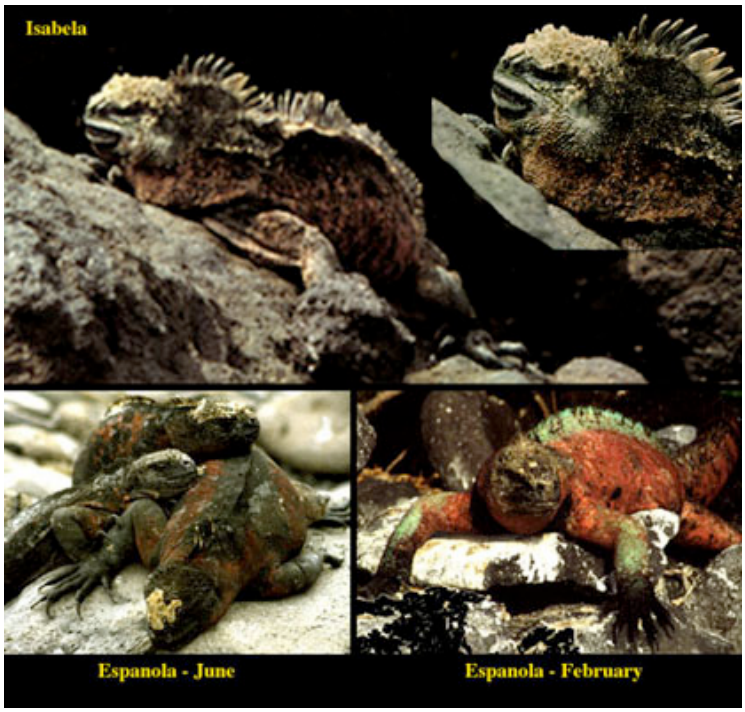
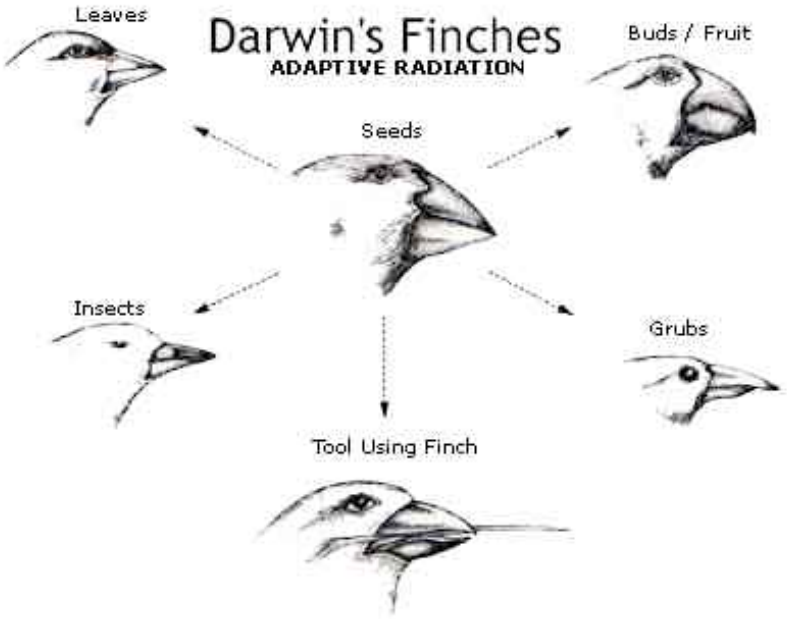
The Committee on Evolutionary Biology
Student Handbook 2010-2011





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Chicago IL 60637
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Department of Comparative Human Development
5730 South University Avenue
Chicago IL 60637
773-702-3971

Dept. Ecology & Evolution
Zoology Building, Room 114
1101 East 57th Street
Chicago IL 60637
773-702-1988

Dept. Geophysical Sciences
Hinds Laboratory, Room 161
5734 South Ellis Avenue
Chicago IL 60637
773-702-8180

Dept. Organismal Biology & Anatomy
Anatomy Building, Room 107
1027 East 57th Street
Chicago IL 60637
773-702-4822

Department of Philosophy
Classics Building, Room 17
1010 East 57th Street
Chicago IL 60637
773-702-8513

Argonne National Laboratory
9700 S. Cass Av.
Argonne IL 60439
708-972-2000

Brookfield Zoo
Chicago Zoological Park
8500 Golf Road
Brookfield IL 60513
773-242-2630

Chicago Botanic Garden
1000 Lake Cook Road
Glencoe IL 60022
847-835-5440

The Field Museum
1400 S. Lake Shore Dr
Chicago IL 60605-2496
312-922-9410

Lincoln Park Zoo
2001 N. Clark St.
Chicago, IL 60614
312-742-2000

The Morton Arboretum
4100 Illinois Route 53
Lisle IL 60532
630-968-0074

THE COMMITTEE ON EVOLUTIONARY BIOLOGY

The Committee on Evolutionary Biology (CEB) is a doctoral-degree-granting academic unit within the Division of the Biological Sciences at the University of Chicago. It provides students with the opportunity for interdisciplinary study of all aspects of evolutionary biology. CEB consists of faculty members with primary appointments in departments from all four graduate divisions within the University (Anthropology, Comparative Human Development, Ecology and Evolution, Geophysical Sciences, Linguistics, Organismal Biology and Anatomy, and Philosophy), and from several other institutions in the Chicago area (Argonne National Laboratory, Brookfield Zoo, Chicago Botanic Garden, The Field Museum, Lincoln Park Zoo, and The Morton Arboretum). The diversity of research interests represented by the collective expertise of the CEB faculty contributes to its strong national and international reputation as a graduate training program.

Students in CEB have ready access to facilities at these institutions, including the more than 2900 animals representing over 400 species at Brookfield Zoo, over 1200 animals representing 230 species at Lincoln Park Zoo, more than 17 million specimens in the Field Museum collections in botany, entomology, ornithology, and paleontology, and libraries at the Field Museum and Brookfield Zoo. Other resources for student research include computer centers equipped with relevant hardware and software and several facilities for the study of molecular evolution.

In the greater Chicago area, CEB students also have used the rich resources available at the Shedd Aquarium, the Morton Arboretum, and the many parks and lands managed by the national parks, local county forest preserves and park districts.

The University of Chicago is a member of the Organization for Tropical Studies. Doctoral students in CEB have taken courses in tropical ecology and conducted research in Costa Rica through this affiliation. Recent CEB students also have conducted domestic research at a variety of field sites, including the S.W. Research Station of the American Museum of Natural History, Kellogg Biological Station of Michigan State University, Friday Harbor Laboratories, Rocky Mountain Biological Station, and Highlands Biological Station. International research has been carried out in every continent.

STUDENT GUIDELINES

General Information

All CEB students will have assigned *office space* (shared with other graduate students) in University buildings affiliated with CEB faculty members. Entering students ordinarily are assigned desks in the CEB space in Culver 402. Every effort is made to house more advanced students in close proximity to faculty and other graduate students sharing their research interests.

CEB students usually are allocated an *expense account* administered by the CEB Administrator. The size of each account will be determined by funds available and each student's quarters of registration. Students will be notified in writing of their annual expense account. This account may be used for photocopying, postage, supplies, etc. Unused expense account funds are not carried over into the next academic year, and students are expected to pay any account overdrafts promptly. Student expense accounts and their amounts are not automatically assured: account amounts may be reduced if students plan to spend significant time away from Chicago, or plan to delay graduation beyond a fifth year in the program.

Computers for CEB students are located in Culver 402. The computer centers contain Apple and Windows computers, laser printers, paper and slide scanners, and wireless internet. Most common software is available. Information on University-wide computing facilities and services should be included in new student orientation packets. Culver 402 has wireless base stations; ethernet connections are available if needed. Consult the student computer czar for all computer information. (Rebecca (Budinoff) Dikow – rbudinoff@uchicago.edu

Access to Hull Court Buildings is by UC ID Card only. The default access for students is M-F 9-5. To change access privileges on your card, contact Don Churilla (702-2978; cwchuril@bsd.uchicago.edu) to request 24/7 access to the Hull Court buildings.

Keys for Culver 402 are available from the CEB Administrator, Sandra Akbar . *Any requests for keys to faculty laboratory space must be accompanied by a signed note from that faculty member.*

Registration

Registration is online. Each quarter, students will be notified of the dates for online registration. .

- Students who have not yet passed the Dissertation Proposal Hearing must obtain approval for their proposed registration from the Student Advisory Committee. The Advisory Committee meets individually with each pre-proposal student every quarter. Students can register online before their meeting with the Advisory Committee, then drop or add courses online in the first 3 weeks of the quarter.
- Students who are Ph.D. candidates can enter their registration requests online (see below)

Time Schedules listing each Quarter's courses generally are available online at http://registrar.uchicago.edu. The Registrar's web site also contains information on university deadlines, tuition and fee schedules, etc.

Online Registration Instructions

- Have your **CNet ID** and **password** ready
- Log on to the Web address: https://grad-registration.uchicago.edu/
- You can register from anywhere – you don't need to be on campus, or in Chicago
- After you access the online registration system, please follow the instructions provided on the Web page. If you have questions, there is a "click here" button. Just click that, and you will be guided through the process.
- If you have trouble registering, please come to Culver 401.

NOTES:
(most of this information is right on the web…)

(1) Residence Status:

There are two basic residence status classifications for CEB students:
Scholastic Residence – years 1 – 4
Advanced Residence – years 5 - graduation

(2) Subject Codes: Some common places to look for courses:

BIOS – Biological Sciences Collegiate Division
BSDG – Biological Sciences Graduate Courses (Ethics, TA Requirement, TA Training)
ECEV – Department of Ecology and Evolution
EVOL – Committee on Evolutionary Biology
GEOS – Geophysical Sciences
ORGB – Department of Organismal Biology and Anatomy
STAT – Statistics (most CEB students take College level Stats)

(3) Courses with variable units, and sections for each instructor. For the courses below, you must enter a section number for the particular instructor with whom you are working (found on Time Schedules web site):

49500 – teaching (not for BSD teaching requirement)
49600 – reading with Field Museum Curators
49700 – reading
49800 – research, off campus (use also w/ pro forma registration)
49900 – research, on campus

(4) Regular graduate courses – Most graduate courses carry 100 units and the section number is 01.

(5) Undergraduate courses - Graduate students *supposedly* are not allowed to register for the College courses for the first two weeks of the quarter, *however, this seems to be rarely implemented!*

(6) Change of Registration
You will have **3 weeks** in which to change your registration free of charge (aka "drop-add period"). If you can't make the change online, please email the Graduate Program Director.

(8) Degree application and graduating

You can apply for a degree online – this must be done before the end of the first week of the quarter in which you want to receive the degree. Go to cMore to access the online degree application pages.
You have to APPLY for a degree – you don't just "get" it – and the deadlines are very strict.

(9) If you're not going to be in residence at U Chicago

If you will be away (or off campus, for example at the Field Museum), please notify the Graduate Program Director in advance so that s/he can request that your health clinic and student activity fees waived. S/he also needs to make sure that you're in the right registration category. Usually students who are not on campus at all, or more than 100 miles from campus for the quarter, are registered in a category called *pro forma*. This category has some restrictions, but the tuition is greatly reduced, since you won't be using University resources during the quarter. You will need to actually apply for pro forma registration – please request the form from the Graduate Program Director.

Teaching Assistant Program

All Divisional graduate students are required to serve as Teaching Assistants in two courses (see the BSD Teaching Assistant Opportunities handbook) or register for the BSD TA course and then T.A. in an approved course. The Teaching Assistant Program is administered by a Committee on Teaching Assistants chaired by the Dean for Graduate Affairs. Each Basic Science Department and Committee is invited to select one member for this committee. The Committee on Teaching Assistants determines which Teaching Assistant positions meet the Divisional requirement, assures that all students have two opportunities to teach in approved courses, and modifies the program as necessary. For more information, students should contact the Graduate Program Director in Culver 401.

Stipend, Tuition and Fees

All incoming students should have received a contract indicating financial support from the Division of the Biological Sciences. This contract, usually mailed in March or early April, indicates support for the upcoming academic year. Any tuition bills received that seem to contradict a student's understanding of the support agreement should be brought to the attention of the Graduate Program Director.

All eligible domestic first-year students should apply for NSF Predoctoral Fellowships very early in the Autumn Quarter. Eligible students will be contacted over the summer by the BSD Graduate Affairs Office, and a workshop will be held during orientation week to help students prepare their fellowship proposals. CEB faculty members and current/former NSF fellows will be available to assist first year students in preparing NSF fellowship applications. NSF URL https://www.fastlane.nsf.gov/grfp/.

A limited number of Field Museum fellowships are available for more advanced graduate students engaged in dissertation research associated with the museum. These fellowships provide stipend support (with tuition generally provided by the University of Chicago), and are generally for one year, beginning on September 1. Applications are reviewed once per year by the Field Museum scholarship committee; the deadline is February 1st. We expect *all* advanced students conducting research at Field Museum to apply for these fellowships (http://www.fieldmuseum.org/research_collections/scholarships/default.htm).

CEB has been awarded 3-year training grant from the Graduate Assistance in Areas of National Need (GAANN) program of the Department of Education. All CEB students who are US citizens or permanent residents will be considered for these training grant slots, and you may be asked to submit a FAFSA application to determine your potential financial eligibility for a fellowship from this training grant. There are several other training grants in areas relevant to CEB students, mostly funded by NIH and the Dept. of Education. These training grant fellowships are possible sources of funding for US citizens or permanent residents doing research in evolutionary conservation biology (the CEB grant), biomechanics, genetics, development, or ecology. If you are interested in being considered for a position on one of these grants, please talk with the Graduate Program Director.

Stipends. Each graduate student's fellowship is designed with the BSD Office of Graduate Affairs. All Ph.D. students in the Division of the Biological Sciences receive the same basic stipend and health fee/insurance support (2010-11: $27,500 stipend, plus basic health insurance, student health fee).

Teaching Assistantship Requirements for some CEB students: Students whose funding source is primarily University of Chicago fellowships from the Division of Biological Sciences (aka "Divisional Unendowed Fellowships), or some endowed fellowships, must serve as a Teaching Assistant in one laboratory course per year in years three and four for part of their stipend support. Students receiving funding from Divisional funds in their fifth and sixth years generally are expected to serve as Teaching Assistants for two courses per year as part of their stipend support. CEB GAANN fellows are required to serve as supervised and evaluated teaching assistants for 3 courses as part of their training.

Student fellowships are individually discussed and planned in December/January each year. It is essential that students promptly return all questionnaires about their next year's research plans to the Student Programs Administrator: these student plans are consulted in determining fellowship packages, including teaching and off-campus quarters. Reports from each student's Autumn and Spring Quarter committee meetings also are used in evaluation and fellowship planning. It is the student's responsibility to ensure that her/his advisor has filed a report after each of these meetings. *Except in extraordinary circumstances, CEB students are strongly discouraged from taking on any TA or other employment responsibilities in addition to those required by the Divisional Teaching Requirement or individual fellowship packages*.

Late fees, payment deadlines, restrictions. It is each student's responsibility to pay close attention to the published schedules of late fees and restrictions found in the University's quarterly Time Schedule. Any unpaid fee (library fines, activity fees, etc.), can cause the Bursar to *restrict* a student's account. Once a student is restricted, all privileges are lost at the library, and the student account will start to accrue late fees. Late fees may only be removed by a formal petition from the BSD Office of Graduate Affairs.

Funding for Research

Students are encouraged to actively investigate opportunities for securing outside funding for their dissertation research and should watch bulletin boards for announcements of funding opportunities. It is often the case that application may be made to a number of small funds that support initial stages of dissertation research (such as the Hinds Fund endowment, administered by CEB). These small grants can be of great use to students preparing dissertation proposals, as they are not necessarily restricted to advanced students already in candidacy for the Ph.D. Later in the academic program, students are encouraged to apply to national programs such as Sigma Xi, NSF, NIH, NIMH, Fulbright, National Geographic, etc. for doctoral dissertation research funding.

PROGRESS THROUGH THE DOCTORAL PROGRAM OF THE COMMITTEE ON EVOLUTIONARY BIOLOGY

General Timetable for the Ph.D. Program

Most students in the Committee on Evolutionary Biology complete their Ph.D. program in about 5.5 years. The first and second years consist largely of course work and individual reading and research courses, aiming toward successful completion of the Dissertation Proposal Hearing and a defense of a dissertation research proposal by the Spring Quarter of the second year in the program. Work in subsequent years shifts to dissertation-centered research and, finally, preparation and defense of the Ph.D. dissertation. Although there is no SM. program in the Committee on Evolutionary Biology, students may elect to receive the SM. degree upon successful completion of their Dissertation Proposal Hearing.

First Year - Incoming Students

Newly admitted students should receive information from the Graduate Affairs Office, Division of the Biological Sciences, during the summer. This packet should include information about Autumn Quarter orientation and registration dates, housing, etc. Incoming students should contact the Committee on Evolutionary Biology office (Culver 402) as soon as possible after arrival in Chicago. Office staff will provide information about the Committee on Evolutionary Biology and the University, registration for the upcoming quarter, and other information necessary for new students.

First year students will meet with the CEB *Student Advisory Committee* to review their prior academic training and research plans before or during the first week of Autumn Quarter.

- The advisory committee will meet with each student to advise on courses available, arbitrate on which courses meet the “outside distribution” requirement, and otherwise help the student keep on track toward candidacy. A summary of each meeting will be placed in each student’s file.
- The advisory committee meets with each student for 15-20 minutes during the registration period, and the members of the committee are available for discussion and consultation throughout the first two years of a student’s career.
- As the student begins to work more with a faculty member who will become his/her advisor, the student is encouraged to solicit advice both from this advisor and the Student Advisory Committee.

Reading and Research Requirements. The Committee requires all first and second year students to register for six courses (at least one every quarter) involving individual reading, research, or a regularly scheduled course. At least four of these six courses must include topics distinct from the student's anticipated specialty. The most important goal is that the student acquire some breadth in evolutionary biology: this breadth and the interdisciplinary research it permits should be the distinguishing feature of the CEB student. "Outside the student's specialty" means that the student should be exposed to evolutionary phenomena and forces operating on different scales of time and space, to other taxonomic groups, and to the approaches of major disciplines or areas within evolutionary biology (e.g., behavior, organismal structure and function, gene-level evolution, population-level evolution, ecology, paleontology). Each year the Committee revises and posts a course distribution list that classifies all CEB courses according to these categories.

Students are responsible for having a comprehensive understanding of major questions in evolutionary biology. All Committee students are expected to have read Darwin's *Origin of Species* some time before their dissertation proposal hearing.

Second Year

Second year students will continue to meet with the *Student Advisory Committee* until they identify their research area and successfully pass their *Dissertation Proposal Hearing*. The first part of the second year may be taken up mostly with coursework, supplemented more heavily by reading and research courses.

Faculty Advisors and the Student Advisory Committee

The Student Advisory Committee meets 3 times a year with each student until s/he has passed her/his Dissertation Proposal Hearing. The Advisory Committee does not replace nor is it replaced by the student's Dissertation Proposal committee. The Advisory Committee rotates in faculty membership in such a way as to provide some continuity from year to year.

Faculty Advisors. Students should identify a *Faculty Advisor* (Chair of their Committee) at least by the end of the Autumn Quarter of their second year, and their Committee should be constituted no later than the Winter Quarter of the second year.

- The student should write a formal memo to the Chair of the Committee on Evolutionary Biology listing the names of faculty members who already have agreed to serve as Chair/members of the student's committee.
- The Chair of the Committee on Evolutionary Biology will then approve the Advisor and Committee or recommend changes.
- The Proposal Hearing should take place in Spring Quarter of the second year; *any delays must be petitioned in writing to the Chair of the Committee on Evolutionary Biology well before Spring Quarter*.
- The student should meet with his/her entire Committee at least once a year both before and after the proposal hearing.
- The Advisor should provide the CEB Chair with a written memo/email describing the student's progress and any recommendations that arise from these annual meetings; one copy should go to the student and one copy will be retained in the student's file. This report is used in annual CEB faculty evaluations of each student's progress.

Dissertation Proposal Hearing

The Dissertation Proposal Hearing allows the CEB student to:

- propose her/his plan for dissertation research, and discuss the proposal with other interested faculty and students (or, the student may elect to have a "closed" hearing with her/his faculty committee). The student should have written a dissertation research proposal well before the hearing and discussed drafts with her/his advisor and committee. The written proposal should be equivalent in size and quality to an NSF doctoral dissertation improvement grant proposal (8 single-spaced pages);
- engage in closed, private discussion with her/his Committee on further issues regarding background preparation in evolutionary biology, dissertation research, further coursework, and whatever is necessary to aid in the successful completion of the Ph.D.

Timing. All Committee students are expected to schedule their Proposal Hearing *before the end of their second year in the program*. If a student believes that it is not possible to defend her/his dissertation proposal before the end of Spring Quarter in the second year, *it is the responsibility of the student to petition in writing the CEB chair* for permission to delay the examination. The petition must clearly state what has delayed the student's progress and must be accompanied by a supporting letter from the student's sponsor/advisor. The petition to delay the exam should be sent to the CEB chair *well before* the beginning of the Spring Quarter of the student's second year in the program.

National Science Foundation Doctoral Dissertation Improvement Grant proposals for research in the Biological Sciences *require* that the applicant be a candidate for the Ph.D. *before the date of proposal submission*, which is early in November. This NSF regulation makes it crucial that CEB students defend their dissertation proposal in Spring of their second year (and be advanced to Ph.D. candidacy), then have the summer for research and preparation of the NSF proposal.

Setting up the Proposal Hearing

- Prior to the Proposal Hearing, each student must select an advisor, who will normally become the chairperson of the student's Committee.
- A committee for the Hearing will be formed by the CEB chair, in consultation with the student. The committee should be formed before the student requests the CEB chair's permission to schedule the Proposal Hearing. Normally, the student talks with individual CEB faculty, discusses possible committees with her/his advisor, then informs the CEB chair in writing of her/his proposal for a committee. The Student Advisory Committee often suggests that second-year students convene an informal meeting of possible Proposal committee members during the Autumn or Winter Quarter for an early discussion of the student's proposed research. Such a meeting informs the faculty members about the student's research and helps the student decide which faculty members might best serve on her/his Proposal committee. *The proposal hearing may be open to the public or closed. Students choosing a closed hearing must present a public seminar on their research by the end of their 4th year in CEB.*
- The student must notify the CEB Chair and the Graduate Program Director in writing of her/his plans to take the examination *at least 10 working days before the examination*. After the CEB Chair approves the student's request, notice of the hearing will be distributed.
- The student must submit a PDF or CD of the dissertation proposal with the Graduate Program Director *at least 10 working days before the examination*.
- The Graduate Program Director will officially notify the CEB faculty of the hearing, and invite them to examine the proposal and attend the hearing (if it is an open hearing).
- The proposal hearing usually lasts two to three hours, with the first hour dedicated to the student's explication of her/his dissertation proposal.

Possible results of the Dissertation Proposal Hearing

The chair of the Proposal Committee will inform the CEB Chair *in writing* ("Report on the Final Exam for the SM." form available in the CEB office) of the committee's decision, immediately after the examination. Possible outcomes are as follows:

1. The student may be passed as suitable to proceed to candidacy for the Ph.D. The student may also apply for a Master's Degree, if s/he has satisfied relevant Divisional requirements, but this is not a condition for candidacy for the Ph.D.
2. The student may be passed as suitable to proceed to candidacy for the Ph.D., subject to meeting certain specific requirements subsequent to the Proposal Hearing. The student and the CEB Chair are to be informed of these requirements in writing immediately after the Hearing, with deadlines for their completion. The chair of the Proposal Hearing Committee shall inform the CEB Chair in writing when s/he is satisfied that the requirements have been met.
3. The student may be instructed to organize a second proposal hearing within a clearly defined period of time. The student's advisor must notify the CEB Chair and the student of the exact requirements in writing immediately after the Proposal Hearing. No student shall undertake the Proposal Hearing more than twice. A student who is neither recommended for a Master's Degree nor to proceed to candidacy

for the Ph.D. degree at their second Proposal Hearing shall terminate studies in the Committee on Evolutionary Biology at the end of the quarter in which the final hearing was held.

4. The student may be passed for a Master's Degree, subject to satisfaction of relevant Divisional requirements, but not as suitable to proceed to candidacy for the Ph.D. degree.

Candidacy for the degrees of S.M. and Ph.D.

Students who successfully pass their Proposal hearing can apply to be admitted to candidacy for the S.M. and Ph.D. (the student should completely fill out the applications, then return them to the Graduate Program Director).

Results of the dissertation proposal hearing are recorded on the form "Report of Final Examination for the Degree of S.M." The student should type all necessary information onto the form *before* the hearing; the chair of the examination committee signs the form at the end of the hearing and indicates the outcome of the examination in the appropriate space.

In order to proceed to candidacy for the S.M. and Ph.D. degrees, a CEB student must have passed her/his Proposal Hearing. Other requirements for advancement to candidacy are established by the University and the Division of the Biological Sciences, and are indicated in the *Announcements* of the University, the University *Student Information Manual*, and this handbook. Forms for candidacy for the S.M. and Ph.D. degrees are available in the Student Programs Office, along with University forms for reporting the outcome of both examinations. *It is the responsibility of the student to secure and complete these forms, with necessary faculty signatures, and return them promptly to the CEB student programs administrator.*

The forms for candidacy and examinations are now available online:
http://gradprograms.bsd.uchicago.edu/

Please also note that none of the above-mentioned forms actually gets you a degree. Students can now apply for a degree online through the cMore website.

Progress towards the Ph.D.

1. When a student has passed the Dissertation Proposal Hearing with permission to proceed to candidacy for the Ph.D. degree, the Chair of the Committee on Evolutionary Biology will appoint a Doctoral Committee in consultation with the student and the student's advisor.

2. The Doctoral Committee shall meet with second and third year students at least once a year, and shall submit (in writing) their assessment of the student's progress to the CEB Chair. This assessment is normally to be based on a written progress report from the student, and an oral discussion. *It is the responsibility of the student to insure that the annual meeting with his/her doctoral committee take place well before the December CEB faculty meeting.*

3. The Basic Science Chairs of the Division of the Biological Sciences have adopted the following policy for monitoring the progress of students in BSD Ph.D. programs:

Beginning with the fourth year of graduate studies, each student should meet with his/her doctoral committee once every other quarter. It should be the responsibility of the student's advisor to report a summary of the proceedings of the Doctoral Committee meeting to the academic unit. The student's

registration for the fifth and subsequent year shall be permitted only if the summaries of the Doctoral Committee meetings have been reported to the appropriate academic unit.

4. Students in the Committee on Evolutionary Biology shall hold these Committee meetings in the Autumn and Spring quarters. The Autumn quarter meeting shall be scheduled so the advisor can submit a written report to the CEB chair well before the December faculty meeting. The student should prepare documents for her/his committee's review at these meetings which should include an updated, detailed dissertation outline with a completion schedule for each chapter. Based upon these reports and discussion in the December faculty meeting, the CEB chair submits a request for the next year's fellowships for continuing students to the BSD office of the dean of students. The budget for the next fiscal year is fixed shortly thereafter, and it includes the maximum number of students CEB can admit for the next autumn.

5. Each CEB student is responsible for the fulfillment of all degree requirements of the University, as outlined in the CEB Handbook, the Division of Biological Sciences section of the Announcements, and the Student Information Manual of the University of Chicago.

TIMETABLE FOR PLANNING YOUR DISSERTATION DEFENSE AND GRADUATION

It is critical, as you approach your planned quarter of graduation, to carefully build a timetable for the last quarter, when your years of work culminate in the successful submission of your dissertation to your committee, oral seminar and defense of your research, and acceptance of your dissertation by the Dissertation office when it is approved by your advisor and the CEB Chair.

This document describes the various deadlines you must plan for in the ten months preceding your graduation date. This should help you understand how deadlines are formulated, and the consequences of seriously missing certain critical deadlines.

Ten months before graduation

The Division of the Biological Sciences requires a student to have been in candidacy for the Ph.D. degree at least eight months before the degree can be awarded. Well before planning a date for defense of their Ph.D. dissertation, students should consult this timetable and discuss any questions with their advisor, the CEB Chair and the Graduate Program Director.

It is the responsibility of each student, upon successfully passing the Dissertation Proposal Hearing, to request *forms for admission to candidacy for the Ph.D.* from the Graduate Program Director, and to fill out the forms completely (including obtaining the required faculty signatures). The completed forms should be returned to the CEB office for approval by the CEB Chair. The Graduate Program Director will then forward the student's request to be admitted to candidacy to the Office of Graduate Affairs, Division of the Biological Sciences, and the University Registrar.

Six months before graduation

Meet with the staff in the Dissertation Office *before* you start final writing! Bring samples, and get their guidelines. Plan this meeting for the first week of the quarter *before* you plan to graduate (i.e., 20+ weeks before graduation). The Dissertation Office web site is: http://www.lib.uchicago.edu/e/phd/.

It is the responsibility of the student to make sure that the written dissertation, after being approved by the student's Doctoral Committee, is prepared in a form suitable for acceptance by the Dissertation Office.

Failure to meet the Dissertation Office's deadline will result in a delay of graduation.

This must start by the beginning of the quarter *before* your planned graduation quarter (i.e., 20+ weeks before graduation) and before distribution to your other committee members (usually after your revision).

Three months before graduation

*Application for a Degree***.** You now can apply to receive a degree online through cMore. This *must* be completed *before the first Friday of the quarter*, or you will not be allowed to graduate. It may be withdrawn without fee during the first five days of the quarter in which it was filed. After that, there's a small fee for withdrawing the application. Subsequent applications will cost an additional fee. Late applications will not be accepted.

Students must register for graduate research in Advanced Residence during the quarter in which they plan to graduate. Students who have gone past the last quarter in which they were allocated fellowship funds should make sure that a plan is in place for payment of Advanced Residence tuition and fees for their final quarter.

At least ten weeks before graduation

You are required to distribute the final draft of your dissertation to your whole committee no later than the first week of the quarter in which you plan to graduate. The final draft should be substantially complete (including all text, figures, tables, captions, appendices and bibliography) and should be delivered to all committee members at least four weeks before the scheduled date of the dissertation defense. Note that usually one or more of your dissertation chapters should be in press or published by this time; in general, committee members will be seeing at most one or two chapters for the first time on this date.

Eight weeks before graduation

Notify the CEB Chair that you would like to defend your dissertation. You must contact the Chair of CEB to request approval of your dissertation committee and advisor, and inform her/him that you would like permission to set up the oral hearing for your dissertation defense for a specified date and time . You must file a final defensible copy (PDF or CD is preferred) of your dissertation with the Graduate Program Director at this time (NOT the first draft to be seen by your committee). This formal notification, when approved by the CEB Chair, will allow the CEB office to generate formal notification of the CEB faculty that a dissertation hearing will take place, and, at your request, distribution of seminar notices for the public seminar which begins the Ph.D. hearing. While it is not mandatory, most CEB students choose to invite the public to their oral Ph.D. defense hearings. All CEB faculty will have access to the file copy of your dissertation.

Five weeks before graduation

The Ph.D. Dissertation Hearing should take place at least three weeks before the Dissertation Office dissertation filing deadline (5th week of quarter at latest). During the period between defense and final University filing, you must make all revisions to the defended version, based on the examining committee's decisions and recommendations. When your advisor notifies the CEB chair that your dissertation meets her/his approval, the CEB chair will sign the form indicating CEB approval of the dissertation. Final formatting revisions for submission to Dissertation Office are also completed at this time.

Three weeks before graduation

File your approved dissertation with the Dissertation Office by their published deadline. *IF YOU MISS THIS DEADLINE, YOU CANNOT GRADUATE IN THE CURRENT QUARTER.*
http://www.lib.uchicago.edu/e/phd/.

Summary

You should plan to FINISH a final draft of your written dissertation by the end of the quarter PRECEDING your planned quarter of graduation.

If you don't, you are unlikely to graduate as planned.

The responsibility for this planning is yours and will need to be worked out in coordination with the schedules of your various dissertation committee members. The CEB Chair and Student Programs Director will be glad to advise and assist you in reaching your thesis goals if you plan appropriately. In addition, the Dissertation Office has prepared guidelines for the preparation of the PDF of the final written thesis for submission to their office and ProQuest. You should schedule a meeting with personnel in this office well before your planned final quarter, so that preparation of your manuscript conforms to their guidelines.

By carefully planning ahead, you can ensure that your last quarters in CEB are constructive and fulfilling, both for you and your faculty advisors. We have calculated these deadlines by counting backwards from the University dissertation filing deadlines. We recommend this procedure for planning all of your long-term research and writing projects.

If you have any questions about these guidelines for finishing your dissertation research and written thesis, or need any assistance from us in establishing a plan, please consult the Chair of the CEB or the Graduate Programs Director.

Final Examination for the Ph.D. Degree

The candidate will notify the CEB chair of his/her plans to take the Final Examination, after seeking the approval of the Doctoral Committee. The CEB Chair will form a Final Examination Committee in consultation with the student's advisor, who will normally be the Chair of that Committee. The Chair of the Final Examination Committee will communicate the result of the examination, in writing, to the Chair of the Committee on Evolutionary Biology immediately after the examination and submit the "Report on the Final Examination for the Ph.D" to the Graduate Program Director. This form is available online at http://gradprograms.bsd.uchicago.edu/

Post-Graduation

Please make every effort to keep the office of the Committee on Evolutionary Biology informed about your post-doctoral plans and addresses. This information is important not only for forwarding mail and communicating with post-doctoral CEB students. It is also invaluable in documenting the post-graduate careers of Committee students.

Comments and Suggestions

Please send us your comments, questions and suggestions regarding this handbook to darwin@uchicago.edu. We want it to be as useful as possible during all phases of your graduate career at the University of Chicago.

Committee on Evolutionary Biology. Courses Organized by Distribution Topics (revised 8/2009)

Genomics,	Molecular Evolutionary Genetics	30600	Wu
Genetics, &	Current Topics in Evolutionary Genomics	30800	Borevitz, Li
Molecular	Ecological Genetics	31500	Price
Evolution	Evolutionary Aspects of Gene Regulation	32500	Ruvinsky
	Principles of Population Genetics, I &II	35600	Hudson
	Principles of Population Genetics, I &II	35700	Long
	Classics of Evolutionary Genetics	35800	Li, Long
	Evolution at the Genomic Level	35900	Kreitman, Long
	Ecological and Evolutionary Genomics	36000	Borevitz, Wu
	Current Topics in Evolutionary Biology	36200	Coyne
	Speciation	36300	Coyne
	Ecological Genetics of Plant-Enemy Interactions	43000	Bergelson, Dwyer
	Experimental Approaches in Quant. Ecol. Genetics	43200	Borevitz
	Fundamentals of Molecular Evolution	44000	Kreitman
Biomechanics &	Chordate Evolutionary Biology	30200	Coates, Shubin
Morphology	Key Issues in Early Vertebrate Evolution	30300	Coates
	Vertebrate Paleobiology	30400	Coates, Sereno, Shubin
	Vertebrate Paleobiology	30500	Coates, Sereno, Shubin
	Mammal Evolution	31100	(not currently offered)
	Bone	31600	Ross
	Developmental Biopsychology	32000	McClintock
	Invertebrate Paleobiology & Evolution	32400	Webster
	Introduction to Invertebrate Biology	34100	LaBarbera
	Biological Fluid Mechanics	34200	LaBarbera
	Biomechanics of Organisms	34300	LaBarbera
	Biopsychology of Sex Differences	36900	Mateo
	Biopsychology of Attachment	37100	Maestripieri
	Evolution of the Hominoidea	38100	Tuttle
	Comparative Primate Morphology	38200	Tuttle
	Apes and Human Evolution	38600	Tuttle
	Primate Evolution	38700	Martin
	Seminar: Res. in Behavioral Endocrinology	42200	McClintock
	Evol Biomechanics of Vertebrate Feeding Systems	44800	Ross
	Adv. Problems in Paleoanthropology	48100	Tuttle
	Adv. Probs in Primate Locomotion and Comp Morph	48500	Tuttle
Behavior	Biological Psychology	30200	McClintock
	Developmental Biopsychology	32000	McClintock
	Kinship and Social Systems	34800	Mateo
	Biopsychology of Sex Differences	36900	Mateo
	Biopsychology of Attachment	37100	Maestripieri
	Evolution of Parenting	37200	Maestripieri
	Primate Behavior and Ecology	37300	Maestripieri
	Evolutionary Social Psychology	37400	Maestripieri
	Sexual Selection	37500	Pruett-Jones
	Research Seminar in Animal Behavior	37600	Maestripieri, Mateo (3Quart, but 100 units for all)
	Apes and Human Evolution	38600	Tuttle
	Behavioral Ecology	40900	Mateo
	Seminar: Res. in Behavioral Endocrinology	42200	McClintock
	Models of Animal Behavior	45300	Pruett-Jones
Ecology &	Ecological Applications to Conservation Biology	31300	Pfister
Biogeography	Evolutionary History of Terrestrial Ecosystems	32500	Boyce, Makovicky
	Evolutionary Ecology	35000	Wootton
	Evolutionary Conservation Biology	40000	Staff
	Concepts in Ecology	42500	(not currently taught)
	Community Ecology	42600	Wootton
	Topics in Aquatic Ecology	42700	Pfister
	Population Ecology	42800	Pfister
	Theoretical Ecology	42900	Dwyer
	Ecological Genetics of Plant-Enemy Interactions	43000	Bergelson, Dwyer
	Mathematical Topics in Ecology Modeling	43201	Berestycki (AU 09 only)
	Biogeography	45500	Heaney, Patterson
	Paleobiogeography	45600	Sereno

Systematics &	Paleobiological Modeling and Analysis-1	33001	Foote
Evolutionary Theory	Paleobiological Modeling and Analysis-2	33002	Foote
	Geometric Morphometrics	33700	Webster
	Phylogenetic Comparative Methods	35300	Hipp, Ree
	Reconstructing the Tree of Life	35401	Moreau, Ree
	Phylogenetics	35501	Smith
	Classics of Evolutionary Genetics	35800	Long
	Current Topics in Evolutionary Biology	36200	Coyne
	Speciation	36300	Coyne
	Topics in Systematics and Biogeography	37000	Sereno
Paleontology &	Key Issues in Early Vertebrate Evolution	30300	Coates
Historical Biology	Vertebrate Paleobiology	30400	Coates, Sereno, Shubin
	Vertebrate Paleobiology	30500	Coates, Sereno, Shubin
	Macroevolution	31700	Jablonski
	Taphonomy	31800	Kidwell
	Diversity and Evolution of Arthropods	32100	Sierwald
	Principles of Paleontology	32300	Foote
	Invertebrate Paleobiology & Evolution	32400	Webster
	Evolutionary History of Terrestrial Ecosystems	32500	Boyce, Makovicky
	Paleobiological Modeling and Analysis-1	33001	Foote
	Paleobiological Modeling and Analysis-2	33002	Foote
	Introduction to Invertebrate Biology	34100	LaBarbera
	Evolution of the Hominoidea	38100	Tuttle
	History and Theory of Human Evolution	38400	Tuttle
	Apes and Human Evolution	38600	Tuttle
	Primate Evolution	38700	Martin
	Evolutionary Conservation Biology	40000	Staff
	Topics in Stratigraphy and Biosedimentology	41500	Kidwell
	Paleobiogeography	45600	Sereno
	Chemical Info in Sedimentary & Fossil Records	46100	Boyce, Martin
	Species and the Fossil Record	46200	Webster
	Advanced Problems in Paleoanthropology	48100	Tuttle
Evolution and	Developmental Psychology	32000	McClintock
Development	Vertebrate Development	33600	Prince, Millen, Ho
	Developmental Genetics and Evolution	33700	Schmidt-Ott
	Development and Evolution	33800	Prince
	Evolution of Development	34700	Van Valen
	Advanced Developmental Biology	35400 (DVBI)	Ferguson, Fehon
Other Courses	Topics in Paleobiology	31900	Foote, Jablonski, Kidwell, LaBarbera
(valuable, but do not	Field Course in Stratigraphy	33100	Staff
fulfill distribution	Intro to Research in Evolutionary Biology – Field Museum	38800	Staff
requirements)	Grants, Publications, Professional Issues	40100	Bergelson, Ho
	Scientific Illustration	32200	Abraczinskas

30200. CHORDATE EVOLUTIONARY BIOLOGY. (=BIOS 20260) 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. N. Shubin, M. Coates

30300. KEY ISSUES IN EARLY VERTEBRATE EVOLUTION. (=ORGB 31300) 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. M. Coates

30400, 30500. VERTEBRATE PALEOBIOLOGY. (=ORGB 31400, 31500) Systematics, morphology, ecology, and evolution of fossil vertebrates. Open to undergraduates. M. Coates, P. Sereno, N. Shubin

30600. MOLECULAR EVOLUTIONARY GENETICS. (=ECEV 30600) This course deals with advanced topics in evolutionary genetics and molecular evolution. The main goal is to survey the frontiers and to develop research projects of the future. C.-I. Wu

30800. CURRENT TOPICS IN EVOLUTIONARY GENOMICS. (=ECEV 30800) This course will cover current topics in evolutionary genomics including comparative genomics, evolution of duplicate genes, evolution of genome structure and organization, evolution of protein-protein interaction network, and evolution of gene expression. It will also review methods for data analyses. Some background in molecular evolution is required. J. Borevitz, W.-H. Li

31200. DATA ANALYSIS IN ECOLOGY AND EVOLUTION. (=ECEV 31200) This course covers the design and analysis of experiments, focusing on tests used commonly in evolutionary biology. Both parametric and nonparametric tests will be considered. J. Bergelson, T. Price

31300. ECOLOGICAL APPLICATIONS TO CONSERVATION BIOLOGY. (=ECEV 31300, BIOS 23351) We focus on the contribution of ecological theory to the understanding of current issues in conservation biology. The course emphasizes quantitative methods and their use for applied problems in ecology, such as the design of nature reserves, the risk of extinction and the impact of harvesting, the dynamics of species invasions, and the role of species interactions. Course material is drawn mostly from the current primary literature. Two Saturday field trips and computer modeling labs are in addition to scheduled class time. E. Larsen, C. Pfister

31500. ECOLOGICAL GENETICS. (=ECEV 31500) A graduate class in ecological genetics (evolution of the phenotype, without considering molecular approaches). This will be a weekly 2-hour seminar, emphasizing quantitative genetic approaches. Basic theory will cover such topics as heritability and breeding value, genetic correlation, Price's theorem and sexual selection. Seminars will include discussions of current topics from the literature. T. Price

31501. THE INFLUENCE OF HISTORY ON ECOLOGICAL COMMUNITIES. (=ECEV 31501) Why are some ecological communities more species rich than others? We will examine historical and regional factors (age and area) using the primary research literature. Topics covered will include: the relationship between regional and local diversity; the use of phylogenies to reconstruct history of areas; speciation and extinction rates and dispersal; and the importance of different timescales. T. Price

31600. BONE. (=ORGB 31600) This course will explore the diversity and evolution of vertebrate mineralized connective tissues in order to investigate developmental mechanisms, adult structure, in vivo function, and structure-function relationships. Mineralized connective tissues perform vital physiological and biomechanical functions in vertebrates that are reflected in their structural properties. Understanding these function-structure relationships is a fundamental goal of much of vertebrate skeletal biomechanics. The relationships between structure and function in

vertebrate bone also underlie hypotheses about physiology and behavior of fossil vertebrates, which in turn inform models of the evolution of physiological and biomechanical systems. C. Ross

31700. MACROEVOLUTION. (=GEOS 36800) Patterns and processes of evolution above the species level, in both recent and fossil organisms. A survey of the current literature, along with case studies. PQ: consent of the instructor. D. Jablonski

31800. TAPHONOMY. (=GEOS 36700) Lecture and research course on patterns and processes of fossilization, including rates and controls of soft tissue decomposition, post mortem behavior of skeletal hard parts, concentration and burial of remains, scales of time averaging, and the net spatial and compositional fidelity of (paleo)biologic information, including trends across environments and evolutionary time. Offered alternate years. PQ: Consent of instructor. S. Kidwell.

31900. TOPICS IN PALEOBIOLOGY. (=GEOS 36900) In this seminar we investigate paleobiological or multidisciplinary topics of current interest to students and faculty. Previous subjects include the origin of phyla, historical and macro-ecology, the stratigraphic record and evolutionary patterns, and climate and evolution. Prerequisite: consent of staff. D. Jablonski, S. Kidwell, Hinds paleobiology faculty

32000. DEVELOPMENTAL BIOPSYCHOLOGY. (=PSYC 31700) An introduction to the biological and physiological analysis of behavior. Principles of neural and endocrine integration. A lecture course taught with a developmental emphasis, drawing from both the experimental and clinical literature. M. McClintock

32100. DIVERSITY AND EVOLUTION OF ARTHROPODS. (=BIOS 23402) This course will focus on arthropod systematics and evolution, with an emphasis on insects and spiders. Lectures will focus on facets of arthropod evolution, including theories of arthropod origins, the evolution of flight, and the evolution of metamorphosis. Laboratories will focus on comparative examination of diverse arthropod groups, and students will be expected to achieve a general understanding of major arthropod groups. P. Sierwald

32300. PRINCIPLES OF PALEONTOLOGY. (=BIOS 23255, GEOS 22300) Our focus is on the nature of the fossil record, the information it provides on patterns and processes of evolution through geologic time, and how it can be used to solve geological and biological problems. Lectures cover the principles of paleontology (e.g., fossilization, classification, morphologic analysis and interpretation, biostratigraphy, paleoecology, macroevolution); labs are systematic, introducing major groups of fossil invertebrates. PQ: GEOS 13100-13200, or consent of instructor. M. Foote

32400. INVERTEBRATE PALEOBIOLOGY AND EVOLUTION. (=BIOS 23261, GEOS 26300, 36300) This course provides a detailed overview of the morphology, paleobiology, evolutionary history, and practical uses of the invertebrate and microfossil groups commonly found in the fossil record. Emphasis is placed on understanding key anatomical and ecological innovations within each group and interactions among groups responsible for producing the observed changes in diversity, dominance, and ecological community structure through evolutionary time. Labs supplement lecture material with specimen-based and practical application sections. An optional field trip offers experience in the collection of specimens and raw paleontological data. Several “Hot Topics” lectures introduce important, exciting, and often controversial aspects of current paleontological research linked to particular invertebrate groups. **Labs and field trips required.** PQ: Geosci 13100, 13200 (or equivalents for Biosci students) M. Webster

32500. EVOLUTIONARY HISTORY OF TERRESTRIAL ECOSYSTEMS. (=GEOS 27000, 37000) This seminar course covers the evolution of terrestrial ecosystems from their Paleozoic assembly through to the modern world. The fossil history of plant, vertebrate, invertebrate, and fungal lineages are covered, as well as the diversification of their ecological interactions. The influence of extinction events and important extrinsic factors (e.g., geography, climate, atmospheric composition) also are considered. C. Boyce

32600. EVOLUTIONARY ASPECTS OF GENE REGULATION. (=ECEV 32500, GENE 32500, DVBI 32500) Using primary research literature, this course will examine recent advances in understanding of evolution of gene

regulation. Among others it will cover the following topics: patterns and forces of evolutionary change in regulatory DNA and transcription factors, genetic changes that are responsible for phenotypic evolution, and discovery and evolutionary of implications of gene control by microRNAs. I. Ruvinsky

33001. PALEOBIOLOGICAL MODELING AND ANALYSIS-1. (=GEOS 33001) This course is an introduction to mathematical modeling as applied to problems in paleobiology and evolutionary biology. Topics include: basic probability theory; general approaches to modeling; model comparison using likelihood and other criteria; forward modeling of branching processes; sampling models; and inverse methods. A series of programming exercises and a term project are required. Programming in R or C is recommended, but any language may be used. Prerequisites: Mathematics through first-year calculus; basic computer programming skills (or willingness to learn); elementary statistics helpful. EVOL 33001 and EVOL 33002 can be taken in either order. M. Foote

33002. PALEOBIOLOGICAL MODELING AND ANALYSIS-2. (=GEOS 33002) This course is an introduction to multivariate analysis, with emphasis on morphological data and problems in paleontology and evolutionary biology. Topics include: types of data and scales of measurement; data transformations; bivariate analysis; measurement of similarity and difference; clustering; ordination; singular value decomposition; principal component analysis, factor analysis, principal coordinates, correspondence analysis, and other eigenvector methods; and path analysis. Each student will bring a multivariate dataset (not necessarily original) to the course and will write a series of short papers based on analysis of these data. Code written in the R programming language will be supplied for most analyses. Prerequisites: Mathematics at secondary school level; basic computer programming skills (or willingness to learn); calculus, linear algebra, and elementary statistics also helpful, although essential points will be reviewed. EVOL 33001 and EVOL 33002 can be taken in either order. M. Foote

33300. PLANT PALEONTOLOGY. (=GEOS 37100) Introduction to all major groups of extant and fossil plants, ranging from green algae to angiosperms. Discussions of plant taphonomy, the use of fossil plants as indicators of paleoclimate, the fossil spore/pollen record, evolutionary and paleoclimatic applications of palynological data, and the history of terrestrial ecosystems. Examination of living and fossil material at the Garfield Park Conservatory and the Field Museum. PQ: Consent of instructor. C. Boyce

34100. INTRODUCTION TO INVERTEBRATE BIOLOGY. (=BIOS 22244) 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. PQ: Completion of the general education requirement in the biological sciences or consent of instructor. M. LaBarbera.

34200. BIOLOGICAL FLUID MECHANICS. (=ORGB 34200, BIOS 22242) 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. Next offered in Winter, 2011. M. LaBarbera.

34300. BIOMECHANICS OF ORGANISMS. (=ORGB 34300, BIOS 22243) This course examines how organisms cope with their physical environment. It covers the properties of biological materials (bone, cartilage, tendon, shell, wood, cuticle, etc.), mechanical analysis of morphology, and principles of design optimization. Emphasis is placed on support systems of organisms. Mechanical properties of biomaterials are analyzed in relation to their underlying biochemical organization and biophysical properties. Students carry out self-designed laboratory projects. There is a required laboratory. Next offered in Winter, 2013. M. LaBarbera

34800. KINSHIP AND SOCIAL SYSTEMS. (=HUDV 34800) Graduate seminar. This course will use a biological approach to understanding how groups form and how cooperation and competition modulate group size and reproductive success. We will explore social systems from evolutionary and ecological perspectives, focusing on how the biotic and social environments favor cooperation among kin as well as how these environmental features influence mating systems and inclusive fitness. While a strong background in evolutionary theory is not required, students should have basic understanding of biology. The essence of what I hope you will get from this course is a radically different way of thinking about why animals, including humans, behave as they do. In contrast to

physiological, developmental, cognitive or other 'proximate' approaches to behavior, in this course an evolutionary or functional approach will be presented. The kinds of behavior we will focus on include aggression, cooperation, kin favoritism, mating systems, parental investment and sexual selection. We will examine these behaviors in numerous animal groups, including insects, fishes, birds, mammals, primates and humans, to mention only a few. J. Mateo. Permission of instructor.

35000. EVOLUTIONARY ECOLOGY. (=ECEV 35000) An evolutionary approach to the study of ecological interactions. Topics include plant-animal interactions, life history evolution, host-parasite and host-mutualist interactions, competition, and predation. Appropriate for graduate students who have had little background in ecology. J.T. Wootton

35300. PHYLOGENETIC COMPARATIVE METHODS. This is a graduate seminar course about the uses of phylogenetic trees in evolution and ecology, emphasizing historical inference of phenotypic traits, geographic ranges, and community ecology. (This is not a course on how to infer phylogenies, or their uses in studies of molecular evolution and population genetics.) Within this scope we will focus on topics of popular interest and relevance to student research. The format of the 2-hour weekly meeting will be somewhat fluid, but I anticipate giving introductory remarks or a lecture on main topics, followed by discussion of primary literature, and opportunities to work hands-on with software (bring your own laptop). Small-group assignments will be given to develop and present short tutorials on conducting analyses of real data. R. Ree and A. Hipp

35401. RECONSTRUCTING THE TREE OF LIFE. (=BIOS 23404) This course is an introduction to the Tree of Life (phylogeny): its conceptual origins, methods for discovering it structure, and its importance in evolutionary biology and other area of science. Topics include historical context and concepts, source of data, methods of phylogenetic analysis, and the use of phylogenies to study the tempo and mode of lineage diversification, coevolution, biogeography, conservation, molecular biology, development epidemiology, etc. One Saturday field trip and computer labs required in addition to scheduled class time. C. Moreau, R. Ree

35501. PHYLOGENETICS. This course will explore the principles of molecular systematic biology and the use of contemporary phylogenetic methods to address diverse evolutionary questions. Topics include homology and the alignment of sequence data, genome evolution, computational complexity, tree-searching algorithms, optimality criteria, coalescent methods, tree support, and an introduction to comparative methods. This course will emphasize theoretical issues followed by empirical examples to examine these topics as well as feature hands-on instruction for relevant computer programs and resources. Spring: L. Smith

35600. PRINCIPLES OF POPULATION GENETICS I. (=ECEV 35600) Lectures on 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. Knowledge of elementary genetics and calculus is assumed. Prerequisite: consent of instructor. R. Hudson

35700. PRINCIPLES OF POPULATION GENETICS II. (=ECEV 35700) Continuation of EVOL 35600. R. Hudson.

35800. CLASSICS OF EVOLUTIONARY GENETICS. (=ECEV 35800) Major Classic papers in evolutionary genetics that had great impact on the development of the field are reviewed. M. Long

35900. EVOLUTION AT THE GENOMIC LEVEL. (=ECEV 35900) We focus on the newly proposed and solved problems related to evolution of genomes. Instructors will give a series of lectures, dealing with basic concepts and techniques used in the research of topics. Students will present and evaluate literatures. M. Long, M. Kreitman

36000. ECOLOGICAL AND EVOLUTIONARY GENOMICS. (=ECEV 36000) This course will emphasize the vast potentials of the latest DNA sequencing technology in biology. Long standing biological questions that have become answerable will be the major focus. The course will cover topics in evolutionary genomics including genome structure and organization, interaction networks of transcription factors and miRNAs and others. A new

subfield of ecological genomics will be explored, including QTL and association mapping, and population structure on the landscape. Some background in molecular evolution is required. J. Borevitz, C-I Wu.

36200. CURRENT TOPICS IN EVOLUTIONARY BIOLOGY. (=ECEV 36200) Critical analysis of recent literature on empirical research in evolutionary biology. Prerequisite: some knowledge of population genetics, evolutionary biology or consent of instructor. J. Coyne

36300. SPECIATION. (=ECEV 36300) A review of the literature on the origin of species beginning with Darwin and continuing through contemporary work. Both theoretical and empirical studies will be covered, with special emphasis on the genetics of speciation. Prerequisite: coursework in genetics and evolution. J. Coyne

36700. GEOMETRIC MORPHOMETRICS. (=GEOS 36000) This graduate-level course serves as an introduction to the field of morphometrics (the analysis of organismal shape). Quantitative exploratory and confirmatory techniques involving both traditional (length-based) and geometric (landmark-based) summaries of organismal shape are introduced in a series of lectures and practical exercises. Emphasis is placed on the application of morphometric methods to issues such as (but not restricted to) quantification of intraspecific variability, interspecific differences, disparity, ontogenetic growth patterns (allometry), and phylogenetic changes in morphology. Relevant statistical and algebraic operations are explained assuming no prior background. Students are required to bring personal laptop computers, and are expected to acquire and analyze their own data sets during the course. M. Webster

36800. SPECIAL TOPICS IN ANIMAL CONSERVATION. This course will focus on current advances in basic and applied conservation research in both in-situ and ex-situ populations. Each week, students will have a guest presentation by conservation research staff and read and discuss accompanying relevant literature. E. Lonsdorf

36900. BIOPSYCHOLOGY OF SEX DIFFERENCES. (=HUDV 30901/ PSYC 31600) This course will explore the biological basis of mammalian sex differences and reproductive behaviors. We will consider a variety of species, including humans. We will address the physiological, hormonal, ecological and social basis of sex differences. To get the most from this course, students should have some background in biology, preferably from taking an introductory course in biology or biological psychology. Permission of instructor. J. Mateo

37000. TOPICS IN SYSTEMATICS AND BIOGEOGRAPHY. (=ORGB 37000) A graduate seminar which includes short lectures, one-page summaries of readings, and class discussion. Topics include critical examination of current methods in systematics and historical biogeography, their limits, and applications to biological problems. The course assumes familiarity with the principles of systematics and historical biogeography and requires extensive readings from the current literature. P. Sereno

37300. PRIMATE BEHAVIOR AND ECOLOGY. (=BIOS 23248, CHDV 21800, CHDV 34300) This course explores the behavior and ecology of nonhuman primates with emphasis on their natural history and adaptation to the environment. Specific topics include methods for the study of primate behavior, history of primate behavior research, foraging, predation, demography and dispersal, evolution of social and mating systems, affiliation, aggression, sexual behavior, parenting, development, communication, and cognition. D. Maestripieri

37400. EVOLUTIONARY SOCIAL PSYCHOLOGY. (=CHDV 37800, PSYC 37800) This course explores human social behavior from an evolutionary perspective. In this course we will read and discuss articles in which evolutionary theory has been applied to different aspects of human behavior and social life such as: developmental sex differences, cooperation and altruism, competition and aggression, physical attractiveness and mating strategies, incest avoidance and marriage, sexual coercion, parenting and child abuse, language and cognition, and psychological and personality disorders. D. Maestripieri

37500. SEXUAL SELECTION. (=ECEV 37500) A discussion and critical analysis of sexual selection. The course will consist of lectures, reading and discussion. PQ: consent of instructor. S. Pruett-Jones

37600, 37700, 37800. RESEARCH SEMINAR IN ANIMAL BEHAVIOR (HUDV 37500) This graduate workshop involves weekly research seminars in animal behavior given by faculty members, post-docs, and advanced graduate

students from this and other institutions. The seminars are followed by discussion in which students have the opportunity to interact with the speaker, ask questions about the presentation, and share information about their own work. The purpose of this workshop is to expose graduate students to current comparative research in behavioral biology and meet some of the leading scientists in this field. Students must register for this course in the Autumn quarter and will receive credit in the Spring, at the end of the 3-quarter sequence. J. Mateo, D. Maestripieri

38100. EVOLUTION OF THE HOMINOIDEA. (=ANTH 38100) A detailed consideration of the fossil record and phylogeny of the Hominidae and collateral taxa of the Anthropoidea based on studies of classic monographs, casts, and comparative primate osteology. (200 Crs). R. Tuttle

38200. COMPARATIVE PRIMATE MORPHOLOGY. (=ANTH 38200) Functional morphology of locomotor, alimentary, reproductive, and special sensory systems in primates. Dissections will be performed on monkeys and apes. Prereq: consent of instructor. (200 Crs). R. Tuttle

38400. HISTORY AND THEORY OF HUMAN EVOLUTION. (=ANTH 38400, HIPS 23600) A seminar based on the classic theoretic writings, autobiographies, and biographies of C. Darwin, T.H. Huxley, A. Keith, H.F. Osborn, F.W. Jones, W.K. Gregory, D.J. Morton, R. Broom, D. Black, R. Dart, F. Weidenreich, J.T. Robinson, L. Leakey, W.E. LeGros Clark, A.H. Schultz, W.L. Straus, E.A. Hooton, S.L. Washburn, C.S. Coon, T. Dobzhansky, G. Simpson, and S.J. Gould. R. Tuttle

38600. APES AND HUMAN EVOLUTION. (=ANTH 38600) A critical examination of the ways in which data on the behavior, morphology and genetics of apes have been used to elucidate human evolution, with particular emphasis on bipedalism, hunting, meat-eating, tool behavior, food sharing, cognitive ability, language, self-awareness, and sociability. Visits to local zoos, films, and demonstrations with casts of fossils and skeletons required. R. Tuttle

38700. PRIMATE EVOLUTION. (=BIOS 23241) A combined lecture and seminar course covering the comparative morphological and molecular evidence for evolution across the entire order Primates, including both basic data and theoretical issues. R. Martin

38800. INTRODUCTION TO RESEARCH AT THE FIELD MUSEUM. Introduction to Research at the Field Museum and the University of Chicago. This course meets once a week for a lecture by a curator at the Field Museum. A different curator lectures each week, presenting results of her/his current research on a range of topics in evolutionary biology, including phylogenetic systematics, molecular biology, paleontology, development, conservation biology and biodiversity, population biology, or biomechanics. Lectures often are followed by a tour of one of the major natural history collections in the world of living or fossil birds, mammals, plants, insects, fishes, invertebrates, or amphibians and reptiles. Staff

40000. EVOLUTIONARY CONSERVATION BIOLOGY. Graduate proseminar examining critical questions and issues in evolutionary conservation biology, from paleobiology of extinction and survivals to contemporary issues of hotspots, population genetics and ecology, behavioral ecology of free and managed populations, and molecular evolution and systematic biology.

40100. GRANTS, PUBLICATIONS, AND PROFESSIONAL ISSUES. (=ECEV 40100, ORGB 40100) 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. J. Bergelson, R. Ho

40900. BEHAVIORAL ECOLOGY. (=HUDV 40900) Graduate seminar. We will meet once per week to discuss current topics in behavioral ecology, as selected by participating students. PQ: Permission of instructor. J. Mateo.

41500. TOPICS IN STRATIGRAPHY AND BIOSEDIMENTOLOGY. (=GEOS 38400) Seminar course using the primary literature and/or a field problem. Topic selected from the rapidly evolving fields of sequence stratigraphy, basin analysis, and animal sediment relationships. Prereq: GEOS 22200 and 22300 or equivalent. S. Kidwell

42200. SEMINAR: RESEARCH IN BEHAVIORAL ENDOCRINOLOGY. (=HUDV 42200) For students actively involved in research in behavioral endocrinology. Emphasis is on the current literature and on the analysis and the presentation of data. Prereq: Consent of instructor; active research in the area. M. McClintock

42500. CONCEPTS IN ECOLOGY. (=ECEV 42500) Using a combination of lecture and student-led discussion, this course will introduce students to the classical ecological literature as well as the latest work in each of several topics. The goal is to provide students with a solid framework upon which to build their own research program. J. Bergelson, C. Pfister, J. T. Wootton

42600. COMMUNITY ECOLOGY. (=ECEV 42600) Lectures and readings cover advanced topics in multi-species systems, and include an introduction to basic theoretical approaches. J. T. Wootton

42700. TOPICS IN AQUATIC ECOLOGY. (=ECEV 42700) Theoretical and empirical topics especially relevant to the ecology of aquatic systems will be presented. Emphasis will be placed on features of aquatic systems that pose theoretical and empirical challenges such as the prevalence of complex life histories, the potential for long-distance dispersal, and the diverse controls of trophic structure. C. Pfister

42800.POPULATION ECOLOGY. (=ECEV 42800) A lecture course on the empirical and theoretical approaches to the study of natural populations, including field methodologies and quantitative approaches. Includes computer assignments. C. Pfister

42900. THEORETICAL ECOLOGY. (=EVOL 42900) An introduction to mathematical modeling in ecology. The course will begin with linear growth and Lotka-Volterra models, and proceed to partial differential equations. The course's perspective will emphasize numerical computations and fitting models to data. G. Dwyer

43000. ECOLOGICAL GENETICS OF PLANT-ENEMY INTERACTIONS. (=ECEV 43000) This seminar covers current empirical and theoretical issues in the study of coevolutionary interactions. J. Bergelson, G. Dwyer

43200. EXPERIMENTAL APPROACHES IN QUANTITATIVE ECOLOGICAL GENETICS. (=ECEV 43200) This course will consist of selected readings followed by experimental design and analysis of actual or simulated data sets. Topics include the Extended Phenotypes (Community and Ecosystem heritability), cellular genomic/expression phenotype, conservation and landscape genetics, and Quantitative Trait Locus mapping in different environments via linkage and association, and community population genetics (overdispersion vs. co-diversification). Analysis will utilize R, including bioconductor and other stats packages. Expect to generate and/or modify your own scripts and ideally analyze your own data sets if you work in the general area. J. Borevitz

44001. MOLECULAR EVOLUTION I: FUNDAMENTALS AND PRINCIPLES. (=BIOS 23258, ECEV 44001, GENE XXXXX) The comparative analysis of DNA sequence variation has become an important tool in molecular biology, genetics, and evolutionary biology. This course covers major theories that form the foundation for understanding evolutionary forces that govern molecular variation, divergence and genome organization. Particular attention is given to selectively neutral models of variation and evolution, and to alternative models of natural selection. The course provides practical information on accessing genome databases, searching for homologous sequences, aligning DNA and protein sequences, calculating sequence divergence, producing sequence phylogenies, and estimating evolutionary parameters.) PQ: two quarters of Biology and Calculus or consent of Instructor. M. Kreitman

44002. MOLECULAR EVOLUTION II: GENES AND GENOMES. (=BIOS 23259, ECEV 44002, GENE XXXXX) In Molecular Evolution II, the knowledge and well established evolutionary analyses of genes and genomes are taught. The related areas, such as origination and evolution of new genes, exon-intron structure, sex-related genes, sex-determination genetic systems, transposable elements, gene regulation systems, and duplication of genes and genomes and evolution of genome sizes, are covered in the teaching. These topics are discussed under the processes driven by various evolutionary forces and genetic mechanisms. The analysis of these problems is

conducted with the genomic context. Lectures, discussions, and experiments are combined. PQ: EVOL 44001 or consent of Instructor. M. Long.

44100. MOLECULAR METHODS IN ECOLOGY AND EVOLUTION. (=ECEV 44100) This is a laboratory course intended as an intense introduction to molecular methods applicable to research in organismal biology. The topics covered by the course will change from year to year. Students will learn techniques for manipulating DNA, for identifying single base substitutions and tandem repeat length variation, and for carrying out large-scale mapping experiments of a quantitative trait. Class enrollment will be limited to approximately 6-8 students. J. Bergelson, M. Kreitman

44800. EVOLUTIONARY BIOMECHANICS OF VERTEBRATE FEEDING SYSTEMS. This proseminar examines the evolutionary and functional principles underlying the diversity of vertebrate musculoskeletal systems as revealed by research on vertebrate feeding systems. Mechanical, neuromechanical, modeling and experimental approaches to the biomechanics of vertebrate feeding systems are examined. Weekly labs cover practical skills surrounding collection and analysis of in vivo data. Students are required to participate in class discussions and prepare a written and oral proposal of a research project on a vertebrate feeding system. It is expected that the students will then perform that research in the Summer Quarter. *Required background:* Vertebrate diversity and phylogenetic relationships; algebra, some linear algebra and calculus helpful. C. Ross

45300. MODELS OF ANIMAL BEHAVIOR. (=ECEV 45300) Introduction to mathematical models of naturalistic behavior. Lectures, discussions and individual projects. S. Pruett-Jones

45500. BIOGEOGRAPHY. (=BIOS 23406, ENST 25500, GEOG 25500/35500) This course examines factors governing the distribution and abundance of animals and plants. Topics include patterns and processes in historical biogeography, island biogeography, geographical ecology, areography, and conservation biology. L. Heaney, B. Patterson

45600. PALEOBIOGEOGRAPHY. (=ORGB 35600) This course concerns the development of historical biogeography as a discipline and the advent of more recent quantitative methods. Areas of special interest include the quality of fossil and geologic records, the definition of areas, the relationship of speciation and phylogeny to biogeography, and methods that search for congruence. The course is aimed at defining hypotheses open to test by empirical data or simulation. P. Sereno

46100. CHEMICAL INFORMATION IN THE SEDIMENTARY & FOSSIL RECORDS. (=GEOS 36100) Explores the range of biological and environmental information that can be preserved in the chemical composition of fossils and sedimentary rocks, including topics such as elemental proxies for environmental conditions, metabolic and climate controlled isotopic fractionations, and the preservation of organic chemistry and biomarkers. The range of analytical approaches available and the different types of paleobiological and climatological questions that can be addressed are reviewed with the goal of encouraging geochemical awareness and applications in student research. Previous course themes have included biomineralization and the geochemistry of important events in earth history. Boyce, Martin.

46200. SPECIES AND THE FOSSIL RECORD. (=GEOS 36200) This course serves as an introduction to the practical and theoretical issues involved in obtaining primary systematic data from the fossil record, and demonstrates the criticality of such data to the rigorous documentation and interpretation of evolutionary patterns. Precise topics of the seminar discussions will vary from year to year depending on relevance to student research projects and interest, but are likely to focus on issues such as (but not restricted to) practical techniques in specimen-based paleontology (including fossil preparation and photography), species delimitation (including species concepts, variability, and ecophenotypy), stratigraphic/geographic range determination (including biostratigraphic correlation), phylogeny reconstruction (including the relevance of stratigraphic data), and the importance of these topics to broader macroevolutionary issues such as diversity/disparity dynamics and the determination of evolutionary trends, rates and processes. M. Webster

37000. TOPICS IN SYSTEMATICS AND BIOGEOGRAPHY. (=ORGB 37000) A graduate seminar which includes

short lectures, one page summaries of readings, and class discussion. Topics include critical examination of current methods in systematics and historical biogeography, their limits, and applications to biological problems. The course assumes familiarity with the principles of systematics and historical biogeography and requires extensive readings from the current literature. P. Sereno

48100. ADVANCED PROBLEMS IN PALEOANTHROPOLOGY. (=ANTH 48100) Tutorial museum, laboratory and field studies on the hominoid fossil record and contextual information relevant to its interpretation. R. Tuttle

48500. ADVANCED PROBLEMS IN PRIMATE LOCOMOTION AND COMPARATIVE MORPHOLOGY. (=ANTH 48500) Seminar and/or laboratory study of the morphological and behavioral adaptations of selected primates and their implications for primate phylogeny. R. Tuttle

49400. APPROACHES TO TEACHING IN THE BIOLOGICAL SCIENCES. This course will introduce different teaching philosophies and methods that address how to be an effective teacher in the biological sciences. Specifically, the course will address what skills and knowledge undergraduates need to acquire and which assignments best teach these skills. Students will prepare course syllabi, discuss different approaches to teaching, and draft a philosophy of teaching statement. The overall goal for the course is that the students think critically about the art of teaching and formulate their own thoughts on the matter to better prepare them for their own careers in teaching. Staff

49500. TEACHING IN EVOLUTIONARY BIOLOGY. 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. Students must choose the instructor name from the faculty listing in the Time Schedules and register using that instructor's assigned section number. Staff.

49600. GRADUATE READINGS IN EVOLUTIONARY BIOLOGY AT THE FIELD MUSEUM. Directed individual reading courses supervised by CEB faculty members who are curators at the Field Museum. Prerequisite: consent of instructor. Students must choose the instructor name from the faculty listing in the Time Schedules and register using that instructor's assigned section number. Staff.

49700. GRADUATE READINGS IN EVOLUTIONARY BIOLOGY. Directed individual reading courses in evolutionary biology supervised by CEB faculty members. Prerequisite: consent of instructor. Students must choose the instructor name from the faculty listing in the Time Schedules and register using that instructor's assigned section number. Staff

49800. GRADUATE RESEARCH - Off Campus. Advanced research under the direction of the faculty of the Committee on Evolutionary Biology, undertaken away from the University of Chicago campus at the Field Museum, the Chicago Zoological Park, established biological field stations under the direction of their staffs, or other locations approved by the Chair and the student's advisory committee. Students must choose the instructor name from the faculty listing in the Time Schedules and register using that instructor's assigned section number, .Staff

49900. GRADUATE RESEARCH - On Campus. Advanced research under the direction of the faculty of the Committee on Evolutionary Biology. While any approved research problem may be pursued under this course number, special attention is called to the following research fields available in the Committee: population ecology and genetics, entomology, applied ecology, plant biology, systematics of fossil invertebrates, molluscs, problems in the systematics of arthropods, herpetology, mammalogy, ornithology, and ichthyology, theoretical biology, animal behavior, paleoecology, molecular evolution, functional morphology, evolution of development, community ecology and evolution, evolutionary paleobiology and macroevolution, and physiological ecology. Students must choose the instructor name from the faculty listing in the Time Schedules and register using that instructor's assigned section number. Staff