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PROGRAM OF STUDY (IN BRIEF)

Quantitative Approaches Bootcamp

Incoming students from all programs in the Biological Sciences Division are strongly encouraged to attend the week-long Quantitative Approaches Bootcamp, held at the Marine Biological Laboratory in Woods Hole, Massachusetts, in September each year. DRSB students are expected to attend.

Founded in Woods Hole, Massachusetts, in 1888, the MBL is a private, nonprofit institution and an affiliate of the University of Chicago. The MBL is dedicated to scientific discovery and improving the human condition through research and education in biology, biomedicine, and environmental science.

The Bootcamp will include workshops, tutorials, seminars, and social activities designed to develop students’ computational, statistical, and professional skills, familiarize them with the MBL, and help them get to know their fellow first-year students in the BSD.

First Year

The first year of graduate study is spent in coursework, independent reading, and exploratory research. Students are required to undertake short research projects in at least three different laboratories before beginning their dissertation research. These rotations are performed during the first academic year—one each quarter. Additional rotations and/or later rotations require approval from the Curriculum Committee. A written report or oral presentation is required for each rotation; all rotations are graded, and two count towards the course requirement for the degree.

A seminar course, Introduction to Research, has been organized particularly for first year students. This course consists of a series of presentations by faculty to introduce their research programs.

There are multiple seminar series within the Biological Sciences Division, including a monthly seminar offered by the Committee and a biweekly Research in Progress/Journal Club series in which DRSB students and postdocs present either their own work or lead discussion of a recent paper of interest. Students are required to attend the DRSB seminars and Research in Progress/Journal Club talks and are encouraged to attend other seminars of interest.

In winter quarter, first year students will be scheduled to give a Journal Club presentation in the above-mentioned series. In close consultation with their advisor, the student will select a paper in a field distinct from any of their prior or planned research experiences. In preparing for this Journal Club presentation, the student is expected to read broadly in the chosen field, so as to develop the knowledge base from which ideas for the Preliminary Examination Proposal will emerge.

At the end of June, students take the Preliminary Examination as a first step towards candidacy for the Ph.D. The exam consists of the preparation of a written research proposal in the field of developmental biology and an oral defense of that proposal. Further information about the process and expectations can be found on pp. 13-15 of the handbook.
Second Year

Coursework will continue during the second year as needed to fulfill the requirements. Students choose research advisors by July 1 of the Summer Quarter after the first year, and begin developing a research project. By early Fall Quarter, each student assembles a thesis committee: it is composed of the student's advisor and three other faculty members. Its members are proposed by the student and the student’s advisor, and must then be approved by the Curriculum Committee. The student then prepares a written proposal for dissertation research and defends this proposal before the thesis committee (the Qualifying Examination) in Winter Quarter, by the end of January. The Curriculum Committee must be consulted ahead of time if this deadline cannot be met. Passing the Qualifying Exam permits the student to enter into candidacy for the Ph.D. Students must have a subsequent meeting with their thesis committee before the start of the Fall quarter of their third year.

Advanced Years

After the Qualifying Exam, students focus primarily on thesis research. In some cases, students may elect to take one or more additional advanced classes. Students are encouraged to take advantage of the many seminars, Journal Clubs and Research in Progress series that are offered within the division. Regular participation in the DRSB Journal Club is expected.

Students are strongly recommended to attend and present their work at least once at a national/international research conference before graduating, and ideally once a year in their 3rd, 4th and 5th years of study (smaller regional conferences can often provide great opportunities to give talks rather than posters). DRSB has limited funds that can be applied for to help defray the cost of traveling to meetings – only students who are presenting their work are eligible. Finally, each graduating student writes a dissertation describing their research, presents the work in a public seminar, and defends it before a faculty examining committee. As described further below, DRSB students are required to publish a minimum of one first author peer-reviewed paper in order to graduate.

Evaluation

Throughout their term as graduate students, students are expected to have frequent informal conversations with professors in their courses, their research advisor, and members of their doctoral committees. In this way, students can obtain frequent appraisals of their progress and constructive advice.

Formal evaluation of each student's progress continues every academic year. In the first year and a half, the evaluation is based on the student's performance in courses, laboratory rotations, the Preliminary Examination, and the Qualifying Examination. In later years, the research advisor and doctoral committee oversee the student’s dissertation research progress; a report is submitted after each meeting that becomes part of the student’s permanent file and is reviewed by the Curriculum Committee. If the Committee is apprised of any deficiencies in performance, the student will receive a letter describing those deficiencies and making suggestions about how they might be remedied. Students in their fifth and later years must meet with their doctoral committee every six months.

Requirements for the Master of Science Degree

Requirements for the Terminal Master of Science Degree

Students in the Committee are admitted directly for study towards the Ph.D. degree. In exceptional cases, when students leave the program they may receive a M.S. degree. This requires completing
six (6) courses, including the core courses; students must receive a grade of B or better in two of the three distributional courses and two of the three developmental biology courses, and maintain a B average overall in coursework. The Curriculum Committee must approve the awarding of the M.S. degree in each case. Students may, of course, elect at any time to leave the program without completing the required courses or receiving the M.S. degree.

Requirements for the Transitional Master of Science Degree

Students may apply for a transitional degree of Master of Science. The transitional Master’s will only be awarded to candidates who have 1) been matriculated for three quarters or more, 2) successfully completed all course requirements for the Ph.D. and met the requirement for a B average, 3) successfully completed the Preliminary Examination, and 4) are otherwise in good standing at the time of application. To request the transitional Master’s degree, students must contact the Graduate Program Administrator and must submit their degree application online.

REQUIREMENTS FOR THE PH.D. DEGREE

A Ph.D. candidate must fulfill certain formal coursework requirements, pass the candidacy examinations, and present a satisfactory dissertation describing the results of original research.

The Committee expects a knowledge of and proficiency in contemporary developmental biology as well as in the related fields of molecular biology, cell biology and genetics. This requirement will normally be met by fulfilling the formal coursework listed below, but detailed degree programs are flexible. Courses taken at other institutions, in other departments, or as part of the Medical School curriculum may substitute for required Committee courses with the approval of the Curriculum Committee.

Formal Coursework

To obtain a Ph.D. in the Division of Biological Sciences, nine graded courses are required. The DRSB graduate program requires a “quality” letter grade; a grade of “Pass” (or “P”) will not fulfill the requirement, unless a course only provides pass/fail grading. Of the nine courses, the Committee requires three in developmental biology, and one course in each of the following disciplines:

- quantitative analysis
- cell biology or molecular biology
- genetics

First year students are expected to take three courses each quarter; to meet this requirement, students generally take two courses plus a rotation each quarter. All three rotations are graded, but only two are counted toward fulfilling the Divisional requirement of nine graded courses.

Students entering the DRSB program with prior graduate-level coursework can petition the Curriculum Committee to waive specific course requirements. Individualized curricular plans should be developed in consultation with the student’s faculty advisor prior to petitioning the Curriculum Committee for formal approval. All individualized curricular plans must fulfill the Divisional requirement of nine graded courses.

In addition to taking two courses and a rotation each quarter, first year students are required to take DVBI 31800, “Communicating Developmental Biology Concepts”. This is a two-year (six quarter) course that is graded Pass/Fail. Upon completion, the two-year sequence fulfills one Divisional course requirement. First year students are also required to take the seminar course,
“Introduction to Research”; this is graded Pass/Fail but is not counted toward the Divisional requirement.

At the start of the academic year, first year students meet as a group and individually with the Curriculum Committee to discuss their course plan. First year students also meet with their faculty advisor prior to each quarter’s registration deadline. First year students must obtain approval from both their advisor and the Curriculum Committee to take fewer than two courses and a rotation in a quarter. A student may not drop a course without the approval of both their academic advisor and the Curriculum Committee.

Rising second year students must also meet with the Curriculum Committee at the start of the academic year to discuss their plans to fulfill any remaining course requirements, their progress in their research lab and any other relevant issues.

**Training Grant Requirements**

Students should be aware that training grants may have additional course requirements that funded students must fulfill. As training grant appointments usually start at the beginning of a student’s second year, additional course requirements are fulfilled during the second year. Questions about the specific training grant course requirements should be referred to the appropriate Training Grant Administrator.

After completion of all Divisional, DRSB program, and if relevant, Training Grant requirements, any additional coursework is a matter of discussion between the student, their research advisor and their thesis advisory committee.

**Courses that fulfill DRSB program requirements**

**I. Required Courses**

DVBI 31800. Communicating Developmental Biology Concepts (REQUIRED for First and Second year students)

This course teaches students a simple set of strategies for conveying scientific information in a spoken format. Each student prepares a journal club presentation from a recent paper in the literature. Through one-on-one sessions with the instructor and a formal practice talk in front of the class, they then receive feedback to improve their presentation skills. The students also gain experience in "peer review" by learning to give and receive constructive comments within the practice talk sessions. Finally, the student presents their polished talk to the community in the DRSB Data Club. Autumn, Winter, Spring Qtrs.

DVBI 31900 Introduction to Research (Required for First year students)

This broad survey course provides incoming students information about research opportunities and interests across the Molecular Biosciences cluster. Each class features 2-3 short scientific presentations. Autumn & Winter Qtrs.
II. Elective courses

Developmental Biology

DVBI 36400. Developmental Mechanisms
This course provides an overview of the fundamental questions of developmental biology, with particular emphasis on the genetic, molecular and cell biological experiments that have been employed to reach mechanistic answers to these questions. Topics covered will include formation of the primary body axes, the role of local signaling interactions in regulating cell fate and proliferation, the cellular basis of morphogenesis, and stem cells. Winter Qtr.

DVBI 35600. Vertebrate Development
This advanced-level course combines lectures, student presentations, and discussion sections. It covers major topics in the developmental biology of vertebrate embryos (e.g., gastrulation, segmentation, nervous system development, limb patterning, organogenesis). The course makes extensive use of the current primary literature and emphasizes experimental approaches including embryology, genetics, and molecular genetics. Winter Qtr.

NURB 32300 Molecular Principles of Nervous System Development
This elective course provides an overview of the fundamental questions in developmental neurobiology. It is based on primary research papers and highlights key discoveries in vertebrate and invertebrate animals that advanced our understanding of nervous system development. Topics covered, among others, will include neural stem cells, neuronal specification and terminal differentiation, and circuit assembly. Dogmas and current debates in developmental neurobiology will be discussed, aiming to promote critical thinking about the field. This advanced-level course is open to upper level undergraduate and graduate students and combines lectures, student presentations, and discussion sections. Winter Qtr.

DVBI 36100. Plant Development and Molecular Genetics
Genetic approaches to central problems in plant development will be discussed. Emphasis will be placed on embryonic pattern formation, meristem structure and function, reproduction, and the role of hormones and environmental signals in development. Lectures will be drawn from the current literature; experimental approaches (genetic, cell biological, biochemical) used to discern developmental mechanisms will be emphasized. Graduate students will present a research proposal in oral and written form; undergraduate students will present and analyze data from the primary literature, and will be responsible for a final paper. Spring Qtr.

DVBI 33850. Evolution and Development
The course examines the evolution of animal development. Special attention is given to the development of invertebrate phyla from sponges to lower chordates. References to vertebrate body plans are included. Original research papers will be assigned to introduce current debates. Students will be asked to contribute an oral presentation on a selected research topic that fits the broader goal of the course. Autumn Qtr. (Moving to Spring Qtr in 2021)

DVBI 36200. Stem Cells and Regeneration
The course will focus on the basic biology of stem cells and regeneration, highlighting biomedically relevant findings that have the potential to translate to the clinic. We will cover embryonic and induced pluripotent stem cells, as well as adult stem cells from a variety of systems, both invertebrate and vertebrates. Spring Qtr.
DVBI 39800/39900. Reading course in an area of developmental biology of special interest to the student. Every reading course must conform to the following requirements: 1) it must meet weekly; 2) the student must submit a written paper; and 3) at the end of the quarter the instructor must provide a written evaluation of the student's performance and a letter grade. Prior to the registration deadline for the quarter in which the course is planned, the student must submit a written petition to the Curriculum Committee explaining the goals and rationale for the course. A copy of the course syllabus and a signed affidavit from the faculty member expressing their approval of the syllabus and willingness to supervise the course must accompany the petition.

Quantitative Analysis

DVBI 32000 Quantitative Analysis of Cellular Dynamics
This course covers quantitative approaches to understanding biological organization and dynamics at the molecular, sub-cellular and cellular levels. Core topics will include: (a) how to construct and use simple mathematical models to gain qualitative insights into complex biological dynamics (b) modern approaches to quantitative microscopy and image analysis, and (c) statistical methods for comparing models to experimental data. Lectures will cover core concepts and methods for quantitative analysis. However the centerpiece of the course will be a series of weekly in-class and take-home computer labs in which students learn to write programs in Python and get hands-on experience in implementing the methods that we introduce in class. Spring Qtr. alternating years, 2021, 2023….

MGCB/DRSB 32500 Quantitative Approaches to Biological Dynamics II
This is a workshop style course in which students will work closely with instructors and TAs to implement mathematical/computational approaches to address specific research problems of interest to individual students. The course is open to all students who have taken MGCB/DRSB 32000 or its equivalent, or who have otherwise acquired a basic working knowledge of one or more programming languages (e.g. R, Matlab, Python). The course will function as follows: prior to enrollment, each interested student will meet with the course instructors to discuss an open scientific question they wish to address using mathematical/computational approaches. The course will begin with a short presentation from each student describing the problem they propose to study, followed by a discussion with the rest of the students and the course instructors about possible approaches. The course instructors and TAs will then meet one-on-one with students over the course of the quarter to help students implement the proposed strategies and adapt to challenges that emerge through this process. Students will reconvene weekly as a group to report on their progress and discuss alternative approaches. Spring Qtr. alternating years, 2020, 2022….

HGEN 47300 Genomics and Systems Biology
This lecture course explores technologies for high-throughput collection of genomic-scale data, including sequencing, genotyping, gene expression profiling, and assays of copy number variation, protein expression and protein-protein interaction. In addition, the course will cover study design and statistical analysis of large data sets, as well as how data from different sources can be used to understand regulatory networks, i.e., systems. Statistical tools that will be introduced include linear models, likelihood-based inference, supervised and unsupervised learning techniques, methods for assessing quality of data, hidden Markov models, and controlling for false discovery rates in large data sets. Readings will be drawn from the primary literature. Evaluation will be based primarily on problem sets. Spring Qtr.
CPNS 35600 Statistics and Information Theory
This course begins with an introduction to inference and statistical methods in data analysis. We
then cover the two main sections of the course: I) Encoding and II) Decoding in single neurons
and neural populations. The encoding section will cover receptive field analysis (STA, STC and
non-linear methods such as maximally informative dimensions) and will explore linear-nonlinear-
Poisson models of neural encoding as well as generalized linear models alongside newer
population coding models. The decoding section will cover basic methods for inferring stimuli or
behaviors from spike train data, including both linear and correlational approaches to population
decoding. The course will use examples from real data (where appropriate) in the problem sets
which students will solve using MATLAB. Spring Qtr.

ECEV 32000 Computing Skills for Biologists
The course will cover basic concepts in computing for an audience of biology graduate students.
The students will receive basic training in the use of version control systems, databases and
regular expressions. They will learn how to program in python and R and how to use R to
produce publication-grade figures for their manuscripts, and how to typeset scientific manuscripts
and theses using LaTeX. All the examples and exercises will be biologically motivated and will
make use of real data. The approach will be hands-on, with lecturing followed by exercises in
class. Winter Qtr.

Cell Biology

MGCB 31600. Cell Biology I
Eukaryotic protein traffic and related topics, including molecular motors and cytoskeletal
dynamics, organelle architecture and biogenesis, protein translocation and sorting,
compartmentalization in the secretory pathway, endocytosis and exocytosis, and mechanisms and
regulation of membrane fusion. Autumn Qtr.

MGCB 31700. Cell Biology II
This course covers the mechanisms with which cells execute fundamental behaviors. Topics
include signal transduction, cell cycle progression, cell growth, cell death, cancer biology,
cytoskeletal polymers and motors, cell motility, cytoskeletal diseases, and cell polarity. Each
lecture will conclude with a dissection of primary literature with input from the students. Students
will write and present a short research proposal, providing excellent preparation for preliminary
exams. Cell Bio I 31600 is not a prerequisite. Winter Qtr.

Molecular Biology

31200. Molecular Biology I
Nucleic acid structure and DNA topology; methodology; nucleic-acid protein interactions;
mechanisms and regulation of transcription, replication and genome stability and dynamics.
Winter Qtr.

31300. Molecular Biology II
The content of this course will cover the mechanisms and regulation of eukaryotic gene
expression at the transcriptional and post-transcriptional levels. Our goal is to explore research
frontiers and evolving methodologies. Rather than focusing on the elemental aspects of a topic,
the course highlights the most significant recent developments, their implications and future
directions, all with a strong emphasis on molecular mechanisms. Each week the classes focuses
on one topic that is first explored through two lectures and then debated through an in-depth, student-lead discussion centered on 3-4 complementary and/or contrasting research articles in order to achieve a higher level, synthesis of a specific research topic. For the midterm and final, students prepare short research proposals, with extensive input from the TAs and instructors. Enrollment requires Molecular Biology I (MGCB 31200) or by special permission of an instructor. Spring Qtr.

32200 Biophysics of Biomolecules This course covers the properties of proteins, RNA, and DNA, as well as their interactions. We emphasize the interplay between structure, thermodynamics, folding, and function at the molecular level. Topics will include cooperativity, linked equilibrium, hydrogen exchange, electrostatics diffusion and binding. Spring Qtr.

Genetics

MGCB 31400. Genetic Analysis of Model Organisms
Fundamental principles of genetics discussed in the context of current approaches to mapping and functional characterization of genes. The relative strengths and weaknesses of leading model organisms are emphasized via problem-solving and critical reading of original literature. Autumn Qtr.

ECEV 35600 Principles of Population Genetics – 1
Examines the basic theoretical principles of population genetics, and their application to the study of variation and evolution in natural populations. Topics include selection, mutation, random genetic drift, quantitative genetics, molecular evolution and variation, the evolution of selfish genetic systems, and human evolution. Winter Qtr.

RESEARCH INTERESTS OF COMMITTEE FACULTY

Carrillo: molecules and mechanisms controlling neural wiring specificity.

Cunningham: hematopoietic stem cells; transcriptional control of early development.

De Jong: hematopoietic stem cell transplant, cancer and blood diseases.

Du: retinoblastoma protein function and regulation; cell cycle control.

Fehon: molecular genetic analysis of specialized membrane domains.

Ferguson: cell fate specification and stem cell biology in Drosophila.

Gilad: genetic and regulatory differences between humans and other primates.

Glotzer: molecular mechanisms of cytokinesis in animal cells.

Green: neurotransmitter receptor assembly and expression.

Grove: cell-lineage relationships in the cerebral cortex.

Heckscher: development and function of sensorimotor circuits for locomotion in Drosophila larvae.
**Ho:** specification of body axes in the zebrafish embryo.

**Horne-Badovinac:** epithelial morphogenesis and organ shape

**Imamoto:** mouse models of human syndromes that affect craniofacial development.

**Kovar:** molecular mechanisms of actin assembly.

**Kratsios:** molecular mechanisms of motor circuit formation.

**Lahn:** human evolutionary genetics, genomics, and stem cell biology

**Malamy:** molecular regulation of plant root systems.

**Moskowitz:** developmental genetics of cardiac morphogenesis and congenital heart disease.

**Munro:** computational and developmental analysis of cytoskeletal dynamics and tissue morphogenesis.

**Prince:** comparative molecular studies of anterior-posterior patterning in zebrafish and other teleosts.

**Ragsdale:** pattern formation in the vertebrate brain.

**Rebay:** signaling networks and transcriptional regulatory circuitries in development and disease

**Sanders:** molecular and cellular mechanisms of embryonic patterning

**Schmidt-Ott:** evolution of developmental processes in Diptera.

**Schwartz:** biosynthesis of connective tissue during embryonic development.

**Shubin:** evolutionary origin of new anatomical features and faunas.

**White:** gene networks that control developmental and evolutionary processes.

**Wu:** somatic stem cells in mammalian skin, and their involvement in tissue homeostasis and skin diseases.

**Zhang:** mechanisms of brain development and disorders.

**DETAILED DESCRIPTION OF PROGRAM OF STUDIES**

**Laboratory Rotations**

Students undertake short research projects in at least three different laboratories before beginning their dissertation research. Rotations are performed in fall, winter and spring, and generally coincide with the ten-week academic quarter. The purpose of the rotations is to expose students to different research environments, to broaden their acquaintance with useful laboratory techniques, and to introduce them to the conceptual framework of experimental design.
In selecting their rotations, students are encouraged to seek advice and input from their advisor and from the whole Curriculum Committee. It is expected that a student’s interests will evolve and change considerably as they gain exposure to new areas of science through their coursework and other interactions. For this reason, students are encouraged not to plan all three rotations in advance at the start of the academic year. And even if a student “commits” in advance to a specific rotation, such agreements are non-binding and the student may revise their plans up until the start of the quarter in which the rotation is planned. Students are responsible for all logistics of contacting faculty of interest and setting up their rotations. The course “Introduction to Research” facilitates the process of making initial contacts with faculty. Students are encouraged to meet with multiple faculty members to discuss further their lab’s research, and perhaps the possibility of a rotation. Rotations may be performed in labs outside of the DRSB program.

Upon completion of each rotation, the student must provide the Curriculum Committee a written 1-2 page report summarizing the rotation’s scientific goals and achievements. This report should be signed by both the student and the faculty rotation advisor. The faculty member directing the host laboratory will also provide the Curriculum Committee an evaluation of the student's performance and a letter grade. These evaluations aid in tailoring the remainder of the student's academic program.

The following guidelines will be provided to the faculty regarding Rotation grades:

**Rotation Grading Guidelines**

For Laboratory Rotations that are to be counted towards a student’s Divisional Course Requirements it is very important to provide a letter grade that accurately captures the student’s performance (pass/fail grading does not meet this requirement). Please remember that this grade will be considered part of the student’s academic performance record. It is not helpful to the student or the program to artificially inflate grades.

**A grade:** This grade denotes outstanding performance. A grade of A should only be awarded when the student has shown either achievements or effort that go significantly beyond the advisor’s expectations for a rotation.

**B grade:** This grade denotes acceptable/average performance. The grade of B should be awarded when the student has regularly attended the lab and put solid effort into both experimental and intellectual aspects of the project.

**C grade:** This grade denotes inadequate performance. Significant deficits in any of the following areas may lead the faculty advisor to assess the rotation as deserving of a C grade: attendance, intellectual engagement, focus on either experimental or academic goals of the project.

To enable additional differentiation between levels of performance the use of +/- grades is encouraged as appropriate.

**Teaching Assistantships**

Teaching and verbal communication are important skills for a successful research career. All students are required to serve as teaching assistants (TAs) for two quarters; DRSB students are expected to perform one TAship in the third year and one in the fourth year. If a student wishes to TA in their second year, they must submit a written request to the Curriculum Committee, signed by their research advisor, that explains how/why an early TAship is needed to advance their own dissertation research. Standard TA responsibilities include leading discussion groups, writing problem sets, holding office hours, grading exams and other assignments and assisting in laboratory exercises. The instructor will evaluate the TA's performance, and these evaluations will become a part of the student's record.

Any student at risk academically or who is behind in meeting program requirements must request permission from the Curriculum Committee prior to undertaking a Teaching Assistantship.
Under such circumstances, permission to TA would normally be granted only if it were deemed that TAing a particular course would be beneficial in terms of the student’s academic progress.

Students interested in performing additional TAships should consult with both their research advisor and with the chair of their thesis advisory committee prior to making a commitment.

**Vacations**

Graduate students who are fully registered and receiving a full stipend for four academic quarters are required to be on campus, in residence, and engaged in study or research during all four quarters, including the summer quarter. During their first year in the graduate program, vacations generally coincide with the University’s academic calendar. Please note that the Fall rotation continues until roughly one week after the end of final exams. International students who need to travel to their home country for visa renewal may request permission from the Curriculum Committee and from their rotation advisor to end the rotation on the last day of Fall quarter. Prior to joining a laboratory, first year students who wish to take a vacation at other times, including during summer quarter, must obtain the approval of the Curriculum Committee. After joining a laboratory, the amount and the timing of vacation must be agreed upon by a student and their advisor.

**Grading Policy and Academic Standing**

DRSB students must demonstrate proficiency in their core academic coursework. For the discussion below a “core course” is defined as any course taken to fulfill the developmental biology requirement, any course taken to fulfill the distributional requirements in genetics, cell or molecular biology, and quantitative analysis, or any graded rotation. Elective courses are excluded.

A student who fails to maintain at least a B average (3.0) in their core courses in any given quarter will be given an academic warning. The Curriculum Committee will advise the student of what must be achieved to restore good academic standing. Failure to achieve the agreed upon milestones by the end of the next quarter will result in the student being placed on academic probation.

A student who receives a C+ or below in any core course, regardless of their overall grade point average, will be placed on academic probation. The Curriculum Committee will inform the student in writing that they are at risk of being dismissed from the program, and what they must achieve to restore good academic standing.

If a student receives a second grade of C+ or below in any core course, continuation in the program is no longer automatic. This is regardless of their overall grade average, and regardless of whether they had been restored to good academic standing after the first C+ or below. The student may petition the Curriculum Committee to remain in the program. If the petition is granted, the Curriculum Committee will inform the student in writing of what must be achieved to restore good academic standing. If the student is unable or unwilling to meet the necessary milestones, the student will be dismissed from the program.

A student on academic probation at the end of the Spring quarter will not be allowed to prepare for and take the Preliminary exam, unless the Curriculum Committee grants a special exemption.
Although elective courses are excluded from the policies described above, academic proficiency, as demonstrated by a B grade or better, is expected of all students. Thus at the discretion of the Curriculum Committee, if a student fails to demonstrate an acceptable level of academic proficiency in an elective course, they may be required to take additional courses.

The Candidacy Examination

The Biological Sciences Division requires that "a general oral or written qualifying examination, separate from course examinations, must be passed by the student upon the major subject offered and such subordinate subjects as may be required by the Department or Committee concerned.” In the Committee on Development, Regeneration, and Stem Cell Biology, this examination is administered in two parts. Part I, the Preliminary Examination, takes place at the end of the first year. It is administered by a committee of three faculty, including one member of the Curriculum Committee who serves as chair. Members of the examining committee are selected by the Curriculum Committee, with prior advisors and rotation mentors generally excluded. Part II, the Qualifying Examination, takes place at the start of winter quarter in the second year. It is administered by the student’s thesis committee, which is comprised of the advisor and a minimum of three additional faculty suitable to the field chosen by the student in consultation with their advisor. The composition of the thesis advisory committee must be approved by the Curriculum Committee and must conform to the following guidelines: 1) at least two members of the thesis committee must have appointments in the Committee on Development, Regeneration, and Stem Cell Biology; 2) the chair of the thesis committee must be someone other than the advisor, and must have an appointment in DRSB. If the Curriculum Committee feels there might be a conflict of interest between the faculty advisor and any of the other three faculty on the committee, an additional faculty member must be added to the committee.

Part I: The Preliminary Examination

Students take their Preliminary Examination at the end of June of their first year. The purpose of this exam is two-fold. First, it is designed to assess each student’s readiness to start working independently on their doctoral research. Second, it is designed to help all students gain experience in crafting a research proposal, a skill essential to scientific research. The exam presupposes general knowledge in the field of developmental biology, and of how genetic, cellular, molecular and quantitative approaches are employed within the field. It will test the students’ ability to use this knowledge to identify an interesting question from the current literature, to pose a testable hypothesis and to design an experimental plan to advance understanding in the chosen area. Course work during the first year, attendance at seminars, and reading the current literature should be good preparation for the exam.

The format for the exam is a two-hour oral defense of a 5 page written research proposal on a topic chosen by each student. To encourage creativity and independent thinking, the topic should not be closely related to the student’s doctoral project or to projects on which they have previously worked, including undergraduate projects and rotation projects. Additional inappropriate projects include those closely related to projects ongoing in rotation labs. Students must identify an important general area in which research is needed, frame an interesting specific research question in that area, design a set of experiments to test one or more explicit hypotheses, and discuss how the potential results will be interpreted. A critical aspect of the exam is understanding the limitations of different approaches and defining alternative, complementary
approaches. The winter quarter Journal Club presentation in DVBI 31800 “Communicating Developmental Biology Concepts” is designed to help students select their general area of interest and develop a sufficient knowledge base well in advance of preparing the actual proposal.

Approximate timeline and deadlines:

- **Winter Quarter** - Journal Club Presentation of a recent paper in the chosen field of interest.
- **Late Winter Quarter** - Students meet as a group with the Curriculum Committee to discuss the preliminary examination process.
- **April 10, 2020** - Students submit the Specific Aims for their proposal to the Curriculum Committee (CC). Students are strongly encouraged to discuss their ideas with faculty, not limited to those on the Curriculum Committee, in advance of this initial submission deadline.
- **April 13**: Students will be advised of their exam date, time, and location and of the composition of their examining committee. If a student feels there is a conflict with a faculty member assigned to their examining committee they may ask to replace that faculty.
- **April 17, 2020** students will be notified that the proposal topic is approved or that revision is necessary. It is expected that revision will be required. It is common for the first round of revision to be extensive, sometimes requiring complete reworking of both the proposal topic itself and the planned experimental approach. Assuming revisions are required, students should discuss their revision plan with faculty on their examining committee, and as helpful, with other faculty who may be experts in the field, with other members of the Curriculum Committee and with more senior student or post-doctoral colleagues.
- **April 24, 2020** Initial revision of Specific Aims due. Students will be notified as soon as possible that their proposal topic is approved or that additional revision is required. It is expected that revision will be required.
- **May 8, 2020** Final revision of proposal Abstract and Specific Aims due. Students will be notified as soon as possible that their proposal topic is approved. In the event approval is not granted, and additional revision is required, the revised Specific Aims must be approved by **May 25, 2020**. If this deadline cannot be met, then the student will resume work on the Specific Aims after the end of spring quarter and the Preliminary Exam will be postponed by about a month.
- Deadline for submitting the full research proposal to faculty on the examination committee will be about a week in advance of the oral examination dates, which will be scheduled in late June.

Guidelines for Preparation of the Preliminary Exam Written Proposal:

**Specific Aims Page**

After discussing their ideas with relevant faculty, students should prepare a Specific Aims page for their proposal. This document should be one page in length and should include the following items:

- An opening section formulating the overall question that is to be to be addressed.
- A summary of essential background information and identification of a specific knowledge gap that together motivate the question the proposal will address and explain its importance.
- A clear and logical “set-up” of the experimental hypotheses to be addressed.
• The proposed specific aims. For each aim, state the hypothesis that will be tested. The maximum number of specific aims permitted is two; however, since it can be difficult to discuss multiple aims in sufficient depth, students may propose only one specific aim.

• Brief summary of the general experimental strategies for each aim.

References should be included and are not within the 1 page limit. When submitting the Specific Aims page, students must include a recent and relevant review article and a copy of the primary research paper on which the proposal is most closely based.

Full Proposal
The written proposal should include the student’s name and a title and be five single-spaced pages in length, including figures (please follow the NIH format of Arial eleven-point font and half-inch margins). This limit does not include references, for which there is no page limit. The scope of the experiments proposed should be roughly what a graduate student might achieve in four years of doctoral research. The proposal should be organized as follows:

• Specific Aims (one page).
• Background (about a page). Give a brief introduction, providing only essential background on the topic and elaborate on the significance of and interest in the question and the impact the proposal would have on the field, if successful.
• Experimental Design. Describe the approaches to be used to address the experimental hypotheses. It is important to develop a clear rationale for the experimental design; the minute details of the experiments are less important. However, it is critical that the proposed experiments are feasible given the resources and techniques currently available. Possible outcomes, pitfalls, alternative approaches and implications of the results must be discussed. Such discussions can be either integrated with the Experimental Design section, or presented separately.

The student will submit the final proposal by email and, if requested, in hard copy to the examining committee and to the Graduate Program Administrator before the exam. To assist the examiners, the student should also provide a copy of the most useful published review of the field and a copy of the primary research paper on which the proposal is most closely based.

Oral Exam
The oral exam lasts for approximately 120 minutes. Students should prepare ~30 minutes of material: they should briefly present the proposal objectives and the motivation for these objectives; two PowerPoint slides are allowed although working on a whiteboard often works best. The faculty examiners question the students about the foundation for the question, the potential impact of the question, the experimental hypothesis in each aim, the rationale and feasibility of the experiments, possible interpretations of the experimental results, and alternative approaches that might be important. Because part of the purpose of the exam is to test a student’s general knowledge in the area of developmental biology, faculty may also ask general questions to probe the student’s knowledge.

The examining committee will evaluate the written document together with the oral presentation, using the following criteria:

1. Knowledge of fundamental ideas and paradigms in developmental biology
a. Does the student have sufficient depth of knowledge of the chosen area of their proposal to enable them to understand the current status of knowledge in the field and identify an important question?
b. Does the student have knowledge of sufficient breadth to enable them to draw from related fields in the analysis of a given problem?

2. Quality of research strategy posed
   a. Is the logical structure of the strategy sound?
   b. Have the possible experimental outcomes been considered and their interpretations relative to the original hypothesis been carefully evaluated?

An important goal of the exam is to provide an opportunity for students to improve their writing skills, and students should not be surprised if they are asked to revise the written document after the exam. To help improve writing skills, all students are advised to take advantage of writing workshops and courses offered by the division and the university. For more information, go to https://writing-program.uchicago.edu/grads

Based upon the student's performance, the examination committee recommends one of the following:

A. Pass unconditionally
B. Pass conditionally, with revision of written proposal required. The revised proposal should be submitted within two weeks by email and, if requested, in hard copy to the examining committee and to the Graduate Program Administrator. All members of the examining committee will evaluate the revised proposal. The student will be informed of the final decision one week after submitting the revision.
C. Pass conditionally, with further course work required in one or two areas.
D. Unsatisfactory, with the recommendation that the student retake the exam within the quarter.

The Curriculum Committee then meets to consider this recommendation, taking into consideration the student's overall academic performance as well as their performance on the examination. Students who perform unsatisfactorily on the exam and are permitted to retake it must do so by the end of the Summer Quarter. During the interim, students will continue to receive stipend support. The examining committee for the retaken exam will be selected by the Curriculum Committee Chair, and will contain at least one member of the first examining committee and at least one new member.

If the exam is retaken and the student does not pass, the student will be asked to leave the program.

**Choosing an Advisor and Forming a Thesis Committee**

At the end of the Spring Quarter of the first year of graduate study, the student will choose a research advisor. In the event the student chooses to work with a faculty member who does not have an appointment in the Committee on Development, Regeneration, and Stem Cell Biology, the student must petition the Curriculum Committee for approval.

In consultation with the advisor, the student should formulate a list of four prospective thesis committee members (including the student's advisor), and submit this to the Curriculum Committee for approval. The function of the thesis committee is to monitor the student's progress and to assist the student in the development of their dissertation research. For this reason, the choice of the members of the thesis committee should be based on their knowledge and expertise
in the area of the student's research. At least two members of the thesis committee must have appointments in the Committee on Development, Regeneration, and Stem Cell Biology. The thesis committee will be chaired by a member of the Committee on Development, Regeneration, and Stem Cell Biology other than the advisor. The Curriculum Committee will require a fifth member to be added if it believes there are potential conflicts of interest between the advisor and any of the other three faculty; in this case, the faculty member with the perceived potential conflict of interest cannot be appointed chair of the thesis committee. Once a thesis committee is constituted, its composition can be changed only by petitioning the Curriculum Committee. Such changes may be necessitated by differing circumstances, including a shift in the student’s experimental focus or unavailability of a faculty member.

**The Qualifying Examination**

For the Qualifying Examination, the candidate will prepare a research proposal on the topic planned for their thesis research. It is important to note that the Qualifying Exam is not a thesis defense. It does not require preliminary results although, if available, they can be used. The exam tests the student's ability to:

1. Choose a topic - that is, formulate an important biological question (SIGNIFICANCE);
2. Propose a coherent set of avenues to answer the question (SPECIFIC AIMS);
3. Summarize critically the current literature on that topic (BACKGROUND);
4. Describe a series of experiments taking into account possible pitfalls and offer alternative approaches (EXPERIMENTAL METHODOLOGY);
5. Provide references.

The written proposal should be modeled after an NIH grant application. It should consist of specific aims (1 page), background and significance/impact (2-3 pages), and a description of experimental approaches that includes discussion and interpretation of possible outcomes, consideration of limitations of particular approaches, and suggestions of alternative strategies (6-7 pages). These page numbers are guidelines, not strict rules, but the entire proposal must be no more than 10 pages (single spaced, Arial 11 font, 0.5 inch margins). Figures must be included in the body of the proposal, not as additional pages at the end, and count toward the 10-page limit. Figures must be large enough to be legible on a printed page, without additional magnification. References should be placed at the end, and do not count toward the 10 page limit. Examples of past proposals will be available in the Graduate Program Administrator's office.

Students are expected and encouraged to work closely with their advisor as they develop, write and revise their proposal. Assuming a student has been conscientious about reading broadly in their field since joining the lab, a successful proposal will generally require ~ 4-6 weeks of intensive preparation; this effort can of course be spread out over a longer time period to suit individual preferences and/or experimental research obligations.

The oral exam should be scheduled to take place by the end of January. It is the responsibility of the student to take care of the scheduling. The written proposal should be submitted to the members of the thesis committee and to the Graduate Program Administrator no later than one week before the oral exam. In the event that circumstances dictate a different schedule and/or the student's thesis committee is unable to meet prior to this time, the student must secure permission to postpone the
exam from the Curriculum Committee. **All members of the student’s thesis committee must be present for the Qualifying Examination.**

**Meetings with the Thesis Committee**

Students are required to meet with their thesis committee six-nine months after the Qualifying Examination to assess their initial progress. In their third and fourth years, students must meet at least annually with their committee; starting in their fifth year, meetings should be held every six months to prepare the student for graduation. It is the responsibility of the student to schedule their meetings at the appropriate intervals determined by the DRSB program and their thesis committee. These meetings help to ensure that students are making adequate progress toward completing their dissertation and provide the student with a broader base of expertise on which to draw for help and advice. They also strengthen the student’s acquaintance with faculty other than the thesis advisor.

At all meetings, a minimum of three members of the committee must be present, including the student’s advisor and the committee chair. If a meeting is to be held in the absence of one or more faculty members, the student should attempt to meet informally with such faculty in order to discuss their progress. Students may change the composition of their thesis committee as warranted by changes in their research focus, or other reasons. Students must inform the Curriculum Committee of such changes and get approval.

In these meetings, which are expected to last 90 minutes, the student should give a formal oral presentation that both summarizes their experimental accomplishments since the previous meeting and outlines planned future directions. These oral presentations should be 20-30 minutes long to allow ample time for questions and discussion. The intent of these presentations is not to show the committee the result of every experiment the student has performed since the last meeting, but rather to highlight recent findings of particular significance to the project and to seek advice, both technical and intellectual, when stumbling blocks have been encountered in the project. It is critical that the planned presentation allow ample time for a thorough discussion. The student is strongly encouraged to consult with their advisor in advance of these meetings to come up with a plan that will maximize the benefit of the meeting to the student's research progress.

One week prior to the meeting, the student should submit to committee members and to the Graduate Program Administrator an updated curriculum vitae and a written report of experimental progress since the last meeting as well as future objectives; the report should be two to four pages in length. The report should include the original aims and a discussion of how the original aims have been modified, if applicable. The report should also contain descriptions of experiments focused on these aims and, in particular, the data to be discussed at the meeting. Students are also encouraged to define in a summary statement the issues that would most benefit from the committee’s input. For all meetings in the fourth year of study, and beyond, the student must also submit a separate one-page document that outlines their publication plans. For each planned publication, the student should provide a title and a list of projected figures, indicating which data are in hand and which experiments still need to be completed. These outlines are intended to help the student organize their research efforts and to start thinking about publication plans early on in their project. A copy of all written documents should also be submitted to the Graduate Program Administrator.

At the beginning of each committee meeting, the mentor provides a review of the student’s progress. The student is not present for this review. At the conclusion of the meeting, the committee will briefly discuss specific recommendations and will then relay these to the student. Following the meeting, the chair of the committee will provide a brief written report summarizing the discussion. At the very end of the meeting, the advisor will be asked to leave the room, and
the student will be offered the opportunity to speak with the committee in the absence of their advisor.

**Fifth Year Meeting with Advisor**

All graduate students in the Biological Sciences Division are strongly encouraged to conclude their doctoral research within six years. The fifth year meeting is designed to help students and advisors realize this goal. At the beginning of the student’s fifth year in the graduate program, prior to their thesis committee meeting, students will meet with their advisors to develop a plan for completing the dissertation. The plan will include intended completion dates for experiments to be performed and proposed manuscripts to be written. The plan will be submitted to the student’s thesis committee for approval at the committee meeting. Members of the thesis committee must approve the proposed plan or an appropriately amended version, as realistic and suitable. The final, approved plan will be submitted together with the standard thesis committee report after the annual meeting, and will be included in the student’s permanent file.

**Publication Requirement**

To receive a Ph.D., DRSB students are required to publish a minimum of one first author peer-reviewed paper. Equal co-first authorship can also meet this requirement. This requirement formalizes the expectation that every DRSB doctoral student will make an original contribution to the scholarship in their field. Additionally, the requirement ensures training in fundamental aspects of our discipline: preparing a manuscript for submission to a journal, replying to reviewer comments, and finalizing the manuscript for publication.

At the penultimate meeting, the student’s thesis committee will assess whether the student’s publication record is sufficient to meet this requirement, prior to their granting approval for the student to write their thesis. Students may request an exception to the publication requirement by petitioning the Curriculum Committee. Letters from both the advisor and the chair of the thesis committee supporting and explaining the reason for the exception must be included with the petition. If either the advisor and/or the committee chair are members of the Curriculum Committee, additional DRSB faculty member(s) will be recruited on an ad hoc basis to consider the case.

**Penultimate Meeting with the Thesis Committee**

After completing a significant body of experimental work, the student should seek permission from the thesis committee to write and defend their dissertation. One week prior to this meeting, the student should submit to the committee members an outline of their proposed dissertation. This outline should be as detailed as the student can make it, and should include a list of ongoing experiments to be completed before the defense, a list of the chapters and the topics to be covered within each chapter, and a list of figures and tables for each chapter. **All committee members must be present for this meeting, without exception.** If this condition cannot be met, the student must consult the Curriculum Committee to determine alternative procedures. At the meeting, the mentor should review the student’s overall progress in the program. The student is not present for this review. This is followed by a presentation from the student that reviews finished or published work and details ongoing experiments to be completed for the dissertation. After a discussion with the committee members, the chair of the thesis committee should prepare a written recommendation providing approval to the candidate to write and defend the dissertation. The recommendation may include specific guidelines for unfinished experiments as well as for the structure and content of the dissertation. **This report must be signed by all**
committee members as well as the faculty mentor. Approval to write and defend the dissertation does not constitute its acceptance.

Presentation of the Dissertation

Each graduating student must write a dissertation describing their research, present the work in a public seminar, and defend it in front of a faculty examining committee.

The dissertation must be distributed to the thesis committee at least two weeks before the final examination. Announcement of the thesis defense will be posted one week before the defense date. The final exam committee consists of at least four faculty members, three of whom must be members of the student's doctoral committee and at least two of whom are members of the faculty of the Committee on Development, Regeneration, and Stem Cell Biology. A dissertation is not accepted if more than one member of the examining committee abstains or votes against acceptance. In such a case, the examining committee will advise the student and the Chair of the Committee of the additional work that must be completed.

The University has strict rules concerning the preparation of the dissertation. Detailed information is provided on the Dissertation Office website, http://www.lib.uchicago.edu/e/phd/. The final dissertation must be submitted to the Dissertation Office no later than three weeks before the date of the convocation. Once the dissertation has been submitted, the Chair of the graduate program must approve the thesis and the departmental approval form must be submitted to the Dissertation Office.

Student Grievances

The DRSB graduate program follows the Biological Sciences Division policies on resolving graduate students’ concerns about academic matters. Academic matters include but are not limited to such matters as course grades, teaching assignments, publication rights, timely feedback on academic work, timeliness of letters of recommendation, and application of policies and practices.

Briefly, students who encounter problems with their research project, their advisor, or the responses of their thesis committee to their work should approach the chair of their thesis committee to discuss how to handle and resolve the situation. If they feel uncomfortable approaching the chair, then they should contact the chair of the Curriculum Committee and/or the chair of the graduate program for advice – such conversations will always be regarded as confidential. If a student disagrees with the report on their committee meeting, they should immediately contact the chair of the Curriculum Committee. Students should always feel free to contact the DRSB Curriculum Committee to discuss any difficulties, scientific or personal; such communications are always confidential. Similarly, the Dean in the BSD Office of Graduate Affairs is available to help resolve academic problems, and can help direct students to appropriate academic and non-academic support services provided by the Division and University.

The text below is taken from the Statement of BSD policy on “Procedures to Resolve BSD Graduate Students Concerns about Academic Matters”. The full document and other relevant information can be found at: https://biosciences.uchicago.edu/current-students/policies (access requires cnet ID and password).

Questions about academic matters
Students with a question about a grade received in a course should consult with the instructor.
first. Other questions about academic matters may be brought to the academic advisor, the procedural chair of the student’s thesis committee, the chair of the student’s graduate program, the head of the program’s curriculum committee, or the dean for graduate students. These people will also be able to help guide students in determining who is the best person to answer their question.

Grievance resolution process
Students with a grievance should bring the grievance to the attention of an appropriate faculty member, who may be the academic advisor, the procedural chair of the student’s thesis committee, the chair of the student’s graduate program, the head of the program’s curriculum committee, the department chair of the faculty mentor, or in rare cases where none of these individuals are appropriate, the dean for graduate students. In cases where there is a perceived ethical issue, rather than, or in addition to, an academic issue, students should bring their grievance direct to the dean for graduate students. The person to whom the student brings their grievance will act as the facilitator of the resolution process, or alternatively will assist the student in finding a more appropriate facilitator. Grievances should be described in a concise and formal written document and brought forward as soon as possible, at the latest within one quarter.

Should the matter remain unresolved, the student may bring the grievance to the attention of the dean for graduate students. The student should submit their grievance, the written response to the grievance, and an articulation of why the matter is still unresolved in writing to the dean for graduate students. The dean for graduate students will review the written materials, may ask the student for clarification, may consult with the facilitator, and together with the BSD standing faculty grievance committee will make a final determination. The dean for graduate students will discuss the outcome of the review in person with the student and follow up in writing.

Students with questions about any of these procedures may contact the dean for graduate students.
Students may also avail themselves of the Office of the Student Ombudsperson (http://ombudsperson.uchicago.edu/) to assist in providing impartial advice and assistance with navigating the grievance procedures or related matters. The Ombudsperson can also help where the existing channels of communication or dispute resolution have proven unsatisfactory.

Other Complaints
Complaints about sexual harassment or discrimination and harassment on the basis of race, color, religion, sex, sexual orientation, gender identity, national or ethnic origin, age, disability, veteran status, genetic information, or other protected classes under the law are addressed under the University’s unlawful discrimination and harassment policy. For more information, please see http://studentmanual.uchicago.edu/university/index.shtml#unlawful.

Complaints about student conduct involving possible violation of University policies and regulations and other breaches of standards of expected behavior of University students should be brought promptly to the attention of the Dean of Students of the academic area of the student in question.”

REGISTRATION

General Information

About one week before the dates designated for registration, the Graduate Program Administrator will inform all students of the days and times to register online. Special registration procedures
have been established for the first year students in the Fall quarter. During Orientation Week, members of the Curriculum Committee and the Graduate Program Administrator will discuss program procedures with entering first year students. The students will then meet with members of the Curriculum Committee to map out a program of study for the first year. Second year students will also meet with members of the Curriculum Committee at the start of the academic year to review their progress in the preceding year and to discuss further degree requirements.

**Leave of Absence**

A student may, if necessary, apply for a Leave of Absence from the Ph.D. program to be approved by the Curriculum Committee and the Departmental Chair. Only students who are in good academic standing will be granted a Leave of Absence.

**PRO-FORMA REGISTRATION**

Students whose dissertation research requires residence away from Chicago may register pro-forma. Pro-forma status establishes a good faith relationship between the student and the University. The following regulations apply:

1. Pro-forma registration is approved for only one academic year at a time, and the maximum pro-forma enrollment allowed is eight quarters.

2. Applications for pro-forma registration must be approved in writing by the Chair of the Committee, whose signature means that the student's work away from Chicago is recognized as essential to the dissertation, and by the Office of Graduate and Postdoctoral Affairs. Normally, students applying for pro-forma status will have been admitted to candidacy and have had dissertation topics approved.

3. An applicant for renewal of pro-forma status must show the Committee Chair that good use has been made of the time already spent "on location" and that additional time is essential to completing the original task. Renewals of pro-forma status must be approved by the Office of Graduate and Postdoctoral Affairs.

4. A student on pro-forma status may not be gainfully employed for more than 19 hours a week.

5. Pro-forma students may not use the facilities of the University or the time of its faculty, except for progress reports that may be required by the students' program.

6. The Registrar will certify that a pro-forma student is duly registered at the University to any agency requiring such certification.

7. The fact that a registration is pro-forma will be noted on the student's academic record.

8. Pro-forma registrations do not count toward satisfying a student's residence requirements toward a degree.

**Visiting Non-Degree Students**

Students who have moved to the University with their advisor but who are still registered at their home institution are given the status of Visiting Non-Degree Students. This gives them access to the libraries and to athletic facilities while they are completing their degrees.
FINANCIAL SUPPORT

The Committee on Development, Regeneration, and Stem Cell Biology attempts to ensure that all DRSB students are provided with adequate financial aid. Financial aid is guaranteed to all incoming students for their first five years, subject to satisfactory academic performance. Support for subsequent years of study is subject to the student's satisfactory research progress, as determined by the faculty sponsor, the program, and the Division of Biological Sciences.

Through their sixth year in the program, students will automatically receive any divisionally approved increase in stipend amount. Students in their seventh year and beyond will not receive these stipend increases.

Sources of Support
Students receive tuition plus a stipend. The various sources of support are:
- divisional funding
- training grants
- external fellowships
- research assistantships

Payment of Stipend Checks

Divisional funding and NIH checks are paid in equal quarterly installments at the beginning of each quarter and cover the calendar year. Research Assistant Type B (RA-B) students are paid on a monthly basis on the last working day of each month. Taxes will be deducted from this amount. RA-B students are responsible for paying their health insurance and fees from their salary each quarter. If the student prefers, an automatic quarterly deduction can be arranged through the Dean of Students Office to cover health insurance and the health fee for three quarters; the deduction is not available in Summer Quarter. Tuition is paid by the advisor, department, or division.

Taxes

Graduate student stipends are taxable by Illinois and the Federal government. Students on fellowships and NIH training grant support must calculate and pay estimated taxes several times a year. The following IRS forms provide information on determining what portion of your stipend is taxable and how and when to pay taxes you owe:
- Tax Benefits for Education, PUB 970
- US Tax Guide for Aliens, PUB 519
- US Tax Treaties, PUB 901

These forms are available from the IRS. Regenstein Library also carries tax forms, particularly after January 1st. For more information, please refer to the Internal Revenue website: Taxable income for students (http://www.irs.gov/Individuals/Students).

Loans

For information on the various types of loans that are available to graduate students, you should consult the Student Loan Administration Office (6030 S. Ellis Ave., 2nd floor, 702-6061). This office can provide short-term loans during temporary financial crises (for example, if a stipend check is delayed or if you are transferring from a fellowship to an assistantship). The office also has up-to-date information on federally-sponsored student loan plans.
Supplies and Research Expenses

In general, costs of research supplies and equipment are covered by grants or contracts held by the faculty member in whose laboratory you are working. Limited supply funds are available on training grants, and are disbursed on an annual pro-rated basis, directly to the laboratories in which trainees are working. Students supported on training grants have small annual allowances for supplies. Students must usually be in their second year of support to receive an allowance. Requests for supplies are handled by the training grant administrator.

Travel to Scientific Meetings

Attendance at scientific meetings is an important part of the educational process. Limited travel funds are available on training grants, and are distributed by the training grant administrator to students who request them, with preference given to students who have passed the Preliminary Exam. Funds are only given to students scheduled to present a paper or a poster at the meeting.

Should you wish to apply for such support, you should submit a formal request (with your advisor's approval) in writing to the grant administrator, supplying the following information: purpose of meeting and relevance to the research; title, place and time of the meeting; (if applicable) title and authors of paper being presented; amount requested for travel, registration fees, food, and lodging.

MISCELLANEOUS INFORMATION

Curriculum Committee

This faculty committee is responsible for advising all students during the first year of graduate study or until a research advisor has been chosen. Each student will be assigned a member of the Committee to serve as temporary advisor during this time. Every quarter, the Curriculum Committee will meet with each student prior to registration, to approve courses and rotations the student intends to take, and also to discuss any issues concerning the first-year curriculum or other topics of concern. The Committee conducts a quarterly review of each student's course performance and administers the Preliminary Examination.

Graduate Program Administrator

The DRSB Graduate Program Administrator provides assistance to students on a variety of questions and problems as they arise. The office is located in CLSC 1105, and the phone number is 702-3372.

DRSB Student Representatives

Students who have finished their first year of study are eligible to serve as student representatives. They help to organize a variety of student activities under program auspices, such as student recruitment events and the annual Retreat. Representatives typically serve for two years.

Scientific Ethics Course

A course on scientific ethics, “Responsible, rigorous and reproducible conduct of research,” is
offered in Winter Quarter. All first year students are required to register for and attend the course.

**Senior Ethics Course**

All students in their fourth year and beyond are required to register for and attend a course on scientific ethics for senior students. The course is offered in Spring Quarter.

**Seminars**

In addition to formal courses and seminars, there are many regularly scheduled research seminars that will help to keep students up-to-date on new developments in molecular genetics, cell biology, and related disciplines.

One seminar in particular deserves special note: on Fridays at 5:00 p.m. in CLSC 101, students and postdocs gather for an informal seminar, Graduate Student Seminar (GSS). Beer, soda, and food are provided. The format is for a student to give a one hour presentation on their research.

Seminars sponsored by the Molecular Biosciences cluster are usually held on Tuesdays at 5:00 p.m., except for Human Genetics, which holds its seminars on Wednesdays. The schedule is as follows:

- **GGSB**, 1st Tuesday, CLSC 101  
- **BMB**, 2nd Tuesday, GCIS 301  
- **DRSB**, 3rd Tuesday, CLSC 101  
- **CMB**, 4th Tuesday, CLSC 101  
- Human Genetics, one or two Wednesdays each month, KCBD 1103

Other seminar series of interest include:

- **Cancer Biology**  
  Various Fridays, 12:00 noon, KCBD 1103  
  Mondays, 3:30 p.m., KCBD 1103  
  [http://pondside.uchicago.edu/ee](http://pondside.uchicago.edu/ee)

- **Darwin’s Weekly**  
  Tuesdays, 12:00 noon, Erman 200  
  [http://pondside.uchicago.edu/ee](http://pondside.uchicago.edu/ee)

- **Immunology**  
  Mondays, 4:00 p.m., BSLC 115

- **Committee on Neurobiology and Committee on Computational Neuroscience Seminar Series**:
  Thursday 11:00 noon, BSLC 001  
  [http://neuroscience.uchicago.edu/events/](http://neuroscience.uchicago.edu/events/)

- **Chemistry**  
  Mondays, 4:00 p.m., Kent 120

- **Institute for Genomics and Systems Biology**  
  Second Thursdays, 4:00 p.m., KCBD 1103
http://www.igsb.org/events/

Evolutionary Morphology
Thursdays, 7:30 p.m., Hinds 176
http://evbio.uchicago.edu
Contact: Carolyn Johnson, csjohnso@uchicago.edu

Microbiology
Wednesdays, 12:30, CLSC 119

The Biological Sciences Learning Center and Jules F. Knapp Medical Research Building

This complex is located at the northern end of the Science Quadrangle. The Learning Center provides classrooms, laboratories, and research facilities for undergraduate, graduate, and medical programs. The Knapp Building houses faculty members in the areas of molecular cardiology, immunology, oncology, and neurobiology. In addition, the Office of Graduate and Postdoctoral Affairs for the Division of Biological Sciences is located in the Learning Center.

The Gordon Center for Integrative Science

The Center, a $200 million, state-of-the-art interdisciplinary research facility uniting scientists in the Biological Sciences Division and the Physical Sciences Division, is located at the northwestern end of the Science Quadrangle. This is the largest research facility on the campus, housing 700 investigators and students under one roof.

Knapp Center for Biomedical Discovery

Located adjacent to the Learning Center, the KCBD houses laboratories and office space for principal investigators, postdoctoral students, and graduate students in the departments of medicine and pediatrics, as well as the Cancer Research Center.

Libraries

The John Crerar Library (5730 South Ellis Avenue) combines the University collections in biological sciences, medicine, and the physical sciences. Users with valid University of Chicago ID's or Library cards have access to all floors and stack areas during all library hours. The library is adjacent to the Cummings Life Science Center and is connected by tunnel to Cummings, the Kovler Viral Oncology building, the Gordon Center for Integrative Science, and the Medical Center.

The lower level of Crerar contains the major service units: the Circulation Desk, Scan and Deliver, search requests, and course reserves. The website for the University of Chicago Libraries is www.lib.uchicago.edu.

Bursar's Office

The Bursar's Office, located at 6030 S. Ellis Ave, 2nd floor, is open from 9:00 a.m. to 4:00 p.m., Monday through Friday. For additional information, Students may call 702-8000. For the website, go to: http://bursar.uchicago.edu
Student Health Services

Student Health Services provides health care to all registered students in the University. It is funded by a mandatory quarterly student health fee. Payment of this fee allows the student access to the University’s student health services. Some specialized and emergency care is not covered, nor does the fee include the cost of outside referrals, laboratory tests, and hospitalizations.

In addition to participation in Student Health Services, all students are REQUIRED to carry a health insurance plan (either university student health insurance or comparable insurance) to cover the costs of hospitalization, outpatient diagnostic and surgical procedures, laboratory tests and catastrophic illness. Charges for university insurance are assessed for each of three quarters (Fall, Spring, Winter); there is no charge for coverage for the Summer Quarter. More information about health services and the university insurance can be found on the web, [http://wellness.uchicago.edu](http://wellness.uchicago.edu) and [https://wellness.uchicago.edu/student-insurance/u-ship/](https://wellness.uchicago.edu/student-insurance/u-ship/)

Students with comparable group insurance coverage through a parent’s, spouse’s, or their own policy may request that participation in the university program be waived. However, they must cover the cost of alternative health insurance out of their own pocket.

The Student Health Service is located at 860 E. 59th St., Suite R100. Hours are 8:00 a.m. to 6:00 p.m., Monday- Thursday, and 8:00 a.m. to 5:00 p.m. on Friday. To make an appointment, call 702-4156. If you need emergency medical advice after SHS business hours, or if you need emergency medical advice during business hours or want to review an acute medical problem, call 702-4156 and follow the prompts to connect with a nurse. The nurse can provide time-saving advice and assistance and help you to determine if you need immediate medical treatment. For other services and phone numbers, please visit the SHS website at [http://wellness.uchicago.edu](http://wellness.uchicago.edu).

The Student Counseling Service is located at 5555 S. Woodlawn Avenue, and is open from 8:30 a.m. to 5:00 p.m., Monday through Friday. It specializes in diagnostic evaluation, psychotherapy and emergency services for all students, as well as services for students who are experiencing difficulties in studying and learning and difficulty in managing time commitments. For an evaluation, outside referral, or assignment to a therapist call 702-9800 to schedule an appointment. Emergencies are taken immediately during regular hours. During evenings and weekends, a therapist is available by calling 702-3625. For all services and phone numbers, please go to the SCS at [http://wellness.uchicago.edu](http://wellness.uchicago.edu/)

Computing Facilities

Information Technology Services (IT Services) is UChicago’s central provider for IT infrastructure, technology, and related service and support. Students may get information and apply for personal computing accounts online at [http://its.uchicago.edu/get-started-students/](http://its.uchicago.edu/get-started-students/). Also, the TECHB@R, located on the first floor of the Joseph Regenstein Library, provides convenient walk-up technology support.

Email accounts

All students must establish UChicago email accounts and check their accounts regularly. Email accounts can be set up online at [http://its.uchicago.edu/get-started-students](http://its.uchicago.edu/get-started-students)
Keys

The MGCB Department Office (CLSC 1106) issues keys needed by those working in the Cummings building. Graduate students may obtain laboratory keys from the receptionist.

Mail

The Cummings Mailroom is located in CLSC 108. First year students share mailbox number 60 and may also receive mail at their rotation lab; advanced students receive mail in their appropriate lab boxes.

Copying, Printing and Scanning

Copy, print, and scan stations are located in the Crerar and Regenstein libraries. The cost varies and a UChicago Card or campus card is required; no machine takes cash. For more information, see https://printing.uchicago.edu.

MGCB has a photocopying/scanning machine in CLSC 1106. You must set up an access account through the Departmental Office.

Lost and Found

Most University buildings have their own lost and found location. For the libraries, go to www.lib.uchicago.edu/thelibrary/lost-found/. For the Reynolds Club at 57th and University, call 2-8787. For the Medical Center at 58th and Maryland, call 2-6262; for Admissions at 58th and University, call 2-8650.

Parking

You may obtain an assigned parking space on campus by paying a monthly fee. Information about current fees and how to apply for a parking assignment is available at http://safety-security.uchicago.edu/transportation

For space in the multi-level parking garage at 5840 S. Maryland Ave., you must apply to the Hospital Parking Office located in the garage, 702-4381.

Transportation

Campus Bus

The Chicago Transit Authority (CTA) provides bus service for Hyde Park and Kenwood. The routes are as follows:

#171 U. of Chicago/Hyde Park: Services Lake Shore Drive/54th Street and the 55th-56th-57th Street Metra station. This route travels to campus on 55th Street and Ellis Avenue and then circles campus. This route operates weekdays from 7:32 a.m. to 6:32 p.m.; weekends from 8:02 a.m. to 6:32 p.m. After Summer Convocation, a reduced service schedule goes into effect.
#172 U. of Chicago/Kenwood: Services Lake Shore Drive/50th Street and the Hyde Park-53rd Street Metra station. This route travels to campus on Hyde Park Boulevard and Ellis Avenue and then circles around campus. This route operates weekdays from 7:30 a.m. to 6:37 p.m.; weekends from 8 a.m. to 6:37 p.m. After Summer Convocation, a reduced service schedule goes into effect.

#192 U. of Chicago Hospitals Express: Provides express service to/from downtown to Harper Court, campus, and the medical center. Southbound service is from 6:30 a.m. to 9 a.m., northbound service is from 3:45 p.m. to 7 p.m.

For more information, see http://safety-security.uchicago.edu/cta_buses

Students ride the # 171 and 172 free with a UCID; regular CTA fares apply for the #192 (full fare, $2.25).

The University also operates a free evening bus service, Nightride, consisting of four routes that cover the Hyde Park-Kenwood neighborhood. The buses operate on 15-30-minute schedules between 5 p.m. until about 4 a.m. Sunday through Wednesday, and until 6 a.m. Thursday through Saturday. They depart from the Ellis Parking Garage or University Avenue across the street from the Reynolds Club. During University breaks and Summer Quarter, the service runs until 1 a.m. For more information, see https://safety-security.uchicago.edu/services/ugo_nightride_shuttles

Safety Escort Program

The Safety Escort Program is not a transportation service - it is an escort service offered by University Security. An individual or group may call Security at 702-8181, and request a patrol car to accompany them from their place of departure to their destination anywhere within Hyde Park. This service is extremely useful late at night and/or if buses have stopped running. You may contact Security on emergency phones throughout the campus and Hyde Park. However, Security prefers that people only use these phones when absolutely necessary. Students consider this to be an excellent service. It's really a good idea to utilize it so that it continues to be offered.

RECREATION ON AND NEAR CAMPUS

There are two main student centers. The Reynolds Club, at 57th and University, includes Hutchinson Commons, home of the largest cafeteria on campus; two coffee shops; the North Lounge; automatic teller machines (in the basement area); and a variety of recreation rooms. For more information, visit https://leadership.uchicago.edu/

The Gerald Ratner Athletic Center is a 15,000-square-foot, state-of-the-art athletic and recreational facility. With its fitness center, gymnasiums, dance room, classrooms, 50-meter swimming pool, ball courts and more, it is designed to support the university’s various sports teams as well as the fitness needs of other users. Graduate students receive membership for free. During the academic year, the center is open from 6 a.m. to midnight on Monday to Thursday, 6 a.m. to midnight, on Friday, 6 a.m. to 9 p.m., and 8 a.m. to 9 p.m. on Saturday and Sunday. For additional information about this facility, visit their website: http://athletics.uchicago.edu/landing/index

Ida Noyes Hall, on 59th Street between Woodlawn and Kimbark, was modeled after an English manor house. It houses the Max Palevsky Cinema, a 500-seat theater, home of Doc Films. For more information, visit http://docfilms.uchicago.edu . Ida Noyes also contains The Pub, the office of Career Advancement, and the Maroon office.
Chicago is a fantastic city for music, theatre, and dining out. The Chicago Symphony, the Lyric Opera, Music of the Baroque, jazz, and blues clubs, The Goodman Theatre, and off-loop theatres are all excellent. Both inexpensive ethnic restaurants and expensive special-occasion restaurants abound.

Information on events in Chicago is plentiful. Check out the Explore Chicago pages on the University of Chicago website (https://visit.uchicago.edu/), or http://www.citysearch.com/guide/chicago-il-metro. One of the best print sources is the monthly Chicago Magazine, available at most newsstands. Chicago Magazine rates restaurants, compiles a complete calendar for the coming month, and generally includes a feature or two on getting the most out of the city. The Friday and Sunday Sun-Times and Tribune have good sections on the week's events. In addition, The Reader has the best information on music, movies, dance and shows. It is available free in the Reynolds Club, delivered Thursday night or Friday morning.

Festivals and Exhibits

The following is a brief list of "don't miss" outdoor concerts, cultural festivals and art exhibits all over town. Most events will be listed on the City of Chicago’s events website at: www.choosechicago.com

Ravinia Music Festival - all summer long, a wide variety of music - Chicago Symphony Orchestra, jazz, country, and more in a beautiful outdoor park, www.ravinia.org, 847/266-5000.


Chicago Blues Festival - Held the 2nd weekend in June in Grant Park - Petrillo Music Shell. World famous blues sounds of "Sweet Home Chicago" as well as showcasing talent from coast to coast. For more information, go to https://www.cityofchicago.org/city/en.html

Chicago Gospel Festival - At Grant Park in the Petrillo Shell in June. World's largest free outdoor gospel festival. For more information, go to https://www.cityofchicago.org/city/en.html

Printer's Row Lit Fest - On South Dearborn between Polk Avenue and Congress Parkway, in June. Old, new, rare, antique and special books are for sale by booksellers in historic Printer's Row. Sponsored by the Chicago Tribune, printersrowlitfest.org, 312/222-3348.

Grant Park Music Festival - In June, July and August: America's largest free Symphonic Music Festival featuring international soloists and conductors with the Grant Park Symphony Orchestra and Chorus. Visit www.grantparkmusicfestival.com.

Taste of Chicago - Held in July in Grant Park, the Taste is a premier outdoor food festival showcasing Chicago’s dining diversity; there are nightly concerts at Petrillo Music Shell and live broadcasts from major radio stations. Find more information at https://www.cityofchicago.org/city/en.html
**Air and Water Show** - Spectacular entertainment in the air and on the water at the North Avenue Beach in July or August. Features military and civilian air and water craft. Find more information at https://www.cityofchicago.org/city/en.html

**Buckingham Fountain** - Located on Congress and Lake Shore Drive. The fountain is turned on in early May and runs daily from 8:00 a.m. to 11:00 p.m until mid-October, depending on weather. Water display every hour on the hour for 20 min; color and music show between dusk and 10:20 p.m.

**Chicago Jazz Festival** - Labor Day weekend in Grant Park. This event highlights Chicago's rich jazz tradition. Find more information at https://www.cityofchicago.org/city/en.html

**Chicago International Film Festival** - In October at various Chicago theaters. This event features films from 40 countries. Go to www.chicagofilmfestival.com.

The following websites may also be useful:

The Chicago Convention and Tourism Bureau:
www.choosechicago.com

Special Events Management:
www.chicagoevents.com

The Chicago Park District
http://www.chicagoparkdistrict.com

Metromix:
http://chicago.metromix.com

The Chicago Tribune:
www.chicagotribune.com/entertainment

The Chicago Sun Times:
http://www.suntimes.com/entertainment

The Chicago Reader:
http://www.chicagoreader.com

Chicago Magazine:
http://www.chicagomag.com

The Chicago Symphony Orchestra
http://www.cso.org

The Chicago Music Guide
http://www.chicagomusicguide.com
The Museum of Science and Industry
http://www.msichicago.org

The Field Museum
http://www.fieldmuseum.org

The Alder Planetarium
http://www.adlerplanetarium.org

John G. Shedd Aquarium
http://www.shedd aquarium.org

The Art Institute
http://www.artic.edu

Kohl’s Children Museum
http://www.kohlchildrensmuseum.org

Lincoln Park Zoo
http://www.lp zoo.com

Brookfield Zoo
http://www.brookfieldzoo.org

Navy Pier
http://www.navypier.com

Broadway in Chicago
http://www.broadwayinchicago.com

The League of Chicago Theatres
http://www.chicagoplays.com
The Goodman Theatre
http://www.goodmantheater.org

Steppenwolf Theatre
Http://www.steppenwolf.org
### COMMITTEE ON DEVELOPMENT, REGENERATION, AND STEM CELL BIOLOGY

**ADDRESS LIST**

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**GRADUATE EDUCATION ADMINISTRATOR**

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**COMMITTEE**

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**OTHER UNIVERSITY OFFICES**

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<td>Main Number - Hospitals</td>
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<tr>
<td>Campus Police</td>
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