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Last edited September 2013, M. LaBarbera and A. Anastasio
*The guidelines and policies in this handbook are expected to be normal practice – if reasonable exceptions arise, errors are found, or conflicting information is offered by students, faculty or staff, please contact the Director of Graduate Studies (Michael LaBarbera) for clarification and resolution.
OBA Degrees

The Department of Organismal Biology and Anatomy grants both Doctor of Philosophy (Ph.D.) and Master of Science (M.S.) degrees in Integrative Biology, but students are admitted with the understanding that they are working towards the Ph.D. degree.

OBA Programs

OBA emphasizes an integrative approach to biology and most of its faculty have research programs that can be categorized into one of four general areas. These are:

1. **Biomechanics**: the application of methods from engineering and physics to understanding the design of organisms.
2. **Developmental Biology**: understanding how information coded into the genome is translated into the patterns seen in organisms. Our developmental biology program has a special emphasis on the interface between evolution and development, an area sometimes called “EvoDevo”.
3. **Neurobiology**: understanding how the nervous system regulates and controls the behavior of animals. Our neurobiology program has a special emphasis on the relationship of the nervous system to behavior (or neuroethology) and the application of quantitative methods to understanding neural function (computational neuroscience).
4. **Paleontology**: documenting and understanding evolutionary patterns and processes through analyses of the fossil record.

As part of the Darwinian Sciences Cluster, students in the program on Integrative Biology typically frame their research in an evolutionary context. Most students will, like the faculty, emphasize one of the above areas in their work and interact strongly with faculty and students with similar interests in other Departments or Committees. However, a special feature of training in OBA is exploration of common themes and points of interaction between these areas, so IB students are encouraged to explore the full range of areas of inquiry that relate to their principal interests.

Life and Living in OBA

All entering students are assigned desk space together in a semi-communal office. It’s a good idea to get to know the other graduate students in the program and in the cluster as they are a good source of information about both science and the in's and out's of this Department. You will also find your fellow students an excellent source of advice about the University and living in Hyde Park, or Chicago more generally.

Students are expected to attend the Evolutionary Morphology seminar series (Thursday evenings, 7:30). This is just one means of learning about research within the department, but it has the added benefit of frequent contributions from external speakers, thereby giving a flavor of the wider interests of our research community. Many other valuable seminar series from other Departments and Committees will be available to you; these provide a superb opportunity to broaden your intellectual horizons. Many seminars include an opportunity for an informal get together (often with food) to ask questions, discuss the field and to get to know the speaker. Get into the seminar habit — you'll find that these are a painless way to pick up a speaking acquaintance with a variety of topics, and will amply reward the time invested. If at first you feel a bit lost in the talks, be assured that’s perfectly normal — these talks are generally aimed at professionals in the field. (Which you soon will be.) Persist and you’ll be amazed at how much you pick up over the course of a quarter. Most of all, don’t be afraid to ask questions. If you preface your question with “This is not my area but I was wondering ...” any question, no matter how basic, will be treated with respect. Seminar announcements are posted in the first floor hallway of Anatomy and are available by subscribing to a variety of mailing lists (see appendix).

The single most important thing you can do for yourself in graduate school is ... keep in touch. During your first year, let members of the Student Advisory Committee know how things are going; if you run into problems of
any sort, let someone know. Two very important people to get to know are the Director of Graduate Studies in the department (Michael LaBarbera) and the Graduate Program Administrator (Alison Anastasio), as well as members of the Student Advisory Committee: they are all trained to know how the program works and are good sources for advice and advocacy. During your first few years, go out of your way to maintain contact with the faculty members you think you may want to serve on your Committee. Let them know what your interests are, what courses you are taking and, of course, your latest brilliant ideas. Finally, get to know the administrative staff! They are here to help you as well, and if they don’t know the answer to your question, they will help you find the answer.

Graduate Student Training

IB students have the privilege of studying within a Department that encompasses a large range of biological fields, with faculty who take a broad "organismal" approach to biology. Students are expected to make the most of this opportunity by familiarizing themselves with the work of the Department and gaining a broad-based training. Although students are expected to gain a breadth of knowledge, your training should be aligned with your interests and will often have a direct bearing on your proposed dissertation. These aims can be achieved by a combination of course work, directed reading, laboratory experiences (formal rotations and other experiences), and by becoming an active member of the Department (attending seminars and interacting with other students, postdocs, and faculty).

Student Advisory Committee

As an incoming student, you will meet with the Director of Graduate Studies and the department’s Student Advisory Committee, who will assist you in making choices for a course of study in your first quarter (and all subsequent quarters until you have completed your Preliminary Exams; see below). The Student Advisory Committee will monitor your progress during your first two years in our program. You will meet with the Student Advisory Committee once per quarter to ensure that you are on track, and to provide you with formal feedback on your efforts in this initial stage of your graduate training.

Course requirements

In general, most students will have completed the following coursework before arriving:

A) Biology — 6 courses or 16 semesters hours, including one course in biochemistry.
B) Chemistry — two years of college chemistry (inorganic and organic) with laboratory.
C) Physics — one year of college physics with laboratory.

All students are expected to be full-time students — four quarters per year. You are only required to register for coursework during the Autumn, Winter, and Spring quarters (though you will be registered for research or rotations during the summer). Courses may be at the graduate or undergraduate level, as appropriate. For example, if you are taking a course on a topic you did not touch upon as an undergraduate, it may be more helpful to take an undergraduate (200) level course, rather than a graduate (300) level course. You may also register for 300 level "research" courses that carve time out of your schedule dedicated to hands-on research.

Summer quarters are unstructured, generally requiring no formal classes (but do register for "research"). In general, summers should be used to gain laboratory/field experience and to carry out research in the form of rotations, reading courses, or research related to your dissertation. Note that formal laboratory rotations can be counted as a course (and graded) if you and your lab sponsor fill out the appropriate form from the BSD’s Dean of Students office. For those quarters in which you do directed research with a faculty member, you should register for a research course or courses (300-level) with that faculty member. (After you have passed your written prelim exam, you will register for directed research courses full-time, i.e. 3 courses/quarter). It is not required that you take formal classes for all of your coursework during your first two years as a graduate student — indeed, if you don't spend a significant fraction of your time in the latter half of your first year and the first part of the second getting your feet wet in research, you'll be ignoring the most important part of your early graduate education.
The Department requires that you take ORGB 40000: “Introduction to Integrative Organismal Biology” in Autumn Quarter and ORGB 40001: “Topics in Organismal Biology” in the Winter Quarter during both your first and second years. The Division requires that you take the Ethics course (BSDG 55000: “Scientific Integrity/Ethical Conduct) offered in the Spring quarter. We strongly recommend that you also take ORGB 40100: “Grants, Publications and Professional Issues” in the Autumn quarter if you are eligible; this course is invaluable for those of you who will be writing fellowship applications upon your arrival. If you are lacking any of the basic course requirements listed above, you will be expected to satisfy these requirements as soon as possible.

During your first two years, the Student Advisory Committee will help you to decide upon the course structure that is right for you, and will approve each quarter’s course registration. You will be able to choose from the wide range of classes available, so that the demands of your research interests are met. However, the OBA emphasis on integrative science is reflected in our requirement that students complete classes in four out of six research areas during their first two years of study: this is our ‘Distribution Requirement’. These areas include: (1) Biomechanics and Functional Biology, (2) Development, (3) Neurobiology and Behavior, (4) Genetics, (5) Paleontology and Morphology, and (6) Systematics/Evolutionary History. Remember to think about further options, such as molecular and cell biology. While not a distributional requirement, molecular and cell biology is an increasingly important component of most aspects of bioscience, and might well be considered (by future employers) as an essential item in your research training toolkit.

Finally, in addition to taking formal courses to establish your background in the biological sciences, it is important that you begin to define your research interests: attend seminars (you are expected to attend departmental seminars when they occur, as well as Evolutionary Morphology seminars), take reading courses, speak to faculty, probe the scientific literature, and start to assemble your Dissertation Committee.

The Department expects you to do well in all your course work; avoid overloading yourself with more than you can handle. The Student Advisory Committee exists to provide a check on likely problems. If you get less than a “B” in any course, expect to be asked to discuss your performance with the Director of Graduate Studies or the Student Advisory Committee. Be sure to allow yourself ample time for reading and primary literature review. This is often best accomplished as a formal reading course with one or more of the Departmental faculty.

Please be aware that, if you are receiving financial assistance from the Division of Biological Sciences, a training grant, or a graduate fellowship, you must also meet the requirements of your aid program or run the risk of losing that support. Ultimately, your graduate course work must be sufficient to prepare you for the preliminary qualifying examination.

The Department has no foreign language requirement. However, depending on your field and research interests, you may still be asked to achieve reading competency in a particular language.

**Preliminary Exams**

Our preliminary exam has two parts, a written exam (“Written prelims”) taken at the end of the 4th quarter and an oral defense of a proposal (“Oral prelims”), typically done in the 7th quarter.

**Written Prelim Exam**

The Written Prelim Exam will generally be taken in late September, at the very beginning of your second year. The exam consists of two broad, synthetic questions to be answered within one week. The precise questions will be tailored to you and your research interests; one of the two will be deliberately formulated to be far from your primary area of expertise. The questions will provide a challenging test of the extent of your knowledge, understanding, and ability to integrate the primary scientific literature. Each essay will be limited to 10 pages of text (not including figures or references), typically in the form of a critical review of the literature. The essays
will be evaluated by an Ad-Hoc Written Prelim Exam Committee (chosen by the Director of Graduate Studies), and you will then meet with the Committee to discuss your answers in further depth and get the verdict on whether your responses were deemed adequate.

**To give you an idea of the type of questions to expect, here are some examples from past years:**

For the purpose of the examination, assume that OBA has founded a new journal named "Trends in Organismal Biology". This journal is much like the other "Trends" journals (e.g. Trends in Ecology and Evolution, Trends in Genetics, Trends in Biochemical Sciences), and it may be useful for you to examine them as models. An excerpt from the "Instructions to Contributors" reads: "Contributions to this journal should do more than just review research in an area. They should summarize the major themes and ideas in an area, examine them critically, and evaluate the area's major assumptions, contributions to biological sciences as a whole, and directions in which future work would be productive. The data of others do have a place in such reviews, but should not be the exclusive focus: concepts and ideas are equally important."

1) **The origin and diversification of whales involved changes to genes, anatomy, and biomechanical and physiological systems.** New fossils and new molecular analyses of whale phylogeny have yielded controversy as to the origin and early evolution of the group. Review the origin of whales, paying particular attention to the evidence of their higher-level relationships within Mammalia and the morphological transformations involved in the evolution of their novelties. Your review should assess the spectrum of phylogenetic evidence that has been used to assess cetacean relationships. Include an analysis of implications of the different hypotheses of the morphological, functional and physiological changes involved with their origin.

2) **Muscular hydrostats are a form of musculo-skeletal system common in invertebrates (especially molluscs) where one muscle directly opposes another muscle without an intervening lever-type or hydrostatic skeleton.** Although muscular hydrostats are widespread in invertebrates, they are rare in vertebrates (restricted to, e.g., some tongues, elephant trunks, and manatee snouts) where they clearly have independently evolved. Given the evident utility of muscular hydrostats (ask any octopus or elephant), speculate on what aspect(s) of vertebrate biology restricts their use among our kin. Assume your readers know little about muscular hydrostats; review the basics before tackling the main question. The following references should help you get into the literature: Kier, W.M. and K.K. Smith. 1985. Tongues, tentacles and trunks: the biomechanics of movement in muscular-hydrostats. Zool. J. Linn. Soc. 83:307-324; Marshall, C.D., L.A. Clark and R.L. Reep. 1998. The muscular hydrostat of the Florida manatee (*Trichechus manatus latirostris*): a functional morphological model of perioral bristle use. Mar. Mammal Sci. 14:290-303; Sumbre, G., Y. Gutfreund, G. Florito, T. Flash and B. Hochner. 2001. Control of octopus arm extension by a peripheral motor program. Science 293:1845-1848.

3) The classical investigations of the physiology of the neuromuscular junction were carried out using the sartorius muscles of frogs, and work over the past half century has extended the taxonomic scope to include neuromuscular junctions in a wide variety of vertebrates and invertebrates. There has been particular progress over the past decade due to the introduction of a variety of innovative optical imaging techniques, as well as the application of tools from molecular biology. Nature: Neurosciences has asked you to write an overview of the neuromuscular junction that will be accessible to a broad range of neuroscientists from systems neuroscientists to ion channel groupies. After reviewing the classic concept of the function of the neuromuscular junction, Nature: Neurosciences has asked you to summarize the current understanding of how the structure and physiology of neuromuscular junctions is related to differences in the functional requirements of the muscles they innervate. In particular, they have asked you to clarify the relative roles of anatomical and molecular differences in determining neuromuscular performance, highlighting the contribution of modern techniques to clarifying this problem.

4) **What do we know of deuterostome phylogeny?** Considerable space has been devoted to this issue in multiple high-profile journals, but the evidence is so diverse and specialized that the individual pieces are only intelligible to a minority of interested parties. How is this diversity of data to be compared? Are there irresolvable conflicts? How is the sum total to be interpreted? Current Biology, always on the lookout for a review article with scope, has asked you to take on the task of digesting this indigestible lump, reviewing anatomical, developmental, molecular, phylogenetic, and fossil evidence, explaining along the way how each form of evidence contributes to the picture. Put another way, attempt to explain to Current Biology's readership their combined relationship to a xenoturbellarian.

Should you fail to reach the expected standard, there will be an opportunity to retake the Written Prelim Exam in December (of the second year). If you are still unable to satisfactorily complete the exam, you will be expected to make a choice between registering for a Masters degree or leaving the program. In order to obtain a Masters degree you must successfully complete a laboratory based, original research project, and present this work to the Department both in the form of a written manuscript and orally as a Research Seminar. The supervisory
committee for the Masters degree can be formed in one of two ways. The most straightforward is for the student to identify at least three faculty members competent to supervise the work and secure their agreement to act as a thesis committee. (This is the preferred method.) Alternatively, the Student Advisory Committee will bring in a new Preliminary Committee member to assist the student in working towards his/her Masters. **To receive a M.S. degree, a student must formally request of the Department that this degree be granted.**

Please note that you cannot be formally admitted to candidacy for a Ph.D. degree until both portions of the Preliminary Examination have been passed. Having passed this exam you should file for Masters candidacy **even if you have every intention of going on to complete your Ph.D.** (It’s free — take it!) Assuming you successfully complete the Written Preliminary Exam and defend your dissertation proposal (the Oral Preliminary Exam — see below), the Masters degree is awarded on the basis of work completed to that point in your research training, subject to the approval of the Student Advisory Committee. An M.S. under these conditions costs you nothing, looks good on your resume, ... and will make your parents happy, giving them something to brag about.

**Dissertation Proposal and Oral Prelim Exam**

Having successfully passed the Written Preliminary Exam, you should concentrate on developing a dissertation proposal. To assist in this process, it is important that the final choice of a primary lab be made as early as possible in the second year, although you officially have until the end of your second year before you must declare which faculty member is to be your permanent dissertation advisor. "Permanent" is not as eternal and unchangeable as it sounds; you have the right to request a change of advisors at any time. This decision is not to be taken lightly, however, since your dissertation advisor should be the person to direct your research. A change in advisors usually also implies a change or major shift in research topic; because of the time necessary to complete most dissertation research, it is unwise (although not impossible) to change either one after the middle to end of your third year.

During your second year you should concentrate on laboratory work and, where appropriate, carry out a feasibility study on the proposed dissertation project. It is expected that some preliminary data will be included in your proposal. During this phase you will also continue to take courses and to be involved in directed reading projects, with your progress overseen by the Student Advisory Committee. As your dissertation interests develop, you should start to assemble a Dissertation Committee. This will need to include your dissertation advisor **and two other faculty members from OBA**; any additional members of your dissertation committee can be drawn from within the department, outside the department but within the University, or from outside the University. The committee should minimally have three members, but no more than six. Remember that your Committee is a resource to help you with your dissertation; you should choose Committee members with this in mind. In the unlikely event that problems arise between you and a member of your Committee, you may petition the departmental Chair at any time to change a Committee member. If you feel you need advice on forming a dissertation committee, the Director of Graduate Studies (Michael LaBarbera) is always available for confidential discussion.

The dissertation proposal should be formatted as a National Science Foundation (NSF) Doctoral Dissertation Improvement Grant (DDIG), or National Institutes of Health (NIH) pre-doctoral National Research Service Award (NRSA) application; each of these include sections on Background and Preliminary Results, Specific Aims, Methodology and Interpretation. You will not be penalized if a preliminary study has shown that a particular avenue is unlikely to be fruitful, but you will nevertheless be expected to present and explain any negative results, and the reasoning underlying any proposed changes of direction. Your proposal will provide the framework for an actual NSF DDIG / NIH NRSA Grant submission.

By the end of the Spring quarter (May or early June) of your second year, you should be ready to formally submit and defend a dissertation proposal. (Note that you will not be required to strictly adhere to this early proposal throughout the course of your Ph.D. work — we expect your research to evolve as you progressively learn more — but deviations from your proposal should be cleared with your dissertation committee). Having
written the dissertation proposal and submitted it for examination, you will present it orally to your Dissertation Committee. You may choose to present your proposal in closed session (the dissertation committee only) or in a forum open to the public (faculty and students). Nearly all students choose an open session. If you do choose a closed session, you will be required to make a public presentation of your proposal at a later date. Note that “closed” exams are closed to the general public but remain open to OBA faculty. Since the Department, not an individual faculty member, grants your degree, the entire faculty has a stake in the originality and rigor of your work.

You should email the Director of Graduate Studies and the Graduate Program Administrator at least 10 working days before your oral prelim exam, including information on the members of your committee, a pdf of your proposal, and the date, time, and place of your exam. Based upon this information, a notice will be emailed to all faculty giving the date, time, and location of your exam. After presentation of your proposal, faculty on your committee will perform the examination, providing you with valuable feedback on the direction of your research. Results of your exam may be Pass, Conditional Pass, or Fail.

Should the dissertation proposal examination fall short of the standards expected by the Department (determined by vote of the examining committee), you will be given an opportunity to retake this exam on one more occasions, at the end of September, before beginning the third year. If a student is still unable to satisfactorily complete the exam, he/she will be expected to make a choice between registering for a Masters degree or leaving the program as outlined above.

Having successfully completed your Oral Prelim Exam, you will file for "candidacy" for the Ph.D. These forms should be prepared by the Graduate Program Administrator and signed by the appropriate parties before submission to the Registrar. Admission to candidacy is an absolute requirement to enable you to apply for an NRSA or NSF Dissertation Improvement Grant so do not neglect to complete this step!

**Teaching Requirements**

The Division of Biological Sciences (BSD) currently requires that students serve as course assistants for a minimum of two approved undergraduate, graduate, or medical school courses. Students receive no additional pay for their teaching in meeting this requirement. If you wish, you may also take a TA Training Course (BSDG 50000: “Teaching Assistant Training” — offered in the Fall Quarter) that covers teaching concepts and approaches, a course meant to assist students in developing their teaching skills. If taken before or concurrently with your TA-ing an undergraduate or medical school course, this TA course can serve to meet one of your TA course requirements. The requirement to TA two courses is part of the BSD's guarantee of tuition and stipend support for a minimum of five years (irrespective of your source of financial aid). For additional information on which TA-ships are available, see the Graduate Program Administrator. We view teaching as an important component of your professional training and believe that you will find it a rewarding experience.

If a student requires stipend support from the BSD (DU, Divisional Unendowed, support) beyond their first two years, the BSD currently requires the student to TA additional courses. To receive DU funding after year two, you must TA one course per year without additional remuneration.

The Division of Biological Sciences will **not** provide stipend or tuition support beyond a student's sixth year; support beyond year six must come from a research grant, a non-university fellowship, or personal funds.

After you have fulfilled your Divisional Teaching Requirement, you may qualify to receive payment for performing additional teaching or as an assistant in certain courses with associated labs. When deciding what course to teach and at what stage it would be optimal, note that in general you will find that you need to concentrate increasingly on your dissertation research as you progress toward completing your doctoral degree. Consider carefully whether you can afford to give up research time for teaching, and be certain to obtain the support of your advisor and dissertation committee. It is not recommended that you teach during your final year in the program. In your final year, it is most critical that you complete your research and write and submit a satisfactory dissertation in a timely fashion. The Graduate Program Administrator has information on the current
stipend level for teaching as an assistant in a course.

**Research Support and Grants**

We expect you will apply for research and tuition/stipend grants throughout your time in the program. Writing grants is an important part of pursuing an academic research career and it is appropriate that you think about obtaining funds to help support your research. Many small grants (Hinds Fund, Sigma Xi, and many others) as well as competitive federal funding are available; see the “Student Resources” section on the departmental website and contact the Graduate Program Administrator for specific funds that are available for your research interests. Don't neglect smaller grants; these can be an important source of funding, and you will find that all the real work goes into writing the first application. (Text can largely be recycled for subsequent applications.)

There is a subsidiary benefit to securing outside funding, one which you should not minimize; having a number of grants on your *curriculum vitae* will make you more attractive to potential employers. Finally, applying for small grants will help you to develop good grant-writing skills that will always be important to your career success. Any time you are preparing a fellowship or grant application, you must check in with Deb Hawkins, the grants and contract administrator in OBA, to see whether you need to route your application through the University. Failure to do so before submission could result in many headaches after an award has been made.

We expect that, if eligible, you will write and submit National Science Foundation GRFP (3-year fellowship) applications at the beginning of your first (Autumn) quarter on campus. The course “Grants, Publications, and Professional Issues” will help you with this application. These are highly desirable awards to receive, both for you and for the University. This is also an excellent starting point for developing a strong CV that demonstrates your ability to compete for funding, as well as your promise and achievement in carrying out independent scientific research. Obviously, your ability to bring in extramural support for three years of your graduate education helps the Division of the Biological Sciences (and, thus, our Department) support a larger number of talented graduate students. Success in gaining funding from NSF depends on:

1. A strong paper record (*i.e.* strong GPA, GREs, an undergraduate honors research thesis paper),
2. A strong research statement; you need to be able to define the general direction of your research interests and why the program that you are in will help you to achieve these goals, and
3. Strong, detailed letters of recommendation from both former and current professors familiar with you, your research interests, and the specific proposal you will be submitting.

A detailed research project is not required; however, the more focused you can be in describing your research goals, the stronger your proposal will be. You should plan to consult with the Director of Graduate Studies and take the Grants, Publications, and Professional Issues (EVOL 40100) course to write this proposal. These are competitive grants, so do not be disappointed if you fail to receive an award. Even if you do not receive a pre-doctoral fellowship, the experience is certainly worth the effort of having written your first research application. Between 2007-2011, 17 out of 36 domestic students in the Darwinian Sciences (OBA, CEB, E&E) have received NSF fellowships, an impressive 47% rate of funding.

As outlined above, once you have passed your preliminary qualifying exam and are advanced to candidacy for your Ph.D., you may apply to the National Science Foundation (NSF) Doctoral Dissertation Improvement Grant (DDIG) in many fields. These proposals are due in early autumn each year; check with the Graduate Student Administrator for this year's deadlines. NSF DDIGs pay for research supplies and travel; they do not cover stipend or tuition support. Students in our graduate program often receive such awards to support their doctoral research. As you prepare your own proposal, you should consult with these students and review successful proposals, in addition to discussing the proposal with your doctoral dissertation advisor. Normally such awards will support your research for a 1-2 year period (Year 4/5). Finally, it is often the case that your research can be supported, in whole or in part, by funds available from your doctoral dissertation advisor’s research grant(s). Such support carries with it an obligation that your research bear some meaningful relevance to the stated goals of your advisor's own grant, as it is incumbent upon him/her to meet those research goals for which they received funding.
If you are working in an area relevant to the research programs of the National Institutes of Health (NIH) we will also expect you to apply for an NRSA. NRSA Fellowships pay a stipend that the BSD supplements to the Divisional level, together with support for insurance and travel. Tuition costs are supplemented by BSD for students holding these fellowships. These pre-doctoral awards are for up to 5 years. (Note that there are also 3-year NRSA Post-doctoral fellowships; you will not be precluded from holding one of these should you obtain a pre-doctoral NRSA). Pre-doctoral awards provide no support for research expenses.

**Dissertation Committee Meetings**

The Department and BSD requires that all students admitted to candidacy (i.e., who have passed the written preliminary exam and the oral qualifying exam) meet with their Dissertation Committee **no less than two times each year, and preferably three times each year**, during the remainder of their time as a graduate student. **It is your responsibility to schedule these meetings.** They are extremely important, so don't avoid arranging them. Committee meetings ensure a mechanism for maintaining communication between you and your Committee members, as well as your advisor, with whom you will most likely maintain closest contact. Clearly the degree of contact that you have with your advisor will depend on the nature and field of research that you have chosen to embark on.

The goal of these meetings is for you to present a progress report on your work, identifying any difficulties that may have come up since the last Dissertation Committee meeting and any resulting changes in the scope or direction of your dissertation. (It is wise strategy to get your committee to approve such modifications of your planned dissertation as they become apparent — these are not issues you want to arise in your dissertation defense.) In addition, it is a good idea to plan to present representative data that you have collected and a summary of the data, which your Committee members can evaluate and comment on. Feedback from your Committee members, who have varying perspectives and expertise that bear on your doctoral project, is a critical component of these meetings. Following each meeting, you and your dissertation advisor are responsible for writing a summary of the meeting, documenting your Committee's evaluation of your progress and the goals that were agreed on at the meeting for your subsequent work. This report will be circulated to you and to all members of your Committee, as well as being kept in your student file. In this way, there is a paper record giving you and the Department feedback on the nature of your progress. Remember that this report and the meetings themselves are meant to serve a positive role in providing you with critical feedback on the progress of your work. In our experience, inadequate communication between you and your Dissertation Committee is the main source of difficulty likely to arise when you write and defend your dissertation. By keeping your Committee informed regarding your progress and any change in the content and scope of your thesis, you will assure that no unforeseen surprises await you at your defense! (Note that a slightly different dissertation committee structure is becoming increasingly common in the Department. In this alternative model, the dissertation committee has a formal committee Chair, separate from your advisor. The dissertation committee Chair runs the committee meetings, takes notes on the conversations, and prepares the report of each dissertation committee meeting that is circulated to you, your advisor, and to your official files.)

If, during the course of your work, you have a problem, it is your responsibility to seek advice from the appropriate member of your Committee, much as you will ask advice of your colleagues after you receive your degree. It is possible that you may have a problem but not recognize it. This represents an additional reason for regularly reporting to your Dissertation Committee — they can help you by offering advice and pointing out both problems and possible solutions.

**Research Conferences**

It is important for your training, and also for raising your profile within your field, that you attend research conferences. The Department provides $500 travel support (see Student Expense Account, below) for students to attend a conference each year. Ideally, this will be to present a portion of your research results. Presenting your research is critical at the early stages in your career for establishing an identity with others in your field; it will give people something to talk to you about and to remember you by. Departmental support for travel is intended to help cover the meeting registration fee, your travel costs (airfare, car, bus/cab) and housing (hotel...
room). Your meal expenses will not be covered. To receive reimbursement for these costs, it is essential that you retain receipts. Submit these receipts and a travel report form to the Operations Assistant (Cindy King), who can supply you with the form. Travel Support (Student Expense Account) is budgeted from July 1 to June 30 of each academic year. If you are supported by or are working on a faculty grant, these funds will take precedence over the Department's support of your travel. Your Student Expense Account can also help to pay your expenses to off-campus training or field courses.
Travel Support (Student Expense Account) — Frequently Asked Questions

- **Amount of money you get per year:** $500

- **How many years of funding:** 5 years

- **Purpose for this money:** The $500/year is to be used for travel support for students to attend one national conference/meeting per year. (Ideally, this will be to present a poster or oral report on your research).

- **Can this money be used for non-conference use:** If you would like to use this money towards something non-conference related, you will need to contact both the OBA Chair (Robert Ho) and Director of Graduate Studies (Michael LaBarbera) to get their approval.

- **Can any unused money from your account rollover:** Yes, but only for two years (to a maximum of $1000) under normal circumstances.

- **Exception to Rollover Rule:** If there is some special circumstance that will demand a larger sum than available in a single year (e.g., a major conference/meeting that is held outside of the U.S.; a course important to your training given at a field station or other remote location) it is possible to accumulate your travel award over more than one year. Again, you will need to contact both the OBA Chair (Robert Ho) and Director of Graduate Studies (Michael LaBarbera) to get their approval IN ADVANCE.

- **Documentation:** Note that all expenditures must be supported by itemized receipts, so save credit card receipts, hotel bills, etc. Expenses not supported by receipts cannot be reimbursed. Consistent with the 2012 change to student reimbursement policy at the University, you will also be required to submit a signed waiver acknowledging that the expense is legitimately non-taxable.

If you have any questions about the purpose/policy for these funds, please contact the OBA Chair (Robert Ho) and Director of Graduate Studies (Michael LaBarbera).

The Doctoral Dissertation

As you work on your dissertation research, set yourself goals and deadlines. If your project turns out to be unworkable, how many years are you willing to devote to finding this out? With the assistance of your advisor and Dissertation Committee, set yourself a deadline for definitive, positive results, using your best judgment as to how long it will take to get solid results, yet leaving yourself enough time to change the direction of your research if your original proposal turns to be unworkable. Budget ample time for writing your dissertation (only you can judge how long this may take you), keeping in mind that your dissertation will probably go through at least two drafts before the final version.

As you approach the quarter you will be graduating in, please meet with the Graduate Program Administrator at least four weeks prior to the start of that quarter to review what needs to be done in order to graduate (applying for graduation, registration, the dissertation submittal process, etc.).

The format of your dissertation is between you and your Dissertation Committee, as long as the basic formatting requirements of the University are met. Make sure to meet with the University of Chicago Dissertation Office (http://www.lib.uchicago.edu/e/phd/) early in the dissertation writing process to check on the latest regulations. Although the Department has no specific requirements concerning the dissertation itself, we recommend you structure your dissertation as separate chapters that correspond to publishable papers. Each chapter will have an introduction, materials and methods, results, and discussion sections (as opposed to a "traditional" dissertation, which comprises a single introduction, materials and methods, results and discussion sections). Although this will add some redundancy to your dissertation due to overlap among your principal chapters, writing your
dissertation so that each chapter represents the format of a scientific paper facilitates any final changes that may be required before you actually submit your paper(s) for publication to a journal. This latter approach will generally require that you write a short introductory chapter as a background leading into your primary research chapters and a short summary chapter providing an overview of your entire dissertation research. Publication of your work in refereed journals should be your real goal, not simply completing your dissertation. If you submit dissertation chapters for publication before you defend your dissertation (a practice we strongly encourage), be sure to give the members of your Dissertation Committee a chance to review and comment on the manuscript before you submit it. Nothing irritates a Dissertation Committee more than to be presented with a fait accompli in the form of a published dissertation chapter that they didn’t get an opportunity to review.

Once you have completed each chapter of your dissertation, circulate it among your Committee members for their comments. The draft of your dissertation must be judged acceptable in format and style by your Committee before you can schedule your dissertation defense. A final copy of your dissertation must be submitted to your Committee and made available for examination by the Department faculty two weeks before your defense. You should also have an abstract of your dissertation (about two typed pages) to give to the Graduate Student Administrator for circulation to all members of the faculty two weeks before your defense. Consult your dissertation advisor and the members of your Committee in setting a date for the dissertation defense. Send an e-mail to the Graduate Student Administrator at least 10 working days before the defense which includes: a list of your committee members, the title of your dissertation, and the date, time and place of your Dissertation Hearing. The two-page abstract of your dissertation should be included with this email. A notice will be electronically sent to all students and faculty announcing your Dissertation Hearing and Seminar.

N.B. In order to graduate in a given quarter you must have successfully defended your dissertation by the end of the fourth week of that quarter. You must file an online application for the Ph.D. Degree by the beginning the quarter in which you plan to graduate. Please meet with the Graduate Student Administrator four weeks before the start of the quarter in which you plan to graduate to review the graduation process.

Timeline for Graduate Work

Here is a summary of the principal steps in obtaining your Ph.D.

First Year

• Orientation week – meet with Director of Graduate Studies and Student Advisory Committee in preparation for Autumn quarter.
• Begin fulfilling breadth requirements
• Apply for predoctoral fellowships
• December – second meeting with SAC, in preparation for Winter quarter.
• March – third meeting with SAC in preparation for Spring quarter
• BSD ethics course
• June – fourth meeting with SAC in preparation for Summer quarter
• Lab rotations if necessary

Second Year

• End of summer quarter – Written Preliminary Exam.
• Orientation week – fifth meeting with Student Advisory Committee
• Choose primary lab and dissertation advisor
• Start to assemble Dissertation Committee (minimum of three OBA faculty); plan an informal meeting of likely members.
• December – sixth meeting with Student Advisory Committee
• March – seventh meeting with Student Advisory Committee
• June – Oral Preliminary Exam. File for candidacy for the Masters degree. File for candidacy for the Ph.D.

Third Year and Beyond

• Begin a schedule for regular meetings with Dissertation Committee: at least once a year for 3rd and 4th year students, at least twice a year (Autumn and Spring) for students beyond the 4th year. (More frequent meetings are recommended.)
• Apply for DDIG and other research grants
• Present your research at appropriate conferences and symposia
• Teaching requirement should be completed by this point.
• Plan to have one paper submitted for publication by the end of this year.
• Begin thinking about next steps after graduation (see p. 13)

Final Year

• Continue meeting with Dissertation Committee
• Meet with the Graduate Program Administrator at least four weeks prior to the start of the quarter that you will be graduating to review what needs be done in order to graduate (applying for graduation, registration, the dissertation submittal process, etc.).
• Two weeks before Defense: distribute a two page summary of dissertation to Department, final copies of Dissertation to Committee and available to the Department.
• Oral defense of dissertation by end of fourth week of quarter.
• File approved dissertation with Dissertation Office by the end of week 7 of the quarter (or 6th in the summer quarter). If you miss this deadline you cannot graduate in that quarter.

Next Steps After Graduation

There are many career paths that you may choose to pursue after your Ph.D. The Career Advancement office on campus (https://careeradvancement.uchicago.edu/) is available to help with both academic and non-academic job preparation and professional development. The dedicated representative for the sciences is Christine McCary. Many doctoral graduates will decide to pursue an academic career, either via further postdoctoral research training, or by directly entering an academic research or teaching position. Others will take up research positions in industry, and still others will make use of the unique intellectual training afforded by a Ph.D. to pursue science-related or non-scientific careers.

Postdoctoral Fellowships

Postdoctoral fellowships not only can allow you the opportunity of learning new techniques and points of view, but they give you the chance to improve your academic credentials by publishing a greater body of work. In most fields within the biological sciences, post-doctoral training is required to be competitive for a job at a research university. Certainly you are likely to get a better academic position after having completed a postdoc.

You will have a broader choice of labs in which to do your postdoc if you are able to obtain your own fellowship funding, rather than relying on your potential supervisor to provide funds. Also, having such a fellowship will show future employers that you have the capacity to obtain independent funds. Of course you will need to identify a supervisor and discuss potential projects before you can make most applications. There are several different types of postdoctoral fellowships available, depending on your field; consult with the Graduate Program Administrator about such funding opportunities. The OGPA maintains a list of fellowships here (http://gradprograms.bsd.uchicago.edu/current_students/postdoctoral_fellowship_opportunities.pdf). Because of the significant time delay between making fellowship applications and the start of the funding, not to
mention the possibility that you may be unsuccessful at your first attempt, it is a good idea to be thinking about labs for your postdoc up to 18 months before you hope to start.

The BSD Postdoctoral Association is a also great resource (http://www.bsdpostdoc.uchicago.edu/) – they offer helpful seminars during the academic year, and of course lots of people who have just recently experienced what you are going through!

**Jobs in Academe**

In the present tight job market (and demographics seem to indicate that the market will not get better soon), you have to convince prospective employers at the outset that you are a professional, competent scientist, even if you are applying for jobs before you actually receive your degree. Since most advertised academic positions attract from 100 to 300 applications, you need to find some way to make your application stand out. There are basically two ways to increase your visibility, and you should decide early in your graduate career that you are going to use both:

1. **Publications.** Publishing your research is the best way to get yourself known in science and will show prospective employers that you do publish your research. The latter point may seem silly, but it isn't; approximately three-fourths of all dissertations completed in the U.S. are never published in professional journals. Since active research and publishing are requirements for most jobs, having a few publications on your CV will greatly improve your chances of landing the postdoc or job you want. Decide early that you are going to have at least one paper published or in press before you leave grad school. (Keep in mind that it will take at least 3-6 months for a submitted manuscript to go through the reviewing process; if a paper is accepted it will take at least another four months to one year before it actually appears in print.)

2. **Making contacts and establishing an identity in your field.** This process uses word-of-mouth recommendations, news of your work, and personal acquaintances and can often be the deciding factor in getting the postdoc or job you want. So how do you get plugged into this process if you are a mere graduate student? There really is only one way — advertise yourself. When there is a Departmental seminar in your field, hang around after the seminar is over and take the opportunity to talk with the speaker; contribute what you can to the conversation. Go to one national meeting a year if you can, introduce yourself to people, and talk informally about your research and interests. Once you have data to present, discuss with your thesis advisor the possibility of giving a paper at one of these meetings. If you do this, by the time you are writing your dissertation, you'll find that you know many of the people in your field and they know you.
CONTACT INFORMATION

Department Staff

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Office</th>
<th>Phone</th>
<th>Email</th>
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</thead>
<tbody>
<tr>
<td>Chair</td>
<td>Robert Ho</td>
<td>Culver 305</td>
<td>4-8423</td>
<td><a href="mailto:rkh@uchicago.edu">rkh@uchicago.edu</a></td>
</tr>
<tr>
<td>Director of Graduate Studies</td>
<td>Michael LaBarbera</td>
<td>Culver 101</td>
<td>2-8092</td>
<td><a href="mailto:mlabarbe@uchicago.edu">mlabarbe@uchicago.edu</a></td>
</tr>
<tr>
<td>Executive Administrator</td>
<td>Julie Steffen</td>
<td>Anatomy 106</td>
<td>2-0844</td>
<td><a href="mailto:j-steffen@uchicago.edu">j-steffen@uchicago.edu</a></td>
</tr>
<tr>
<td>Grants and Contract Specialist</td>
<td>Debra Hawkins</td>
<td>Anatomy 106</td>
<td>2-8039</td>
<td><a href="mailto:dlhawkin@uchicago.edu">dlhawkin@uchicago.edu</a></td>
</tr>
<tr>
<td>Human Resources Administrator</td>
<td>Annetha Bartley</td>
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<td>4-3294</td>
<td><a href="mailto:annetha@uchicago.edu">annetha@uchicago.edu</a></td>
</tr>
<tr>
<td>Graduate Research, Education, and Outreach Manager</td>
<td>Alison Anastasio</td>
<td>Culver 405E</td>
<td>2-3891</td>
<td><a href="mailto:aea@uchicago.edu">aea@uchicago.edu</a></td>
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Office of Graduate Affairs--Biological Sciences Division (BSD)

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Office</th>
<th>Phone</th>
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<tbody>
<tr>
<td>Assoc. Dean &amp; Dir., Grad. Affairs</td>
<td>Victoria Prince</td>
<td>BSCL 104</td>
<td>4-2100</td>
<td><a href="mailto:vprince@uchicago.edu">vprince@uchicago.edu</a></td>
</tr>
<tr>
<td>Executive Administrator</td>
<td>Diane J. Hall</td>
<td>BSCL 104</td>
<td>5-3849</td>
<td><a href="mailto:d-hall@uchicago.edu">d-hall@uchicago.edu</a></td>
</tr>
<tr>
<td>Student Affairs Administrator</td>
<td>Melissa Lindberg</td>
<td>BSCL 104</td>
<td>2-3905</td>
<td><a href="mailto:mlindber@bsd.uchicago.edu">mlindber@bsd.uchicago.edu</a></td>
</tr>
</tbody>
</table>

Fax Machine for student use is located in:

Anatomy 106 (Office hours only) 773-702-0037

RELEVANT SEMINARS

By being on the student email list (obastu@lists.uchicago), you are automatically subscribed to announcements for the Natural History and E&E weekly seminar series. Others of interest are listed below.

<table>
<thead>
<tr>
<th>Seminar</th>
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<tbody>
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<td>Darkness at Noon (Journal Club)</td>
<td><a href="mailto:noon_illumination@lists.uchicago.edu">noon_illumination@lists.uchicago.edu</a></td>
</tr>
<tr>
<td>Evolutionary Morphology</td>
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<td>Integrative Neuroscience, CNS and Neurobiology</td>
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<td><a href="mailto:behavior_seminar@lists.uchicago.edu">behavior_seminar@lists.uchicago.edu</a></td>
</tr>
<tr>
<td>Computational Neuroscience Journal Club</td>
<td><a href="mailto:cns-jc@lists.uchicago.edu">cns-jc@lists.uchicago.edu</a></td>
</tr>
<tr>
<td>Fish Group</td>
<td><a href="mailto:criswell@uchicago.edu">criswell@uchicago.edu</a></td>
</tr>
</tbody>
</table>
RELEVANT COURSE OFFERINGS

ORGB 30001: The Human Body
*Faculty: Ross, O'Reilly*
The Human Body course is the first component of the Scientific Foundations of Medicine curriculum in Year 1. The Human Body course will provide you with a foundation in the structural organization of the body. You will learn gross anatomy of the back, thorax, abdomen, pelvis, head and neck, and upper and lower limbs through large and small group teaching sessions, as well as cadaver dissection. Correlations with Radiology and Surgery are an integral part of the course and provide real world clinical context for the anatomic material.

ORGB 30260: Chordate Evolutionary Biology
*Cross-listed: EVOL 30200, BIOS 20260*
*Faculty: Coates*
Chordate biology emphasizes the diversity and evolution of modern vertebrate life, drawing on a range of sources (from comparative anatomy and embryology to paleontology, biomechanics, and developmental genetics). Much of the work is lab-based, with ample opportunity to gain firsthand experience of the repeated themes of vertebrate body plans, as well as some of the extraordinary specializations manifest in living forms. The instructors, who are both actively engaged in vertebrate-centered research, take this course beyond the boundaries of standard textbook content.

ORGB 31300: Key Issues In Early Vertebrate Evolution
*Cross-listed: EVOL 30300*
*Faculty: Coates*
The course addresses questions about the origin of vertebrates, the interrelationships of major gnathostome clades, and the fish-tetrapod transition. Undergraduate level chordate biology required; familiarity with methods in systematic biology advantageous.

ORGB 32500: Survey of Systems Neuroscience
*Cross-listed: NURB 31600, BIOS 24208, CPNS 30116*
*Faculty: Ragsdale, Mason, Issa*
This lab-centered course teaches students the fundamental principles of mammalian neuroanatomy. Students learn the major structures and the basic circuitry of the CNS and PNS. somatic, visual, auditory, vestibular and olfactory sensory systems are presented in particular depth. A highlight of this course is that students become practiced at recognizing the nuclear organization and cellular architecture of many regions of brain in rodents, cats and primates.

ORGB 33500: Current Debates in Evolutionary Biology
*Faculty: Schmidt-Ott*
The goal of this graduate student class is to reach a sophisticated understanding of current debates in evolutionary developmental biology. At the beginning of the course, a list of questions and references (to get started) will be provided. Each participant will be expected to choose questions and to provide critical surveys of key literature to other participants. Themes may include (but are not limited to) important debates concerning the relationship of major animal groups, the origin of bilaterian symmetry, mesoderm, segmentation, heads and eyes, but my also cover general developmental phenomena such as the interplay of phenotypic plasticity, genetic assimilation and canalization, or more abstract biological concepts such as homology, or predictability in evolution. Topic suggestions from participants are welcome.

ORGB 33600: Vertebrate Development
*Cross-listed: DVBI 35600, EVOL 33600*
*Faculty: Prince, Sharma*
This advanced-level course combines lectures, student presentations, and discussion sessions. It covers major topics on the developmental biology of vertebrate embryos (e.g. formation of the germ line, 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.

ORGB 33700: Developmental Genetics and Evolution
*Cross-listed: EVOL 33700, BIOS 20256*
*Faculty: Schmitt-Ott*
The purpose of this course is to provide graduate students and undergraduates with a developmental genetic perspective on...
evolutionary questions that have emerged in various disciplines including developmental biology, paleontology and phylogenetic systematics. Topics range from the evolution of gene regulation to the origin of novelties such as eyes and wings. These subjects will be introduced in lectures, but emphasis will be put on reading, presenting and discussing original research papers. Graduate students and undergraduates will be expected to collaborate in preparing paper presentations. As an introductory text “From DNA to Diversity” by Carroll, Grenier and Weatherbee (2004; 2nd ed.; Blackwell Science) is recommended.

**ORGB 34200: Biological Fluid Mechanics**  
**Cross-listed: BIOS 22242, EVOL 34200**  
**Faculty: LaBarbera**  
Properties of biological materials, mechanical analysis of morphology, and principles of design optimization, with appropriate examples from zoology, botany and paleontology. Lectures concentrate on solid mechanics in odd-numbered years. Prereq: undergraduate chemistry and physics, consent of instructor. Offered in even-numbered years.

**ORGB 34500: Computational Neuroscience I: Single Neuron Computation**  
**Cross-listed: BIOS 24221, CPNS 33000**  
**Faculty: Staff**  
This course briefly reviews the historical development of computational neuroscience and discusses the functional properties of individual neurons. The electrotonic structure of neurons, functional properties of synapses, and voltage-gated ion channels are discussed. PQ: Prior course in cellular neurobiology or consent of instructor required. Prior or concurrent registration in Math 200.

**ORGB 34600: Computational Neuroscience II: Vision**  
**Cross-listed: BIOS 24222**  
**Faculty: Staff**  
This course considers computational approaches to vision. It discusses the basic anatomy and physiology of the retina and central visual pathways and then examines computational approaches to vision based on linear and non-linear systems theory, information theory and algorithms derived from computer vision. PQ: BIOS 24222 and a prior course in systems neurobiology, or consent of instructor, required. Prior or concurrent registration in MATH 20100 recommended.

**ORGB 34700: Computational Neuroscience III: Cognitive Neuroscience**  
**Cross-listed: BIOS 24223, VPND 33200**  
**Faculty: Hatsopoulos**  
This course is concerned with the relationship of the nervous system to higher order behaviors (e.g., perception, action, attention, learning, memory). Psychophysical, functional imaging, and electrophysiological methods are introduced. Mathematical and statistical methods (e.g., neural networks, information theory, pattern recognition for studying neural encoding in individual neurons and populations of neurons) are discussed. Weekly lab sections allow students to program cognitive neuroscientific experiments and simulations.

**ORGB 40000: Introduction to Integrative Organismal Biology**  
**Faculty: Coates, Hale, LaBarbera**  
Integrative organismal biology aims to address questions focused at the organismal level, such as how animals and plants develop, evolve or function, through use of integrative and comparative approaches. This course will introduce students to faculty working in this area, their research and the methods used in their laboratories. Enrollment limited to first and second year OBA students.

**ORGB 40001: Topics in Integrative Organismal Biology**  
**Faculty: Coates, Hale, LaBarbera**  
A formal lecture series focused on a different topic related to Integrative Organismal Biology each year. Faculty in the department give each lecture. Enrollment limited to first and second year OBA students.

**ORGB 40100: Grants/Publications/Professional Issues**  
**Faculty: Ho, Bergelson**  
Covers professional topics in evolutionary biology, such as strategies in grant and article writing, construction and submission of professional articles for journals in the field, career alternatives and strategies, ethical issues, etc. Topics are decided upon by enrolled students and faculty leading the seminar.
ORGB 49500: Lab Teaching/Teaching: Organismal Biology & Anatomy
Faculty: Staff
Under the supervision of University faculty, graduate students in the Evolutionary Biology may serve as teaching assistants for courses in the College and relevant Graduate Divisions. Students will be evaluated and mentored throughout the quarter by their faculty supervisor, and at the end of the quarter by enrolled students. Prerequisite: successful fulfillment of the BSD teaching requirement and consent of instructor.

ORGB 49600: Lab Teaching/Training: Organismal Biology and Anatomy
Faculty: Staff

ORGB 49700: Readings: Organismal Biology & Anatomy
Faculty: Staff
Directed individual reading courses in Organismal Biology & Anatomy supervised by ORGB faculty members. Prerequisite: consent of instructor.

ORGB 49800: Research: ORGB-Off Campus
Faculty: Staff
Advanced research under the direction of the faculty of the Department of Organismal Biology and Anatomy, undertaken away from the University of Chicago at locations approved by the Chair and the student's advisory committee.

ORGB 49900: Research: ORGB-On Campus
Faculty: Staff
Advanced research under the direction of the faculty of the Department of Organismal Biology and Anatomy.

ORGB 57500: Cell, Growth, Injury, Repair & Death
Cross-listed: MPMM 57500, MOLM 57500, ISTP 57500
Faculty: Lee

BIOS 21236: Genetics of Model Organisms
Faculty: Bishop, Malamy, Ferguson, Glotzer, Palmer
A small number of organisms have been chosen for extensive study by biologists. The popularity of these organisms derives largely from the fact that their genomes can be easily manipulated, allowing sophisticated characterization of biological function. This course covers modern methods for genetic analysis in budding yeast, Drosophila, C. elegans, Arabidopsis, and the mouse. Case studies demonstrate how particular strengths of each system have been exploited to understand such processes as genetic recombination, pattern formation, and epigenetic regulation of gene expression.

BIOS 22233: Comparative Vertebrate Anatomy
Faculty: Westneat
This course covers the structure and function of major anatomical systems of vertebrates. Lectures focus on vertebrate diversity, biomechanics, and behavior (from swimming and feeding to running, flying, seeing, and hearing). Labs involve detailed dissection of animals (muscles, organs, brains) and a focus on skull bones in a broad comparative context from fishes to frogs, turtles, alligators, mammals, birds, and humans. Field trip to Field Museum and visit to medical school lab for human dissection required.

BIOS 22244: Introduction to Invertebrate Biology
Faculty: LaBarbera
This is a survey of the diversity, structure, and evolution of the invertebrate phyla, with emphasis on the major living and fossil invertebrate groups. Structure-function relationships and the influence of body plans on the evolutionary history of the invertebrate phyla are stressed.

BIOS 22260: Vertebrate Structure and Function
Faculty: Sereno
This course is devoted to vertebrate bones and muscles, with a focus on some of the remarkable functions they perform. The first part takes a close comparative look at the vertebrate skeleton via development and evolution, from lamprey to human. The major functional changes are examined as vertebrates adapted to life in the water, on land, and in the air. The second part takes a close look at muscles and how they work in specific situations, including gape feeding, swimming, leaping, digging, flying, and walking on two legs. Dissection of preserved vertebrate specimens required.
BIOS 23100: Dinosaur Science  
*Faculty: Sereno*
This introductory-level (but intensive) class includes a ten-day expedition to South Dakota and Wyoming (departing just after graduation). We study basic geology (e.g., rocks and minerals, stratigraphy, Earth history, mapping skills) and basic evolutionary biology (e.g., vertebrate and especially skeletal anatomy, systematics and large-scale evolutionary patterns). This course provides the knowledge needed to discover and understand the meaning of fossils as they are preserved in the field, which is applied to actual paleontological sites. Participants fly from Chicago to Rapid City, and then travel by van to field sites. There they camp, prospect for, and excavate fossils from the Cretaceous and Jurassic Periods. Field trip required.

BIOS 24203: Introduction to Neuroscience  
*Faculty: Sharma, Sherman, Grove*
This course is designed to provide a comprehensive introduction to the structure and function of the mammalian brain.

CPNS 30107: Behavioral Neuroscience  
*Faculty: Margoliash*
This course is concerned with the structure and function of systems of neurons, and how these are related to behavior. Common patterns of organization are described from the anatomical, physiological, and behavioral perspectives of analysis. The comparative approach is emphasized throughout. Laboratories include exposure to instrumentation and electronics, and involve work with live animals. A central goal of the laboratory is to expose students to in vivo extracellular electrophysiology in vertebrate preparations. Laboratories will be attended only on one day a week but may run well beyond the canonical period.

MGCB 35400: Advanced Developmental Biology  
*Faculty: Ferguson, Preuss*
This course provides an overview of the fundamental questions of developmental biology, presenting both the classical embryological experiments that defined these questions, and the modern molecular and genetic experiments that have been employed to try to reach mechanistic answers to these questions. The first portion of the course will focus on the mechanism of axis formation in a variety of organisms; the second part of the course will explore selected topics in the field.

MGCB 35500: Developmental Genetics of Non-vertebrate Model Systems  
*Faculty: Ferguson, Du, Greenberg*
This course explores the use of genetics in three different model systems, C. elegans, Drosophila melanogaster and Arabodopsis thaliana, to elucidate developmental mechanisms. The class will focus on a series of interrelated topics: for each topic, introductory material presented by the lecturer will be followed by student-led discussions of individual papers.

MGCB 35600: Vertebrate Developmental Genetics  
*Faculty: Prince, Millen*
This advanced-level course combines lectures, student presentations, and discussion sections. It covers major topics in the developmental biology of vertebrate embryos (e.g., formation of the germ line, 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.

MGCB 35700: Developmental Genetics and Evolution  
*Faculty: Schmidt-Ott*
This course uses the developmental genetics of established invertebrate and vertebrate model systems as an entry point to explore the developmental basis of evolutionary change. Topics range from the evolution of gene regulation to the origin of novelties such as eyes and wings. We will study original research papers. The purpose of this course is to provide graduate students (and advanced undergraduates) with a developmental genetic perspective on evolutionary questions that have emerged in various disciplines including developmental biology, paleontology and phylogenetic systematics.

MGCB 35800: Developmental Neurobiology  
*Faculty: Grove, Zou, Issa*
Topics include neural induction, early patterning of the central nervous system, axon guidance and neuronal migration, the development of brain activity, and the mechanisms of plasticity that fine-tune brain function. Approaches will range from molecular to cellular to systems neurobiology. Focus will be on the vertebrate CNS but attention will be given to important lessons from invertebrate systems.
### UNIVERSITY ACADEMIC CALENDAR
#### 2013-2014

#### Summer 2013

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<tr>
<td>Monday, June 24</td>
<td>Quarter Begins</td>
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<tr>
<td>Thursday, July 4</td>
<td>Independence Day</td>
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<tr>
<td>Friday, August 2</td>
<td>Dissertation Deadline</td>
</tr>
<tr>
<td>Friday, August 30</td>
<td>Convocation</td>
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<tr>
<td>Saturday, August 31</td>
<td>Quarter Ends</td>
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#### Autumn 2013

<table>
<thead>
<tr>
<th>Date</th>
<th>Event/Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday, September 22</td>
<td>New Student Orientation</td>
</tr>
<tr>
<td>Wednesday, September 25</td>
<td>Registration</td>
</tr>
<tr>
<td>Monday, September 30</td>
<td>Quarter Begins</td>
</tr>
<tr>
<td>Friday November 15</td>
<td>Dissertation Deadline</td>
</tr>
<tr>
<td>Thursday–Friday, November 28–29</td>
<td>Thanksgiving</td>
</tr>
<tr>
<td>Thursday–Friday, December 5–6</td>
<td>Reading Period</td>
</tr>
<tr>
<td>Friday, December 13</td>
<td>Convocation</td>
</tr>
<tr>
<td>Saturday, December 14</td>
<td>Quarter Ends</td>
</tr>
</tbody>
</table>

#### Winter 2014

<table>
<thead>
<tr>
<th>Date</th>
<th>Event/Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, January 6</td>
<td>Quarter Begins</td>
</tr>
<tr>
<td>Monday, January 20</td>
<td>Martin Luther King, Jr. Day</td>
</tr>
<tr>
<td>Friday, February 14</td>
<td>College Break</td>
</tr>
<tr>
<td>Friday February 21</td>
<td>Dissertation Deadline</td>
</tr>
<tr>
<td>Thursday–Friday, March 13–14</td>
<td>Reading Period</td>
</tr>
<tr>
<td>Friday, March 21</td>
<td>Convocation</td>
</tr>
<tr>
<td>Saturday, March 22</td>
<td>Quarter Ends</td>
</tr>
</tbody>
</table>

#### Spring 2014

<table>
<thead>
<tr>
<th>Date</th>
<th>Event/Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, March 31</td>
<td>Quarter Begins</td>
</tr>
<tr>
<td>Friday May 16</td>
<td>Dissertation Deadline</td>
</tr>
<tr>
<td>Monday, May 26</td>
<td>Memorial Day</td>
</tr>
<tr>
<td>Thursday–Friday, June 5–6</td>
<td>Reading Period</td>
</tr>
<tr>
<td>Saturday, June 14</td>
<td>Convocation</td>
</tr>
<tr>
<td>Saturday, June 14</td>
<td>Quarter Ends</td>
</tr>
</tbody>
</table>

#### Summer 2014

<table>
<thead>
<tr>
<th>Date</th>
<th>Event/Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, June 23</td>
<td>Quarter Begins</td>
</tr>
<tr>
<td>Friday, July 4</td>
<td>Independence Day</td>
</tr>
<tr>
<td>Friday August 1</td>
<td>Dissertation Deadline</td>
</tr>
<tr>
<td>Friday, August 29</td>
<td>Convocation</td>
</tr>
<tr>
<td>Saturday, August 30</td>
<td>Quarter Ends</td>
</tr>
</tbody>
</table>
Biological Sciences Division policy requirements for admission to candidacy to the Ph.D. and for the Ph.D. degree

1. Admission to candidacy for the degree of Ph.D. requires:
   a. Completion of Divisional Course requirements (nine courses, up to two of which may be substituted by graded laboratory rotations). A “B” average (GPA =3.0) must be maintained.
   b. Submission of a written thesis proposal and its defense to the satisfaction of the candidate’s thesis committee (note in some programs this defense also has a public component).

2. Admission to candidacy must occur, or be scheduled to occur, before the end of the student’s ninth quarter in residency (typically the Fall quarter of the 3rd year).

3. If admission to candidacy has not occurred by the end of the student’s ninth quarter then he/she will be unable to register at the beginning of the tenth quarter unless OGPA has approved a detailed plan from the program, student, and thesis advisor in which:
   a. The program adequately explains why candidacy has not yet been achieved.
   b. The student lays out a detailed plan for completion of the thesis proposal, with a timeline that does not extend beyond the end of their eleventh quarter in residency
   c. The thesis advisor provides a detailed plan, which includes frequency and nature of mentoring meetings, to assist the student in satisfactorily completing and defending the thesis proposal

4. Completion of the Ph.D. degree additionally requires:
   a. Completion of Divisional TA-ship requirements
   b. Completion of Divisional Ethics training requirements
   c. Completion of all graduate program-specific requirements.
   d. Submission and oral defense, to the satisfaction of the student’s thesis committee and graduate program, of an original dissertation

Approved Program Chairs.2.12.13
Graduate Student Affairs (GSA) is a part of the office of the Deputy Provost for Graduate Education and supports graduate students at every stage of their academic careers. GSA is a destination that provides graduate students with resources that support timely degree completion and professional preparation so that they can translate their degrees into a variety of careers.

**Selected GSA Programs for Various Stages of PhD Programs** *(Fall calendar on reverse.)*

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Course Work</th>
<th>Qualifying Exams</th>
<th>Dissertation Research</th>
<th>Dissertation Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fellowship Info Sessions—NSF, Fulbright, SSRC, etc.</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Fellowship Advising &amp; Editing—identify &amp; apply to grants</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Academic Networking—developing “elevator speech”</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Computational Literacy—maximizing computers for research purposes</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Expose Yourself Series—grads present research to peers</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>IRB Info Session—navigating human subjects clearance</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Dissertation as Process—managing dissertation project</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Write-Ins—boot camps for proposal &amp; dissertation writing</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Academic Publishing—how, when, and where to publish</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>GradUCon Conference—translating grad degree to jobs</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Teaching at...Conference—learning about the variety of colleges and universities; featuring grad alumni faculty</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Discerning Your Trajectory—alumni talks on career paths</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>The Frugal Grad—managing personal finances for grads</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Family Resource Center—drop-in center for grad parents</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Living Well—series on grad mental health</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

**GRAD.UCHICAGO.EDU** is a comprehensive online portal dedicated to information, news, and programs for graduate students. The website highlights essential university-wide resources and weekly updates from the *Grad Guide Weekly* bulletin.
FALL QUARTER EVENTS

GRADUATE STUDENT AFFAIRS

SEPTEMBER
9/24   Graduate Student Orientation, 10:30 a.m.-5:30 p.m. (various locations)
9/25   NSF Info Session, Noon - 1:00 p.m. (Classics 110)

OCTOBER
10/2   SSRC Intl. Dissertation Fellowship Info Session, 12:00-1:00 p.m. (Classics 110)
10/9   Expose Yourself: “In the News this Summer,” 4:30-7:00 p.m. (TBD)
10/10  Presidential Mgmt. Fellowship Info Session, 12:00-1:00 p.m. (Classics 110)
10/14  “Diapers & Dissertations: Grad School Parenting,” 12:0-1:00 p.m. (Classics 110)
10/14  The Frugal Grad: Cooking Well in Graduate School, 5:00-7:00 p.m. (I-House)
10/15  “Making Graduate School Work” with Professor Jonathan Lear, 12:00-1:30 p.m. (Classics 110)
10/16  “Failure To Launch: How Anxiety Affects the Brain’s Performance” presented by doctoral student Jason Sattizahn, 12:00-1:30 p.m. (Classics 110)
10/17  “Seeking Life/Work Balance,” featuring Lizanne Phalen, 12:00-1:30 p.m. (Family Resource Center, Ida Noyes Hall Lower Level)
10/17  Discerning Your Trajectory, 4:00-6:00 p.m. (Alumni House Library)
       Research on Happiness in Neuroscience, Psychology, and the Humanities
10/19  History of Football at UChicago, with Paul Durica (PhD’11), Noon – 1PM (56th St.)
       Part of UChicago Graduate Homecoming Celebrations
10/23  The Frugal Grad: Budgeting Workshop, 12:00-1:00 p.m. (Classics 110)

NOVEMBER
11/6   The Frugal Grad: Navigating Student Loans, 12:00-1:00 p.m. (Classics 110)
11/7   GradUCon Registration Opens at GRADUCON.UCHICAGO.EDU
11/13  Expose Yourself: Graduate Research at the Art Institute, 5:00-7:00 p.m.
       Presented at the Art Institute of Chicago through ArtsPass
11/21  Discerning Your Trajectory: From an MA to a PhD, 4:00-6:00 p.m. (Social Sciences 122)
11/22  FLAS (Foreign Language Area Studies) Fellowship Applications Available

DECEMBER
12/5   Fellows Fête: Reception Honoring Grad Fellowship Recipients, 4:00-6:00 p.m. (TBD)
12/16 – 21  Dissertation Write-In, 9:00 a.m.-1:00 p.m. (Dissertation Writing Room)

Dates and times subject to change. The most current information regarding events, including full descriptions, can be found at grad.uchicago.edu. If you are in need of special accommodation, contact Kalee Ludeks at kalee@uchicago.edu.