassment and Human Rights

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. It is critical for graduate students both as colleagues in a laboratory setting and potentially as TAs to understand what constitutes sexual harassment, how to avoid it, and how to deal with it when it arises. Students should access the [University Sexual Harassment webpage](#) for definitions, assistance, and a statement of the full University policy. In addition, refer to the University policy on human rights [here](#).

## APPENDIX I: Recognizing and Avoiding Plagiarism

### A. Recognizing Plagiarism

#### 1. Definition.

Plagiarism is the use of other people's intellectual material and/or efforts in place of one's own work, and representing these materials and/or efforts as one's own work. In other words, "plagiarism occurs when a writer uses someone else's language, ideas, or other original material without acknowledging the source" (from "Defining and Avoiding Plagiarism", by the Council of Writing Program Administrators, obtainable from the Internet [here](#)).

#### 2. Examples of Plagiarism in an Academic Setting.

- Presenting part or all of another student's lab report or other written assignment as one's own.
- Use of an essay, review, report, or other material purchased or obtained free from any kind of "writing service" or database (such as are found on the Web) to complete a class assignment.
- Copying from an unpublished or published source, including a textbook, lab manual, or other class material.
- Copying from a published paper and using the material in one's own term paper, grant proposal, or manuscript without proper attribution.
- Copying from a web site and using the material in one's own term paper, grant proposal, or manuscript without proper attribution.

### B. Negative Consequences of Plagiarism in an Academic Environment

#### 1. Plagiarism is cheating.

Students are here to learn a body of skills and materials, and to be assessed on how well they have learned. Any form of cheating impedes learning and misrepresents one's capacity to perform.

#### 2. Products of intellectual work are property; just as other products of work are property.

To use another person's work without crediting that person is intellectual theft. This is a major issue in the academic world where ideas and the presentation of ideas are used for professional credit.



### 3. *Plagiarism destroys trust between and among professors and students.*

Trust is an essential component of research and the communication of ideas. Without trust, both education and research are seriously impaired. Plagiarism cannot be tolerated if the University is to fulfill its educational mission.

#### C. Penalties for Plagiarism

Penalties for first offenses of plagiarism or any other form of cheating can include reduction in grade on an assignment or in a course (including reduction to an F in the course) at the instructor's discretion. Plagiarism can also lead to disciplinary probation. A second offense can result in suspension or expulsion from the University.

#### D. Clarification: What Plagiarism Is and What It Isn't

##### 1. *Further Examples of Plagiarism.*

**A source does not have to be copied word-for-word to be plagiarized.** The use of small sections of a source, interspersed with non-plagiarized material, without scholarly or peer attribution, is plagiarism. Likewise, using material that has been modified by paraphrasing, substituting synonyms, altering punctuation, or changing rhetoric in ways that do not substantially alter the original passage, without attribution to the source, is plagiarism. Evidence for plagiarism is the illegal use of material per se, not one's actual intent. A charge of plagiarism is not automatically nullified by claims such as "I didn't know I was copying", or "I didn't know I couldn't copy that material" or "I didn't intend to plagiarize." The concept of plagiarism applies to material from the Internet as for printed material. A person who supplies material that is illegally copied is as guilty as the copier in any case in which two papers are so similar that they are judged to share a common source, unless it can be clearly demonstrated that a fellow student has taken from another student's original work by copying, downloading, or stealing materials without the student's knowledge.

##### 2. *Some Uses of Other People's Language or Work that Is Not Considered Plagiarism.*

**Technical terms and language.** No matter how specialized a term is, once it has been used to describe a certain situation, it becomes common property.

**"Common knowledge".** Repeating "boilerplate" phrases such as "The purpose of this report is to analyze heredity in *Drosophila*" would not ordinarily be counted as plagiarism, since such sentences may turn up repeatedly in reports written independently. However, statements expressing scientific ideas, data, or conclusions do not fall under this exception.

**Quotations.** It is legitimate to use another person's work verbatim if it is presented as a direct quotation. To do so, the material must be enclosed in quotation marks and the author and source must be cited. For example, here is a correctly presented quotation from a biology text: "...the biological species concept hinges on reproductive isolation, with each species isolated by factors (barriers) that prevent interbreeding, thereby blocking genetic mixing with other species." --Campbell, N.A., and Reece, J.B., *Biology*, 6th Ed. Benjamin-Cummings, San Francisco, 2002. p. 465. However, quotations are used only occasionally, to 'dress up' a report, and are not extensively used in primary scientific literature.

**Improperly or Incorrectly Referencing Material.** An incomplete reference or one with a typographical error is not plagiarism. However, deliberately citing the wrong sources is a serious offense, because it makes it harder for the reader to assess the accuracy of the information you

present.

**Recycling One's Own Earlier Writing.** Technically, it is not considered plagiarism. However, if you quote your own earlier writing it is considered proper to place it in quotation marks and cite its source. Furthermore, "submitting the same paper in more than one course without the knowledge and approval of the instructors involved" is considered a form of cheating (see Chapter IX of the CLAS Student Academic Handbook, cited above). And, the same would apply to submitting a paper to more than one journal.

## E. How to Make Sure Not to Plagiarize

### 1. *Avoid poor work habits.*

Many people inadvertently (but still improperly!) plagiarize because of poor work habits. For example, some people copy notes word-for-word from a source as they read, put the notes aside, and later compile the assignment by reading and typing directly from those notes.

### 2. *Let your notes summarize your own ideas.*

As you read source material, condense it in your own words, and write those as notes. Write commentaries on the material as you read it.

### 3. *Write from an outline.*

Make an outline of the assignment, then write a rough draft without consulting your sources.

### 4. *Check facts.*

Go back to the source material to check facts and to make sure that major ideas are expressed correctly.

### 5. *Consult.*

When in doubt, check with an instructor or your research sponsor.

## APPENDIX II: Courses of interest for Specific Areas of Specialization

Reviewed: 2021

*Students lacking the equivalent background should enroll in the following courses, which they could have taken as an undergraduate.*

**BIOC:3110 Biochemistry 3 s.h.** Chemistry, metabolism, molecular biology of living systems. Prerequisites: two semesters of general chemistry, one semester of organic chemistry, and one of the following: a life science course, an additional organic chemistry course, or consent of instructor.

*or*

**BIOC:3120 Biochemistry and Molecular Biology I 3 s.h.** Structures of nucleic acids, proteins, carbohydrates, lipids, and their participation in cellular transport, catalysis, oxidative reactions; first course of two-semester course that concludes with 099:130. Prerequisites: two semesters of general chemistry and one of organic chemistry.

and

**BIOC:3130 Biochemistry and Molecular Biology II 3 s.h.** Molecular dynamics of biological systems, metabolism of lipids and nitrogen-containing compounds; information transfer in prokaryotes, eukaryotes; recombinant DNA techniques; chemistry and enzymology of replication, transcription, translation, cell transformation, regulation of gene expression. Prerequisite: 099:120.

### A. Advanced Lecture Courses

The following courses are considered advanced lecture courses (3000-level or greater) to satisfy the 6 s.h. course requirement for the iBio program. Courses lacking an additional prerequisite beyond introductory biology are not counted towards the advanced lecture requirement. These would include any lecture courses used to make up for undergraduate deficiencies (e.g., Physics, Biochemistry, or Fundamental Genetics) and other specialized introductory courses (e.g., Cell Biology (BIOL:2723), Ecology (BIOL:2673), 2000-level). This list is not exhaustive, and students are encouraged to seek out other appropriate courses in consultation with their advisor and the DGS.

| Courses offered through the Biology Department     |           |        |
|--|-----------|--------|
| Evolution  | BIOL:3172 | 4 s.h. |
| Introduction to Developmental Biology              | BIOL:3233 | 3 s.h. |
| Genomics   | BIOL:3314 | 3 s.h. |
| Plant Development Biology                          | BIOL:3363 | 3 s.h. |
| Human Population Genetics and Variation            | BIOL:3373 | 3 s.h. |
| Plant Response to the Environment                  | BIOL:3663 | 3 s.h. |
| Molecular Genetics                                 | BIOL:3713 | 4 s.h. |
| Genes and Development                              | BIOL:4333 | 3 s.h. |
| Neurophysiology: Cells and Systems                 | BIOL:4353 | 4 s.h. |
| Molecular Evolution: Genes, Genomes, and Organisms | BIOL:4373 | 3 s.h. |
| Fundamental Neurobiology I                         | BIOL:5653 | 3 s.h. |

| <b>Courses offered through the Biology Department</b>         |           |        |
|---|-----------|--------|
| Fundamental Neurobiology II                                   | BIOL:5654 | 3 s.h. |
| <b>Courses offered through the Biomedical Science Program</b> |           |        |
| Principles Molecular & Cellular Biology                       | BMED:5207 | 3 s.h. |

**B. Data Informatics Courses (best options are bolded)**

| <b>Courses offered through the Biology Department</b>                    |                       |               |
|--|-----------------------|---------------|
| <b>Introduction to Systems Biology</b>                                   | <b>BIOL:3383</b>      | <b>3 s.h.</b> |
| <b>Bioinformatics for Beginners</b>                                      | <b>BIOL:3212</b>      | <b>3 s.h.</b> |
| <b>Bioinformatics</b>  | <b>BIOL:4213</b>      | <b>4 s.h.</b> |
| <b>Introduction to Scientific Computing for Biologists</b>               | <b>BIOL:4386</b>      | <b>3 s.h.</b> |
| <b>Courses offered through other departments (availability may vary)</b> |                       |               |
| <b>Introduction to Biostatistics</b>                                     | <b>BIOS:4120/5110</b> | <b>3 s.h.</b> |
| <b>Biostatistical Methods I/II (includes programming in R)</b>           | <b>BIOS:5710/5720</b> | <b>4 s.h.</b> |
| Biostats for Biomedical Research (Subsession: Off-cycle)                 | BIOS:5050             | 1 s.h.        |
| Bayesian Methods and Design (many prereqs)                               | BIOS:6810             | 3 s.h.        |
| Biostat. Methods Categorical Data (some prereqs)                         | BIOS:5730             | 3 s.h.        |
| Practical Bioinformatics (Subsession: Off-cycle, Jan.)                   | BISC:5205             | 1 s.h.        |
| Bioinformatic techniques   | BME:5320              | 3 s.h.        |
| Computational Genomics (many prereqs., including BME:5320)               | BME:5330<br>BIOL:5320 | 3. s.h.       |

|   |                   |               |
|---|-------------------|---------------|
| Knowledge Discovery                         | CS:6421           | 3 s.h.        |
| Big Data Analytics (some math/stat prereqs) | IE:4172           | 3 s.h.        |
| <b>Introduction to Informatics</b>          | <b>IGPI: 3110</b> | <b>3 s.h.</b> |
| <b>Probability and Statistics</b>           | <b>STAT:3120</b>  | <b>4 s.h.</b> |