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INTRODUCTION

Welcome! This handbook answers many questions OBE majors have concerning requirements, study abroad, research and other opportunities in the OBE Department. For further information, meet with your advisor, watch the bulletin boards, attend the majors' meeting in the fall, and check your e-mail frequently. Advise the department administrative assistant of your Worner Center box number, phone number, e-mail address, any prolonged off-campus sojourn, and any change in your status at the College. Ultimately, it is the responsibility of the student to know all departmental and college requirements and regulations.

Whether you have just started your college career or are already in the middle of completing an OBE major, we urge you to read all of the sections in the handbook, and to review any questions you have with an OBE faculty member.

IMPORTANT DATES, EVENTS, AND ANNOUNCEMENTS

It is very important that you declare your OBE major no later than your sophomore year, so that you receive OBE Department announcements. To declare the major, you need a faculty advisor in the Department of Organismal Biology and Ecology with whom you confer before declaring. Appendix I contains the checklist of important items.

- Each fall a REQUIRED meeting of all prospective and declared majors will be announced. Topics include:
  - Introduction of new faculty and staff;
  - Discussion of graduation requirements including the capstone experience, seminar abstracts, senior exams, and optional graduation with distinction or senior thesis;
  - Discussion of graduate school applications and employment opportunities in biology;
  - Other important announcements.
- All OBE majors must complete the senior capstone experience (see details below).
- OBE majors have the option of writing a senior thesis and attempting to graduate with distinction (see details below).
- Majors should also attend OBE Day each spring (see OBE Day section).

THE OBE MAJOR: A SHORT GUIDE TO REQUIREMENTS

I. Two units in Introductory Organismal Biology: BY105 and/or BY106 and/or BY107
II. BY208 Ecology
III. Two units in Molecular and Cellular Biology and in Genetics: BY131, and BY280 OR BY231
IV. Three units in Chemistry: CH107 and CH108 and CH250
V. Two units in Mathematics: one unit of calculus and one unit of statistics OR mathematical modeling
VI. Five approved OBE Electives (of which 3 must be upper-level)
VII. Senior capstone experience (of which the senior capstone course can count as one of the electives)

ADVICE ON SCHEDULING COURSES FOR A MAJOR IN ORGANISMAL BIOLOGY AND ECOLOGY

The OBE Major requires that a student earn a C- or higher in 15 courses. Many of these courses must be taken in a prescribed order. Thus, it is very important to plan out your OBE major early in your career, and try to take at least 4 courses each year that apply to the major. Students who want to study abroad have to plan carefully, as many study abroad programs do not enable students to earn credit towards the OBE major while studying abroad. Study abroad is a valuable experience, so plan ahead: you may have to take more than 4 required courses in the year before or after your study abroad experience.

It is also important to consider what extracurricular activities you will pursue in order to move toward gaining entrance to a post-graduate degree program, or toward employment following graduation. In particular, you should work with the Career Center and your advisor to plan for summer activities that will enrich your academic experience and make you more eligible for post-graduate work or employment. Summer research experience is increasingly required for admission to graduate programs including medical school, and is essential to qualify for Ph.D. programs. Furthermore, students earning high enough grades to qualify to graduate with distinction should plan to do undergraduate research during the summer between their junior and senior years, because a senior thesis (BY499) is required to graduate with distinction and extensive research and writing time is required to complete a thesis.

The department strives to offer sufficient sections of all courses to meet the needs and desires of our students; however, there is high demand for most OBE courses. OBE majors must consult with the academic advisor to wisely allocate points during registration. By department policy, OBE faculty generally hold to course limits. If you are on the wait list for a course you need/want, show up the first day of class and you may get in. Faculty are not obliged to overload any course, and you should not expect that to happen.
FIRST YEAR:
At least 2-3 of the following courses:

BY105 Biology of Plants
BY106 Biology of Animals
BY107 Biology of Microbes
BY131 Intro to Molecular and Cellular Biology
CH107 General Chemistry I
CH108 General Chemistry II

SECOND YEAR:
At least 3-4 of the following:

BY105, BY106, or BY107 if both blocks have not already been completed
BY131, if not already completed
Statistics requirement (recommended before BY208)
CH107, CH108 if not already completed
BY208 Ecology
CH250 Organic Chemistry

Talk with your advisor and the Career Center about possible summer activities between your second and third years at the college.

Talk to your OBE advisor and declare your major before the end of your sophomore year.

THIRD YEAR:

Finish your Math requirements
BY280 Population Genetics or BY231 Genetics
2-3 approved OBE electives

Talk with your advisor to find out if you might be eligible to graduate with distinction, so that you can complete those requirements. This would likely involve doing summer research.

FOURTH YEAR:
Complete the entire Senior Capstone Experience (includes seminars & abstracts; ETS or GRE exam, senior capstone course)
2-3 approved OBE electives

REQUIREMENTS FOR THE OBE MAJOR: THE FULL GUIDE

I. Two units in Introductory Organismal Biology:
   • BY105 Biology of Plants
   • BY106 Biology of Animals
   • BY107 Biology of Microbes

   Note: AP/IB credit may count towards a lower level elective or as credit for BY131 (see below), but cannot replace these organismal courses.

II. BY208 Ecology

III. Two units in Molecular/Cellular Biology and Genetics:
   • BY131 Introduction to Molecular and Cellular Biology
     An IB-HL score of 6-7 fulfills this requirement or may count as one lower-level elective credit; a Biology AP score of 5 does not fulfill this requirement but does count as one lower-level elective credit.
   • BY280 Population Genetics OR BY231 Genetics

   Note: In order to take BY231, a student should consult with an MB faculty member to determine if their background is sufficient for this genetics course.

IV. Three units in Chemistry:
   • CH107 General Chemistry
   • CH108 General Chemistry II
   • If you have Chemistry AP or IB credit on your transcript, you may take a bypass exam for CH107 General Chemistry I or CH108 General Chemistry II. The Biology Department excuses the general chemistry courses that you bypass. While some students are able to bypass CH107, skipping CH108 is rare and not recommended because the lab experience in CH108 helps greatly in future classes. Contact Ted Lindeman (tlindeman@coloradocollege.edu) in Chemistry for more information; please ask the Chemistry Department to notify your biology advisor about your score on the bypass exam.
   • CH250 (Structures of Organic Molecules)

   Note: Graduate schools often require BOTH CH250 and CH251 Reactions of Organic Molecules.
V. Two units in Mathematics:
   - One unit of calculus from:
      MA126 Calculus I
      MA127 Calculus I and II, accelerated
      MA129 Calculus II
     AP or IB credit recognized by the registrar – note: choose your calculus course carefully so that you avoid doing mostly review and do not take a course without adequate preparation. The Math Department recommends the following:
       o If you have Calculus AB credit on your transcript, take Calculus 2 and not Calculus 1.
       o If you have Calculus BC credit, do not take Calculus 2. If you want to take more math, take a Computer Science class or a higher level math class (ask your advisor for recommendations).
       o If you have IB credit, talk to the Math Department.
       o If you took Calculus in high school but do not have AP or IB credit, talk to the Math Department.
   - One unit of statistics or mathematical modeling from:
      BY220 Biostatistics and Experimental Design
      MA256/BY256 Mathematical Models in Biology
      MA117 Probability and Statistics
      MA217 Probability and Statistical Modeling
      EV228 Analysis of Environmental Data
     AP or IB credit recognized by the registrar in statistics.
     
     Note: The statistics/modeling requirement is fulfilled by AP credit in statistics. However, many students with this AP credit benefit a great deal by taking BY220 Biostatistics and Experimental Design.

VI. Five approved Biology Electives
   - Three of the electives must be upper-level (numbered 300 or higher). Two of these must be Biology (BY) upper-level courses (one of these must be a capstone course taken during the last 8 blocks before graduation - see capstone options below). The remaining upper-level elective may be a non-BY class at the 300-400 level.
   - All BY courses except BY100 and BY104 may count as electives. BY101 (FYE) counts as one elective. BY280 may count as an upper-level elective IF taken after BY231.
   - All MB courses, excluding non-majors courses, may count as electives.
   - The following Human Biology & Kinesiology courses may count as electives: HK204, HK304, and HK321.
   - No more than 2 research blocks (BY309/BY409/BY499) may count as electives.
   - AP/IB credit may count as one unit of lower level elective credit (ask your advisor).

   Note: this list is not exhaustive and you may petition the department to consider other courses to count as electives (there are often new courses during a given year that might count as biology electives – ask your advisor).

VII. Senior capstone experience

Before the end of your senior year, you must:
   - Complete attendance at three OBE-approved seminars, summarize each in an abstract (see example abstract at end of Handbook), and submit each abstract electronically to both Donna Sison and your advisor no later than the first Monday of the block following the block in which the seminar occurred. Students are strongly advised to begin turning in abstracts before their senior year.

During your junior and senior years, you must:
   - Successfully pass the Biology ETS exam or the Biology GRE exam.
      Register to take the 2-hour ETS Major Field Test in Biology early in Block 3 or early in Block 6, the only two times Biology offers the exam. It is best to take the ETS exam in Block 3 in case you do not pass the exam. See the “Senior Capstone” section below on advice for preparing for this exam and links to sample questions.
      Alternatively, you can take the Biology GRE in the fall, but we strongly recommend that you take the ETS exam instead. You must list Colorado College as a recipient of the GRE scores.
   - Complete a senior capstone course (this also counts as one of your five electives) in the last two semesters prior to graduation, in one of the following ways:
      BY499 Senior Thesis
      BY409 Advanced Research in Biology (if it meets the requirements described in the section on “Senior Capstone” - ask the faculty member supervising your research).
Capstone course. The options vary from year to year. The current list of approved OBE capstone courses is: BY308 Advanced Ecology, BY365 Plant Physiology, BY366 Comparative Animal Physiology, BY367 Animal Ecology, BY 370 Tropical Forest and Coral Reef Ecology, BY390 Ecology and Biogeography of Patagonia, BY410 Ornithology, BY412 Entomology, BY415 Evolution, BY421 Conservation Biology, BY442 Special Topics: Biology of Disease Vectors, BY475 Techniques in Molecular Ecology.

MB capstone courses may also be used to meet the capstone requirement (ask your advisor).

### SENIOR CAPSTONE EXPERIENCE

There are three parts of the required senior capstone experience:

1. Attend research seminars & turn in 3 abstracts
2. Successfully pass the Biology ETS exam or the Biology GRE exam
3. Complete a senior capstone course during the last 2 semesters prior to graduation

### PART 1: BIOLOGY RESEARCH SEMINARS & ABSTRACTS

Majors must submit satisfactory abstracts from 3 OBE-approved seminars. Attend acceptable seminars (see below), summarize, and email each abstract to both Donna Sison (dsison@ColoradoCollege.edu) and your advisor by the first day of the block after the seminar. Abstracts submitted after this day will generally not be accepted. You must declare an OBE major and be a junior or senior before abstracts can count. Declared majors receive e-mail notices of Biology seminars, which are also on the departmental web page.

#### ACCEPTABLE SEMINARS

- OBE Department seminars, including the keynote address at OBE Day
- Biology seminars at UCCS, CU, CSU, DU, CU medical school, and Penrose or Memorial Hospitals, but ask your academic advisor before attending.
- Selected seminars from other science departments at CC. In your abstract clearly link the seminar to OBE. Again, ask your academic advisor before you attend non-OBE seminars.
- Not eligible: student presentations, including OBE Day talks.

#### FORMAT FOR ABSTRACTS

- Limited to one printed page.
- Include 1) your name, 2) full seminar title, 3) complete name and academic affiliation of the presenter, 4) seminar date, 5) your abstract, and 6) the Honor Code and your commitment that you have followed it indicated by typing your name. Each abstract must be clear, concise, well-written, and complete to be accepted by your advisor and the department. See Appendix III for an example.
- Follow the spirit of the CC Honor Code; this obviously includes attending the seminar and writing the abstract in your own words.

### PART 2: PASS A SENIOR EXAMINATION

Successfully passing the senior examination is required of all students graduating with a major in Organismal Biology and Ecology. The senior comprehensive exam is the Educational Testing Service (E.T.S.) Biology Subject Test, which is administered by the OBE Department twice during the year: early in Block 3 (students wishing to graduate in December must take the exam then) and early in Block 6. **Students are strongly advised to take the exam during Block 3**, in case they do not pass and need a second chance in Block 6. In the past, 20-25% of students failed the first attempt and needed a second round to pass the exam. The ETS Biology Exam is a 2-hour multiple choice test covering diverse fields of biology and is a nationally administered exam. Scores are recorded as percentiles ranked across multi-year performance of Biology majors at undergraduate institutions across the country. Scores are given for Overall Percentile, and in 4 subareas: Cell Biology, Genetics and Molecular Biology, Organismal Biology, and Population Biology, Evolution, and Ecology. The exam grade will be recorded permanently on the student transcript. Faculty use performance on the exam when writing letters of recommendation and when deciding how to distribute departmental research funds and other awards. A description of the ETS exam contents can be found at [http://www.ets.org/s/mft/pdf/mft_testdesc_biology_4gmf.pdf](http://www.ets.org/s/mft/pdf/mft_testdesc_biology_4gmf.pdf), while practice questions can be found at [http://www.ets.org/Media/Tests/MFT/pdf/mft_samp_questions_biology.pdf](http://www.ets.org/Media/Tests/MFT/pdf/mft_samp_questions_biology.pdf).

The Graduate Record Exam (GRE) Subject Test in Biology may be substituted for the ETS only if it is taken on the November or December test dates. The Spring GRE results come back too late for graduation deadlines. To substitute the ETS, students must list Colorado College as a recipient of the GRE scores. See Appendix VIII for advice on how to maximize your chances of passing the exam.

### Criteria for Passing the Exam

1. **ETS:** a grade of Outstanding will be given for achieving the 85th percentile overall or in at least 2 of the 4 subcategories. A grade of Satisfactory will be given for achieving the 60th percentile overall, or the 65th percentile in at least 2 subcategories.
2. **GRE:** a grade of Outstanding will be given for achieving the 80th percentile overall or in at least 2 subcategories. A grade of Satisfactory will be given for achieving the 50th percentile overall or the 60th percentile in at least 2 subcategories.

**What happens if you do not achieve a passing score?**
Students who fail the exam in the fall must retake the ETS in Block 6 to attempt to raise their score to a passing level. Students who retake the ETS may receive a grade of Outstanding if their scores improve enough to reach that level.

**Students who do not pass the senior examination must take a two-hour oral exam** administered by two faculty members chosen by the department. Students will have to present a research paper during the exam, defend their interpretation of that research paper, and then answer questions covering the breadth of their Biology coursework. The faculty will know exactly which courses students took, so students should expect to review all of their notes from all of their Biology classes. The makeup exam must be scheduled in a timely fashion no later than block 7 in order to meet the graduation deadlines. *A passing grade must be achieved on the senior exam before graduation forms can be signed. Oral exams will only be given to students who have previously attempted the ETS or GRE exam. Students who do not take the ETS or GRE are not eligible for oral examination and will not be able to graduate with a degree in OBE until they have taken one of the tests. Students who take the oral exam only have the option of moving from Failing to Satisfactory. They may not receive Outstanding.*

Cost of the exam is approximately $30. Students must register and pay for the exam by the second Monday of Block 2 for the Block 3 test date. Students who fail the exam in Block 3 must register and pay for the spring exam by the second Monday of Block 5 for the Block 6 test date. Registration and payment should be done in the OBE Department office.

**PART 3: PASS AN APPROVED SENIOR CAPSTONE COURSE**

Students may fulfill the capstone course requirement by completing a senior thesis (BY499), completing a research block that requires a substantial written research report with literature background (e.g. BY409, if the supervising faculty member requires that the student meet the capstone course description and the department approves a petition — See Appendix VI) or successfully completing a designated capstone course that draws upon a body of knowledge, perspectives, and experiences developed over the entire course of the OBE major (see “requirements” section for a list of approved capstone courses). A capstone experience must be integrative across more than one level of biological organization, e.g. genome-metabolism-organism, genome-organism-evolution, or genome-phyiology. Moreover, a capstone course must include at least two of the following elements: a critique of primary literature; a seminar-style discussion of primary literature; a written proposal, oral presentation, or paper that requires synthetic thinking; substantive opportunities designed to broaden student understanding of inquiry and research methods in OBE. A course may only fulfill the capstone requirement if taken during the last two semesters before graduating; the intent is for students to bring to a given course the full complement of their biology education at Colorado College.

Students who complete the senior capstone course will be better able to:

- Critique primary literature, providing theoretical context for the literature discussed
- Analyze a body of research including primary literature, explain application and relevance of the findings, and describe potential future directions of the research topic
- Select appropriate primary literature papers relevant for a research project, seminar, or research proposal
- Organize information from multiple sources (primary literature, review articles, original research) into a cohesive oral presentation or written report or proposal. Presentations or reports may be of any length (as decided by the supervising faculty) but should provide evidence of synthesis of information across levels of biological organization

If you have questions concerning these requirements, see your academic advisor in the OBE Department.

**UNDERGRADUATE RESEARCH/TRAINING OPPORTUNITIES**

A. **Supervised Research Blocks in Organismal Biology and Ecology (BY309/409)** Students are encouraged to engage in supervised research through enrollment in BY309/409 and other programs. See section below for more details.

B. **Senior Thesis (BY499)** Students planning professional careers requiring research experience are encouraged to complete a senior thesis. Select an area of concentration in the sophomore or junior year. Research performed in BY309 or 409 can be the basis of a thesis. Students may sign-up for one full block of BY499 or for an entire year of BY499 extended format (must be initiated by the beginning of block 1 for the senior year). See section on Senior Thesis for details.

C. **Off-campus - Research Experience for Undergraduates (REU)** The National Science Foundation awards REU grants to universities and field stations, which in turn fund undergraduate research, mainly during summers. These typically provide room and board and a stipend for about 10 weeks. These are usually excellent quality programs, and a number of students have written senior theses based on REU experiences. Institutions award REU grants to students based on applications, which are usually due usually in January and February (some as late as May — you should consider preparing applications over winter break). Search online for NSF REU programs to find these opportunities.

E. **There are many opportunities for summer work in ecology, field biology, and environmental science on the listserv EVINTERNSHIPS.** These listings also include a number of laboratory jobs of various sorts, including molecular approaches to questions that relate to multiple aspects of biology, and are not limited to ecological opportunities only. Students with an interest
in lab-based biology are also encouraged to participate in this listserv. If you have an email account at Colorado College, you may request to subscribe or unsubscribe from this list by accessing http://listserv.coloradocollege.edu/archives/HTML/EVINTERNSHIPS.HTML

F. **Department Opportunities - Not for Academic Credit** The OBE Department offers a tutoring program. Junior and senior OBE majors are available to assist students in all core classes in the department. Students interested in earning some extra money, and who are interested in a teaching career or graduate school are encouraged to become a department tutor. For information on becoming a tutor please contact one of the OBE paraprofessionals.

Students wishing to participate in the program can obtain the names and phone numbers of tutors either from flyers posted in their classroom or from the OBE paraprofessionals. Those students needing to be tutored should keep in mind that finding an available tutor takes time and planning. The student must find a tutor who is available and the tutor must contact the paraprofessional in charge of the program before a tutoring session can be scheduled. Students who call a tutor the night before an exam should not expect to be tutored that evening. If you are worried about a particular class but are not positive that you will require the assistance of a tutor, call a few tutors to determine who will be available that block and will best fit your needs.

**NOTE:** All Students who work and receive wages from the OBE Department budget must fill out the proper form in the Financial Aid Office before they can be hired. Final selection of students for department jobs will be made by the OBE Department.

### SUPERVISED RESEARCH BLOCKS

Research in OBE blocks (BY309 or BY409) allow students opportunities to pursue a research project under supervision of an experienced scientist for credit. Projects are designed and supervised with the help of a faculty member whose expertise and interests are related to the project. Faculty specialties are described on the web. Projects may be done at any time, but credit is awarded in a single block. [Students may also sign-up for BY309 or 409 extended format for one-half unit of credit.] **Not more than a total of 2 units** from BY309, 409, 499 or independent study from off-campus programs can be used toward the OBE major, and only 1 unit of independent research from an off campus program may be applied to the major.

Begin talking with a faculty member in the area of your interest before you consider enrolling in BY309 or BY409. A faculty member must agree to work with you before you can register for BY309/409. If a faculty member agrees to supervise your research and is not scheduled for BY309 or BY409 Research in OBE that block, the Registrar will create a course for you. Talk with your faculty research advisor to find out if you should register for BY309 or BY409 (generally BY309 if you are a junior and BY409 if you are a senior). Also remember that you need to petition the department to get a BY409 block recognized as a senior capstone course (see Appendix VI). Please note: BY309 cannot count as a capstone course.

It is possible that you will need to apply for a Venture Grant to help fund a research project. Venture Grant applications also have a deadline (the 2nd Friday of each block), and typically the grants must be awarded before you begin the research. Check with your faculty research advisor to find out if you should write a Venture Grant. See link for details about Venture grants: http://www.coloradocollege.edu/offices/dean/grants-for-students/external-grants-for-students/venture-grants.dot. Students who receive Venture Grant funding must present their work publicly, for example at OBE Day. We strongly encourage all BY309 and BY409 students to present their research in the form of a poster on OBE Day. Talk to your advisor about this opportunity. For information about conducting research off-campus under supervision of a non-CC faculty member, see Appendix V. A petition is required. Not more than 1 unit of independent study from off-campus work can be used toward the OBE major.

**GENERAL RULES for students doing research with a CC faculty member:**

Do not take equipment or supplies from any laboratory, prep room or classroom without communicating in writing or in person with the supervisor of the room: 1) who you are, 2) what equipment/supplies you wish to use, 3) where you wish to move these items, and 4) when you will return it. This will keep the OBE faculty and staff aware of equipment whereabouts when they are preparing for classes.

- If a piece of equipment gets broken or misplaced, immediately inform the professor with whom you are working.
- Before using any chemicals or instruments, make sure the professor with whom you are working explains to you how to properly use them. It is your responsibility to ask if you are uncomfortable with something.
- Upon completion of your research, please clean and return all the equipment and supplies that you have used.

### GUIDE TO OFF-CAMPUS CREDITS for the OBE MAJOR

These guidelines are only for OBE majors and students who definitely intend to declare an OBE major. Other majors should see their department chair.

**Frequently Asked Questions**

- **Do all the CC Approved Programs apply for the OBE major?** No, we only accept specific programs, listed below. We do not accept programs that do not meet our requirements for sufficient biological content. Courses taken on off-campus programs prior to
enrolling in college (for example, in a gap year or gap semester) do not count for the OBE major. No credit for School for Field Studies Programs or for ISDI Sustainable Development/Thailand.

- **How many credits can I receive?** Generally at most 2 elective credits. A few programs have special credits, see notes below. No more than 1 unit of independent study form off-campus programs can be used towards the OBE major, and no more than 2 units from BE309, 409, 499, or independent study from off-campus programs can be used toward the OBE major. *Students are cautioned that a course must receive 4 semester hours to count as 1 full CC unit. Courses of only 3 semester hours will count as only 0.75 units of CC credit and will not fulfill an OBE requirement by themselves.

- **How can I get upper level credits?** Programs that give upper level electives are listed below; in field programs you must have taken BE208 Ecology prior to going in order to receive upper level credit for a research course; BE220 Biostatistics and Experimental Design is strongly recommended prior to doing field programs. To receive upper-level credit for courses in traditional academic settings, the course must have at least two Biology courses as prerequisites and must be approved courses by the OBE Study Abroad Advisor.

- **How do the grades I receive count on my transcript?** Only ACM courses count in your GPA; other program courses will count as credit only. You must receive a grade of at least a C to receive credit.

- **When is the best time to go abroad?** Usually, your junior year, after you have taken the basic coursework in your major (organismal biology, ecology, chemistry, and at least 1 math class).

- **Who approves my proposed program?** You will need to fill out an online proposal/approval form with Study Abroad, who will then contact your advisor and the departmental abroad advisor for electronic approval via SUMMIT.

- **If I do a field program with a research project component, who approves whether or not my project is acceptable for OBE credit?** We require research projects be on a biological topic; when you return, you will be asked to share your project with a OBE faculty member, either your advisor or someone in the department with knowledge of your topic area. They will approve your project for OBE credit and make sure there is a note in your file.

1. **Courses at other institutions in traditional academic settings**

   **Students are urged to take required courses for the major at Colorado College.** Although most requests to OBE for credit from non-CC courses come from third-party abroad programs, in unusual cases, you may seek credit for a required course taken in another formal university setting. You will be asked to document the course content through syllabi, copies of exams, textbooks and through discussion and/or a department member who teaches the course for which you want to substitute one elsewhere. Normally courses with Ecology in the title do not substitute for BY208 Ecology. Only courses that require at least 2 prerequisites in Biology may count as upper-level electives, and must be approved by the OBE faculty responsible for off campus credit.

   **Note:** Substituting required courses in other departments, such as Chemistry, requires written approval by that Department and approval by your academic advisor in OBE.

2. **Third Party Traditional Academic Programs that have courses appropriate for OBE Majors** (see CC Study Abroad website for further information)

   - **Boston University Science Semester in Grenoble, Dresden, or Madrid:** You must have taken Cell Biology (BY131 or equivalent) prior to going as well as Chemistry 107 and 108; credits received are 1 lower level elective (for course in intermediate Cell Biology) and Organic Chemistry 1.
   - **DIS Denmark Program:** no credit for health and medicine related courses or for Arctic Environmental Policy; possible credit, usually 1 lower-level elective, in other biological areas; students commonly take Marine Mammals (3 semester hours) plus Marine Mammal Lab (1 semester hour) for 1 CC unit. DIS courses are usually only 3 semester hours so students will need more than one course to cover 1 elective credit in OBE.
   - **IFSA-Butler:** popular programs include those at James Cook University, Australia, and Otago, New Zealand. Check semester hours and prerequisites for courses. Often a good opportunity to be exposed to very different ecological systems and biota.

3. **ACM Programs**

   No departmental paperwork is required for these programs, and the course work will transfer directly to your OBE major. However, well in advance of your program you should consult with the ACM website for deadlines and application procedures and the relevant ACM advisor (currently Marc Snyder for Costa Rica and Jim Ebersole for Tanzania) and your OBE advisor about the suitability of these programs for your educational goals. We strongly recommend taking BY208 Ecology AND BY220 Biostatistics before attending either of these programs; you will benefit much more from the experience with the background obtained in these courses. This is particularly critical for students thinking about using their project as the basis for a senior thesis.

   - **ACM Tropical Research (Spring) Semester in Costa Rica.** Successful completion of the program provides two units toward the OBE major. One of these will be for BY309/409 Research in Biology if the field project is on a biological topic The second unit will count as an upper-level elective (or as a lower-level elective if the student has not taken 208) Students also receive a third unit in Spanish, and a 4th unit of unspecified CC credit. Prior Spanish required.
   - **ACM Human Evolution & Ecology in Tanzania.** Students who successfully complete this program will receive two units of credit
4. Non-ACM field programs

- These programs generally provide 1-2 elective units, one of which will a research project. To receive credit, your project must be on a biological topic. Courses with Ecology in the title do not substitute for BY208 Ecology. To receive upper level elective credit for research classes, students must have taken BY208 prior to program (if not, 2 lower level electives are given).
- Biostatistics and Experimental Design is strongly recommended Boston University Ecuador Tropical Ecology: Prerequisites for the program are: 1 year of intro Bio, a course in Ecology, and 1 year college Spanish. Participants can receive 1 upper and 1 lower level elective in OBE (BY 208 required for upper level credit).
- Sea Semester Oceans and Climate and Marine Biodiversity: These accepted programs target advanced science students. Prerequisites: a minimum of 3 lab science courses, including 1 at the 300-level or higher, or consent of instructor. Two CC units of credit toward the bio major may be given as follows: 2 upper level OBE electives for Oceans in the Global Climate Cycle and Directed Research for Oceans and Climate Program; 2 upper level electives for Advanced Topics in Biological Oceanography and Directed Research for Marine Biodiversity.
  - Note: No OBE credit will be given for other Sea Semester Programs (e.g. Colonization and Change in the Caribbean, Sustainability in Polynesian Culture, or Energy and the Ocean Environment).
- CC/Woods Hole Environmental Science Semester (at Woods Hole): Prerequisites are 1 year biology, 1 year chemistry, 1 year calculus (1 year generally means 2 blocks). This program will receive 2 upper level OBE electives. *Students who take the Mathematical Modelling of Ecological Systems course in this program can receive a third credit equal to the statistics/modeling requirement in OBE. Some statistical background recommended for this program, however. For students who have already fulfilled the statistics requirement, Mathematical Modelling in Ecological Systems may count as a lower level elective.
- CIEE Bonaire Program: 1 upper and 1 lower level elective.
- IES/USSF Quito Galapagos Program: 1 upper and 1 lower level elective.
- Quest University/Canada: Each year, CC and Quest (also on the block plan) exchange a few students for 2 to 4 blocks. Credits vary so consult with Department Study Abroad advisor.

**SENIOR THESIS AND GRADUATION WITH DISTINCTION IN ORGANISMAL BIOLOGY AND ECOLOGY**

**OVERVIEW OF PROGRAM**
The OBE Department faculty recognizes the educational benefits for any student doing original research and presenting it in writing and orally. Therefore, any senior OBE major may elect to undertake a senior thesis. A senior OBE major who completes a high quality senior thesis, presents it orally at OBE Day, and has a high grade point average (for details of the GPA requirement see the section on Graduation With Distinction below) will receive Graduation With Distinction. This honor will be recorded on the student’s official transcript and noted on the commencement program at graduation. On the other hand, if a student meets the senior thesis and presentation requirements, but does not have a high enough grade point average, s/he will not receive Graduation With Distinction, but the successful completion of the senior thesis requirements will become part of the student’s official transcript under BY499 Senior Thesis.

**CHECKLIST to graduate with distinction in Organismal Biology and Ecology**

1. Complete an OBE senior thesis with a grade of A- or above and
2. From the courses taken for the OBE major, achieve a GPA of at least 3.7 for the 10 courses with the highest grades. If a student does not have seven or more grade track courses, e.g. is a transfer student or a student taking the MBL Semester in Ecosystem Science, a faculty member may nominate the student for consideration for distinction by a departmental vote.

**SENIOR THESIS**
The option of undertaking a senior thesis must be initiated by the student and approved by an OBE Department faculty member (primary research advisor), who will supervise the student’s research and senior thesis. In addition, another faculty member (who may be in another CC department if the area of research falls under the other faculty member’s area of expertise) must agree to act as a secondary advisor. (Faculty members may decline to be thesis advisors because of other commitments.) The primary and secondary research advisors comprise the thesis committee. The thesis committee will establish the format and requirements of the research and thesis, read and suggest revisions in the thesis, and determine whether the thesis is of sufficient quality to qualify for Graduation With Distinction. Ideally, the decision to write a senior thesis should be made in the fall of the junior year so that the spring may be devoted to a survey of the literature and planning for the research. The research itself should begin by the following summer. Work on the writing of the research must begin by the fall of the senior year. The senior thesis is based on original research done by the student. A literature review, although a necessary part of a senior thesis, is not in itself considered to be a thesis.
OFF-CAMPUS RESEARCH

Off-campus research projects done in such programs as the Oak Ridge Semester, the ACM Tropical Field Research Program in Costa Rica, research at another institution, or other approved research experience at a laboratory or field station may be used for the research on which a senior thesis is based. Students should be aware, however, that sometimes research supervision in these programs is not very good, and that they could end their off-campus program without having obtained suitable data for a senior thesis. A student should approach a CC OBE faculty member about being the student’s primary research advisor before the student undertakes the off-campus research. When the student returns to CC after finishing the off-campus research, the primary thesis advisor will judge whether the results of the student’s off-campus research project is worthy of a senior thesis. Students are additionally cautioned that the actual writing of the senior thesis based on off-campus research must be done by working closely with the CC OBE Department faculty member who has agreed to be the student’s primary research advisor. In this case the primary thesis advisor supervises the data analysis and writing of the thesis, rather than supervising the actual research.

REGISTRATION FOR SENIOR THESIS

Students undertaking a senior thesis must return a completed form (Appendix IV) entitled, Registration for Senior Thesis, by the end of block 2 of the senior year, to the coordinator of the Senior Thesis/Distinction program. Students must arrange for a thesis committee consisting of a primary research advisor, who must be an OBE Department faculty member, and a secondary advisor, who may be in another academic department. An oral presentation advisor, normally the primary research advisor, is also necessary. These advisors must sign the registration form before it is turned in to the Senior Thesis/Distinction coordinator.

ENROLLING IN BY499 SENIOR THESIS

By the end of block 2, students planning to do a senior thesis should be enrolled in BY499 Senior Thesis through the Registrar’s Office. Enrolling in BY499 and completing the OBE Department’s requirements for a senior thesis will provide an official record of the senior thesis on the student’s transcript. There is an option of enrolling in BY499 as a regular block course, or enrolling in BY499 as a FULL YEAR extended format course. Students may enroll in one extended format course per semester for ½ CC unit at no extra tuition cost (in the case of BY499 students therefore must enroll for both semesters, thus obtaining a whole unit of credit). The instructor for BY499 should be the primary thesis advisor.

ORAL PRESENTATION OF THESIS

In addition to the written senior thesis, a student must make a high quality oral presentation of the thesis research and results. Ordinarily, this presentation will be at the annual spring OBE Day. The presentation is prepared under the supervision of at least one OBE faculty member who is also part of the thesis committee. Normally the oral presentation advisor is also the primary research advisor for the senior thesis, unless circumstances dictate otherwise. The student’s oral presentation advisor will help the student fit the presentation into the time available at OBE Day, make suggestions about organization and the preparation of slides, and help set the level of the talk appropriate for the CC audience. The talk must be a well-planned, rehearsed, understandable, and professional presentation of scholarly work. Students who do off-campus research as a basis for their senior thesis are cautioned that they must work closely with their CC presentation advisor to prepare their talk, even if they have orally presented the results previously as part of their off-campus research experience. This will help ensure that the presentation will meet the OBE Department’s standards of quality.

The student must inform the faculty coordinator of OBE Day of his or her intention to give an oral presentation at OBE Day and must submit an abstract of the presentation for the OBE Day program. The OBE Day coordinator will send instructions for the abstract via campus mail or e-mail to all those students who have submitted a form declaring their intention to write a senior thesis (see section on Registration for Senior Thesis); however, it is the student’s responsibility to check his/her Worner box and e-mail regularly and make certain that his/her abstract is submitted in a timely manner.

Note: Any student may request to present research based on independent study (such as for BY309/409) at the OBE Department’s annual OBE Day. Because of time limitations for oral presentations of students attempting to qualify for Graduation with Distinction, however, other student presentations at OBE Day will usually be in the form of a poster. The coordinator of OBE Day will make the final decision about the format of research presentations at OBE Day.

Students attempting to graduate with distinction in December must discuss their situation with their advisor and the Department Chair to arrange for fulfilling the oral presentation requirement outside of OBE Day.

TURNING IN THE FINAL COPY OF THE SENIOR THESIS

By the first Friday of Block 8, a final, clean, and professional-looking original of the thesis, signed by the thesis committee (on a title page as shown in Appendix II of this handbook) must be turned in to the OBE office. By signing, the thesis advisors have judged that the written thesis meets the standards of quality necessary for Graduation With Distinction.

The thesis must also be submitted to the library, which only accepts electronic copies. The student should use their last name and tiger number to log in to the following website: http://discovery.coloradocollege.edu/etd/. After logging in, they will be prompted with instructions on how to complete the submission.

For a detailed overview of the thesis submission process, covering everything from how to get departmental and personal
Each spring the department faculty, staff and students meet for an afternoon-long series of presentations, including those given by OBE majors seeking Graduation with Distinction. OBE Day is in March (block 6). All OBE majors are encouraged to attend, and others are welcome. Abstracts required for graduation may be written on the keynote speaker’s talk but not student presentations.

**DEPARTMENTAL AWARDS TO STUDENTS (shared between OBE and MB)**

**The Mary Alice Hamilton Award**
Each year the OBE and MB Department faculty selects one or two outstanding senior biology majors as the winner of the Mary Alice Hamilton Award. Among other things, grades, research, and potential to become a professional biologist are considered in making the award to the outstanding biology major(s). Winners will be announced at Honors Convocation each spring. The award is usually a book appropriate to the professional interest of the recipient.

**The Richard and Reba Beidleman Award**
Each spring the OBE and MB Department faculty selects a student recipient for the Richard and Reba Beidleman Award. The student must have demonstrated through courses, fieldwork, or other activities, outstanding potential for becoming a professional ecologist and/or field biologist. The award recipient, who may be in any year of study, will be announced at the annual Honors Convocation.

**The James Enderson Award in Conservation Biology**
The Enderson Award in Conservation Biology honors Professor Jim Enderson, who joined the Biology Department in 1962, long before it was fashionable to call oneself a “conservation biologist.” Throughout his career, his research centered on the precipitous decline of birds of prey and in particular the peregrine falcon. He was first to breed the temperate North American peregrine in captivity, a line used extensively in restoration of the western population. He served on several recovery teams and working groups for endangered species. At Colorado College he inspired students through independent projects to pursue careers from botany to ornithology, in the lab and in the field. In keeping with his scholarship and breadth as a biologist, the Enderson Award will honor a junior or senior Biology major whom, in the opinion of the faculty, has shown commitment and productivity in an original research project in conservation biology. Candidates are eligible if their work has conservation implications, whether the focus was molecular, organismic, or ecosystem, lab or field.

**The Laboratory Biology Award**
This award is made to a senior OBE and MB major whose interests and course work are mainly in the area of laboratory-based biology. The criteria for selecting a recipient for this award are: grades in biology courses with a laboratory component, engagement in lab-based research, preferably for a senior thesis, and plans for post-graduate work or study.

**The Jason Wilkes Memorial Prize**
Each spring the OBE and MB faculty may select a minority student who is a declared biology major to receive this award. The recipient, like Jason, must have a strong interest in biology.

**The Alfred Alberts Prize**
In alternate years the Chemistry and OBE / MB Departments award the Alberts Prize to support student research in biochemistry and molecular biology.

**FUNDING FOR UNDERGRADUATE WORK AND RESEARCH OPPORTUNITIES**
Aside from The Colorado College student aid program, there are other available funds for financial assistance in this department.

A. **Venture Grants.** The Venture Grant Committee awards funds for research projects under the guidance of a professor. Funds may also be granted to permit students and faculty to attend scientific meetings and conferences. Application forms and further information are available in the Dean’s office.

B. **Departmental Budget.** LIMITED FUNDS are available to assist students in conducting BY309/409 research.

C. **Robert M. Stabler Award.** This permanently endowed fund was established to honor Dr. Stabler who was chair of Biology for many years. It is awarded annually, preferably to a junior OBE major for summer study at a marine Biology station. The amount of money awarded depends on the cost of the program and financial need. Some of the money may also be requested, on a financial-need basis, to partially offset extra costs of international field programs, e.g. courses in Patagonia and Belize. See the department office for application procedures and details.

D. **Research Assistants.** Faculty members may have research grants to hire students to assist in specific research projects. See individual faculty for further information.

E. **Mary Ella Gilmore Magnusson and Prof. Ralph Gilmore Family Fund.** The earnings from this fund are used to provide summer stipends for Colorado College students to engage in research in natural sciences during their undergraduate years. The research may occur in conjunction with a CC faculty member on campus or in the field. The stipend may be used for research expenses,
including but not limited to supplies, chemicals, transportation costs, etc. Contact the professor with whom you would like to work.

Please note that reimbursements for students doing independent or class research has been approved at 10 cents per mile after the first 100 miles per block. No reimbursement will be given for anything under 100 miles.

LETTERS OF RECOMMENDATION

Graduate schools, summer programs, scholarship applications and prospective employers often ask applicants to submit letters from former professors. Use the following guidelines as a matter of courtesy (students are strongly urged to develop a file at the Career Center):

1. Try to choose professors you have had for more than one course or with whom you have done independent work so that the letters can be authoritative.
2. Provide a written and signed request with a list of the persons to whom the letters are to be sent, all proper forms, and the deadline dates for the letters. Include a statement of the position sought and how you match the requirements.
3. Make your request at least two weeks prior to the date on which the recommendation is due.
4. Ask the professor if you should provide them with addressed, stamped envelopes.

DEPARTMENT ALCOHOL AND DRUG POLICY

The Department of Organismal Biology and Ecology strongly supports Colorado College’s Drug and Alcohol policies while on field trips based on the following considerations:

1) A field trip is a concentrated learning experience. Anything that distracts from that experience or reduces the ability to learn and think is contrary to the purpose of the experience.
2) Faculty members and students represent the College when on a field trip. Behavior, therefore, should be in accordance with the highest standards of the College.
3) While the laws concerning the consumption or use of alcohol and other psychoactive drugs differ among the states that may be visited during a field trip, these laws must be obeyed. Neither the College nor the faculty can, will, or should shield students from these laws and their consequences if students choose to violate them during a field trip.

Whenever an instructor has probable cause to believe that a student or students have violated this policy, the instructor has the authority to sever the students involved from the class and order them to return immediately to the campus by their own means of transportation. Such action does not preempt further action by appropriate authorities.

COURSE EVALUATIONS

The department seeks your participation in two forms of evaluation of OBE courses and faculty.

1. You will receive an email asking you to complete an online course evaluation at the end of the block. These evaluations are anonymous, but you must complete your course evaluation before being able to access your grade for the course. Evaluations offer important insight to the instructors, allowing them to look for trends and suggestions in order to improve the course the next time it is offered. The evaluations may also become part of the files used by the department to consider promotion and tenure for the instructor.
2. You will receive requests in the mail for an evaluation of a specific professor under review, or being considered for tenure or promotion. Your honest candid evaluations are very important to the department and College’s review process. Please take the time to respond thoughtfully to this request, as your comments are important and taken seriously in the review process. Please participate, even if your evaluation is brief.
CHECK LIST OF IMPORTANT ITEMS AND EVENTS: Use this checklist to track your progress through the requirements for the OBE major and graduation

1. Spring of Sophomore Year
   A. Obtained an advisor in OBE ................................................................. [ ]
   B. Applied for Major in OBE ........................................................................ [ ]
   C. If pre-health, have a file in pre-health advising office .............................. [ ]
   D. If pre-K-12 education, have contacted Education Department chair .......... [ ]

2. Fall of Each Year
   OBE Majors Meeting .................................................................................. [ ] [ ] [ ]

3. Spring of Each Year
   Attend OBE Day ........................................................................................ [ ] [ ] [ ]

4. Preregistration of Junior Year
   Check graduation requirements before scheduling senior year........................ [ ]

5. Spring of Junior Year
   Make plans for senior thesis, Graduation with Distinction, if desired ................ [ ]
   If considering graduate school, find 5-6 appropriate programs and learn their admissions requirements and application deadlines................................................................. [ ]

6. Departmental Seminars: Attend department seminars, write abstracts of three presentations to be turned in during the junior and senior years ......................................................... [ ] [ ] [ ]

7. Senior Year Capstone Experience
   A. ETS exam OR Biology GRE exam ................................................................. [ ]
   B. Seminars and abstracts ............................................................................ [ ]
   C. Senior capstone course ............................................................................ [ ]
   D. Students who are attempting to graduate with distinction (honors) in OBE
      Register for senior thesis by the end of Block 2 ......................................... [ ]
      Sign up for BY499 by the end of Block 2 .................................................. [ ]
      Sign up to present at OBE Day .................................................................... [ ]
      Turn in beautiful final, signed copy of thesis ............................................. [ ]

8. Fall of Senior Year if planning to go to graduate school at some time:
   A. Register for GRE Biology Subject Test and GRE General tests .................. [ ]
   B. Secure letters of recommendation ............................................................ [ ]
   C. Finish applications, most of which are due December – March...................... [ ]

9. General Education (All-College) Requirements
   A. Social Inequality (1 unit) ............................................................................ [ ]
   B. Global Cultures (1 unit) ............................................................................ [ ]
   C. Scientific Investigation (2 units, includes 1 block with lab/field component) ................................................................. [ ]
   D. West in Time (2-block course, 2 units)....................................................... [ ]
   E. Quantitative Reasoning (1 unit) .................................................................. [ ]
   F. Language (2 blocks or equivalent) ............................................................... [ ]

   Students must fulfill this requirement by one of the following options: 1) 2 units in any of the languages offered at CC (unless permitted otherwise by disability services), 2) an acceptable language program at any accredited college or university, in any non-English language, equivalent to two units of language at Colorado College, if approved by the registrar’s office
   G. Writing proficiency (acceptable writing portfolio or additional writing course) ................................................................. [ ]
CHECKLIST to complete the OBE major:

1. **Two** introductory Organismal units: ........................................................................................................................................[ ] [ ]
   - List courses taken to fulfill this requirement here:

2. BY208 (Ecology) ........................................................................................................................................................................[ ]

3. Two units in Molecular and Cellular Biology and in Genetics
   - BY131 (Introduction to Molecular and Cellular Biology) ........................................................................................................[ ]
   - BY280 (Population Genetics) OR BY231 (Genetics) .................................................................................................................[ ]
     - List course taken to fulfill this requirement here:

4. **Three** units in Chemistry
   - CH107 (General Chemistry I) ....................................................................................................................................................[ ]
   - CH108 (General Chemistry II) .....................................................................................................................................................[ ]
   - CH250 (Structures of Organic Molecules) .................................................................................................................................[ ]

5. Two units of Mathematics including:
   - One unit of calculus: ....................................................................................................................................................................[ ]
     - List course taken to fulfill this requirement here:
   - One unit of statistics or mathematical modeling: ...........................................................................................................................[ ]
     - List course taken to fulfill this requirement here:

6. **Five** approved OBE electives ....................................................................................................................................................[ ] [ ] [ ] [ ] [ ]
   - Three must be Biology (BY) courses at the 300 level or higher ..........................................................................................[ ] [ ] [ ] [ ] [ ]
   - One unit must be an approved senior capstone course ........................................................................................................[ ] [ ] [ ] [ ] [ ]
   - List courses taken to fulfill this requirement here:

7. Senior Capstone Experience
   - Three seminar abstracts ..................................................................................................................................................................[ ] [ ] [ ] [ ] [ ]
   - Pass the Biology ETS exam or the Biology GRE exam ...........................................................................................................[ ] [ ] [ ] [ ] [ ]
   - Complete an approved Senior Capstone Course ..................................................................................................................[ ] [ ] [ ] [ ] [ ]
     - List course taken to fulfill this requirement here:
CHECKLIST to complete undergraduate courses required by most M.D. programs
(check the specific programs to which you plan to apply!)

Access Health Professions Advising webpage at http://www.coloradocollege.edu/healthprofessions
Meet with Health Professions Advisor, Jane Byrnes, MSA, each semester to discuss plans for pursuing a health profession. Maintain a 3.5 GPA to be competitive. If GPA is lower, can look at a Post-Bac or Masters Program to improve application.

Take Pre-requisite courses:

- **Biology** – 2 intro courses: BY 107, 109, 131………………………………………………………………………………………………[ ] [ ]
  
  *This is a bare minimum; additional coursework in Biology is STRONGLY recommended.*

- **Chemistry** – 4 courses: CH 107, 108 and CH 250, 251………………………………………………………………………………………………[ ] [ ] [ ] [ ]
  
  *Summer versions of general chemistry and organic chemistry also fulfill the requirements but may have slightly different course numbers. Some students find CH382 useful before taking the MCAT. Pre-health students from high schools that did not offer AP or IB calculus should probably complete MA125-6 before enrolling in CH107.*

- **Physics** – 2 courses: PC 141, 142 or PC 241,242 (Calc. based)………………………………………………………………………………………………[ ] [ ]

- **English** – 2 courses: 1 literature course and 1 writing intensive course………………………………………………………………………………………………[ ] [ ]

- **Math** – 2 courses: Stats MA 117, Calculus MA 126, 129………………………………………………………………………………………………[ ] [ ]
  
  *Check with pre-health advising if you have AP or IB credit in math.*

Recommended courses include:

- Biochemistry CH 382 (highly recommended)
- Genetics BY 231
- Psychology PY 100
- Anatomy SC 207/BY 207
- Physiology SC 206/BY 321

*Do not take prerequisite courses pass/fail.*

Get on Health Professions mailing list for information about speakers, Health Professions Club, volunteer and internship opportunities.
Join the Health Professions Club and other organizations of interest.
Develop leadership skills through organizations and clubs.
Get experience in the field of health care. Can acquire licenses i.e.: CNA, EMT.
Get experiences shadowing professionals in that field (Physicians, Dentists, and Vets).
Get community service experience (i.e.; homeless shelters, habitat for humanity, soup kitchen, foundations, etc.)
Get research experience.
Take MCAT, DAT, GRE - earliest would be Summer after Junior year.
AP credits may transfer, but not at all schools. Will need to take higher level courses in that department.
Apply end of junior year (at the earliest). One to two years post-graduation is recommended.
Medical admissions favor those who apply early in the application cycle due to rolling admissions.

**Veterinary schools may emphasize a science major requirement** or favor graduates with a science degree. It is worth examining the admissions policy of any veterinary schools of interest.

Other health professions schools, including Veterinary Medicine, Nursing, Podiatry, Physical Therapy, Optometry, Pharmacy, and Physician Assistant programs, are likely to have other specific course requirements and are not as standardized as Medical and Dental school requirements. It is important to consult information from specific schools before completing plans for an academic program.

Students today are often waiting a year or more after graduation before applying to a health professions school. This does not put the applicant at a disadvantage; many medical schools look favorably upon applicants who have taken an extra year or two to mature, gain work experience, and thus make a better decision regarding a career in health professions.
SAMPLE FORM

"TITLE OF THESIS"

A Senior Thesis Presented to

The Faculty of the Department of Organismal Biology and Ecology,

Colorado College

By

"Your Name"

_____ day of May, _____

Approved by:

_________________________________________________________________

Primary Thesis Advisor

_________________________________________________________________

Secondary Thesis Advisor
TITLE OF THE SEMINAR
Date of the seminar

Name and title of presenter
Location of the seminar

ABSTRACT BODY--precise and concise, but complete, summary of the presentation. Focus on the main points and conclusion(s)

EXAMPLE:
"Stress, Social Rank and Personality: Studies of Wild Baboons"
December 11, 1991
Dr. Robert Sapolsky
Department of Physiology, Stanford University

The olive baboons of the Serengeti in East Africa were chosen for this study for a number of reasons, one being that it was possible to study these baboons in the wild. Furthermore, these baboons have an organized system of socialization both behavioral and psychological, including a hierarchical ranking system similar to human beings. The initial purpose of this study was to explore the mechanisms that enable bodies to deal with stress. The original question was to determine if the baboon's health and stress levels were connected to their social rank.

Glucocorticoids are hormones that in abundance cause diabetes, hypertension and ulcers in humans, as well as increase the opportunities for other diseases. The amount of glucocorticoids in the baboons was measured by taking blood samples. The results indicated that lower ranking baboons had increases in the levels of glucocorticoids in their bloodstream. In addition, they were sluggish in turning these compounds on and off. In contrast, the higher-ranking baboons in a troop had lower levels of glucocorticoids and were able to turn them on and off faster. Therefore, it might follow that the lower ranking baboons had a higher level of stress due to increased levels of glucocorticoids in the bloodstream.

However, another aspect of this study involved identifying different personality types among the baboons. Knowing when or when not to fight, knowing when you have won or lost a fight, being successful at making allies, having friends and displacing aggression are categories which all deal with the individual personalities of the baboons. Even while a baboon may be at the top of his troop, life could still be extremely stressful. For example, if a troop is unstable and constantly fighting within themselves to obtain a rank, surely this is more stressful than a troop that is relatively stable and peaceful. Therefore, the study concluded that personality precedes rank in determining a baboon's ability to deal with stress and thus, remain healthy.

REGISTRATION FOR SENIOR THESIS

Return this form to the Senior Thesis/Distinction Coordinator by the end of Block 2.

Student's name (print or type)  Planned Date of Graduation (Month/Year)

Local phone number  Local address

I plan to complete the requirements for senior thesis in Organismal Biology and Ecology. These requirements are: 1) writing a high quality thesis based on original research and presenting the thesis orally at the OBE Department’s annual OBE Day in the spring semester. I have read the sections in the OBE Majors' Handbook on Senior Thesis and Graduation With Distinction, and by filing this form, I understand that the requirements for Senior Thesis must be completed according to the schedule given in the OBE Majors’ Handbook. I understand that coordination, scheduling, and completion of the thesis and oral presentation are the student’s responsibilities.

I further understand that if I qualify for a senior thesis and I meet the minimum grade point average criteria as given in the OBE Majors’ Handbook, I will awarded Graduation with Distinction in Organismal Biology and Ecology.

I certify that I have enrolled in BY 499 Senior Thesis as a regular block course or as an extended format course during my senior year.

Signature

My research will be (was) done at ______________________________________________________

under the supervision of ____________________________________________.

Thesis committee (signatures required below):

Primary advisor (must be in the CC OBE Dept.)  Secondary advisor (may be in another dept.)

Oral presentation advisor (usually the same person as the primary advisor)

STUDENTS: DO NOT WRITE BELOW THIS LINE

Date form filed:  Date of Thesis completion:
Thesis meets standards senior thesis?  yes  no
Date of oral presentation:
Oral presentation meets standards for senior thesis?  yes  no
Overall GPA: ________ GPA in OBE courses:
Graduation With Distinction in OBE granted?  yes  no
APPENDIX V
DEPARTMENT OF ORGANISMAL BIOLOGY AND ECOLOGY
PETITION FOR OFF-CAMPUS RESEARCH CREDIT
BY309 OR 409

Instructions: This petition requesting Off-Campus credit for a BY309/409 research project is to be completed in full and handed to the Chair or Associate Chair of the Department of OBE, BY THE BEGINNING OF THE ACADEMIC BLOCK PRIOR TO THE INTENDED STARTING DATE OF THE PROJECT. This deadline is enforced. Please do not ask for an exception!

Research directly supervised by a member of the CC OBE faculty does not require this departmental petition. See the OBE Majors’ Handbook for guidelines on off-campus studies, research and transfer credit. Print or type the information below. Only one unit of off-campus research credit (BY309 or 409) may be counted for the OBE major. Except for the ACM program, a maximum of two off-campus units may be counted toward the major, only one of these may be BY309 or 409.

Name of Applicant ___________________________ Date ___________________________
Local Address ___________________________ Phone ___________________________

Credit desired: BY309 or 409 (circle one)
Do you have (or have you requested) other off-campus credit for the major? _______________ If yes, explain below:

Class standing of applicant: ___________________________ Name of your academic advisor: ___________________________
Is this course needed for graduation? ____________ For the OBE Major? ___________________________

Courses (numbers) completed toward the OBE major: (attach a COPY of your transcript) ___________________________

Has the registrar approved all-college credit for this study? ___________________________
Explain:

Attach a concise and comprehensive description of the off-campus study to be done (you should type your answer on a separate page and attach to this form - one page maximum).

Method of summarizing the results of the off-campus study (see major’s handbook). You may answer below or on a separate page as above.

Location of off-campus research ___________________________ Dates of research ___________________________
Name, title, address, and telephone number of person at that institution who will supervise and evaluate your research (see back also):

Name & Title: ___________________________
Address: ___________________________
Telephone: ___________________________, Fax: ___________________________
**PETITION FOR POTENTIAL BY309 OR 409 CREDIT --continued**

**TO BE COMPLETED BY PERSON SUPERVISING THE RESEARCH OFF CAMPUS**

Are you willing to sponsor, supervise and evaluate the student research project proposed above? _______________________

Are you willing to submit a written evaluation of the student’s research project after its completion?  _______________________

Please explain the nature of your intended evaluation:

Are adequate research facilities, supplies and support available for the student to undertake the project?  _______________________

Explain briefly, as necessary:

Additional comments (please attach a letter if needed):

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<tr>
<td>Off-campus supervisor signature</td>
<td>Date</td>
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**TO BE COMPLETED BY THE STUDENT**

I understand and agree to the OBE Department guidelines for off-campus research and to the requirements and evaluation methods set by the CC OBE Department and my on-campus advisor:

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<tr>
<td>Student signature</td>
<td>Date</td>
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**TO BE COMPLETED BY THE CC FACULTY SPONSOR AFTER ABOVE IS COMPLETED**

As this student’s on-campus advisor, I have evaluated this student’s proposal and am willing to administer the study for the department. I agree to evaluate the research and submit a grade for the BY309 or 409 credit to the registrar. The student will enroll in the BY309 or 409 under my name.

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<tr>
<td>CC OBE Faculty supervisor signature</td>
<td>Date</td>
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**TO BE COMPLETED AFTER THE STUDY, BY THE CC OBE FACULTY SPONSOR**

I certify the student has successfully completed all requirements and should receive a unit of credit for the study.

Credit received:  BY309  or  BY409  (circle one)

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<tr>
<td>CC OBE Faculty supervisor signature</td>
<td>Date</td>
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**FOR DEPARTMENT USE ONLY--DO NOT WRITE BELOW THIS LINE**

Date Application Filed: ______________________

Application:  Approved  Denied

Comments: ______________________

Unit of BY309 or BY409 credit granted: ______________________
APPENDIX VI
DEPARTMENT OF ORGANISMAL BIOLOGY AND ECOLOGY
PETITION FOR BY409 TO COUNT AS A SENIOR CAPSTONE COURSE

Instructions: This petition requesting that a BY409 course be counted as a Senior Capstone Course is to be completed in full and handed to the Chair or Associate Chair of the Department, BY THE BEGINNING OF THE ACADEMIC BLOCK PRIOR TO THE INTENDED STARTING DATE OF THE BY309/409 course. This deadline is enforced. Please do not ask for an exception!

Name of Applicant __________________________________________ Date ______________________

Phone_____________________________________________________

A course may only fulfill the capstone requirement if taken during the last two semesters before graduating.

When will you graduate? ________________________________________

When will you take the BY409 that you want to have serve as a senior capstone experience?

School Year (e.g. 2014-15) __________________ Block ________________

What is your research question for BY409?

How will your BY409 course require you to integrate across more than one level of biological organization (e.g. genome-metabolism-organism, genome-organism-evolution, genome-physiology-population-ecosystem, etc.)?

Mark all of the following elements that will be included in the BY409 course. A minimum of two are required for the course to count as a senior capstone.

- a critique of primary literature
- a seminar-style discussion of primary literature
- a written proposal, oral presentation, or paper that requires synthetic thinking
- substantive opportunities designed to broaden student understanding of inquiry and research methods in biology.

We strongly advise you to arrange to present your BY309/409 research at OBE Day. Discuss this possibility with your BY309/409 research mentor.

Name and signature of CC faculty member who will supervise this BY309/409 project. Signature indicates that the faculty member agrees that the BY309/409 will meet the requirements for a Senior Capstone.

Name & Signature: ________________________________________________

Block & Date: _________________________________________________
APPENDIX VII
THE BIOLOGY MAJOR through 2013-14 ("old" Biology major)

Students declaring after July 1, 2014 will automatically be OBE majors. Those who declared prior to July 1, 2014 can be transferred to the new OBE major. There are practically NO differences between major requirements of the old Biology major OEE track and the new OBE major. If you are concerned or confused as this transition occurs, please speak with your advisor. Below is a reminder of what the "old" Biology major OEE track looks like, FYI.

In the “old” Biology major, two tracks existed: the first option was the Organisms, Ecology, and Evolution (OEE) track (very similar to the new OBE major), and the second option was the Molecular and Cellular Biology (MCB) track (very similar to the new MB major).

The Organisms, Ecology, and Evolution Track

I. Two units in Introductory Organismal Biology among: BY105, BY106, BY107
II. BY208 Ecology
III. Two units in Molecular and Cellular Biology and in Genetics: BY131 + either BY231 or BY280
IV. Three units in Chemistry: CH107 + CH108 + CH250
V. Two units in Mathematics: MA125-6 or MA126 or MA127 or MA129 + BY220 or BY256/MA256 or MA117 or MA217
VI. Five approved Biology Electives
   a. Three must be Biology (BY) courses at the 300 level or higher
   b. One unit of elective credit may be CH251, CH382, BY205, BY300, SC120, SC204, SC207, EV260, AN306, AN308 (both AN306 and AN308 may count as upper level electives)
   **Please note that only 1 course outside the Biology Department may be counted as an elective towards the major!
   c. One unit must be an approved senior capstone course (see “Senior Capstone” section for list)
   d. Any BY course except BY100 and BY104 may count as an elective
   e. BY101 (FYE) counts as one unit of lower-level elective
   f. AP/IB credit may count as one unit of lower level elective (ask your advisor)
   g. It is possible to petition the department to ask for other courses to count as electives

VII. Senior capstone experience

The Molecular and Cellular Biology track

I. One unit in Introductory Organismal Biology among: BY105, BY106, BY107
II. BY131 Introduction to Molecular and Cellular Biology
III. BY231 Genetics
IV. Four units in Chemistry: CH107 + CH108 + CH250 + CH251
V. Two of the following Mathematics courses: MA117, MA126, MA127, MA129, MA217, BY220, BY256/MA256, EV228
VI. Six approved Biology Electives
   a. Three must be Biology (BY) courses with BY231 (or BY361) as a pre-requisite. BY309, BY409, or BY499 may count toward this requirement provided that you completed BY231 prior to the independent study and the supervising professor agrees
   b. One unit of elective credit may be CH241 or CH382
   c. One unit of elective credit may be PY297, or SC120, or SC204, or SC207
   d. One unit must be an approved senior capstone course
   e. Any BY course except BY100 and BY104 may count as an elective
   f. BY101 (FYE) counts as one unit of lower-level elective
   g. BY220 counts as EITHER an elective or a unit of math. BY256/MA256 counts as EITHER an elective or a unit of math. Neither course can itself satisfy BOTH a unit of biology elective credit and a unit of math
   h. It is possible to petition the department to ask for other courses to count as electives

VII. Senior capstone experience
ADVICE FOR PASSING THE SENIOR EXAMINATION

During your last two semesters, you must pass a senior examination. You can satisfy this requirement by passing either the ETS Major Field Test in Biology or the Biology GRE. Most students choose to attempt to pass the ETS Major Field Test in Biology, so this appendix contains advice for doing well on that exam. Many of our students find the ETS Biology exam challenging, and 20–25% of past students have failed the exam at least once. We faculty would very much like each and every one of you seniors to pass the exam, so please take this advice to heart.

The ETS Major Field Test in Biology is a two-hour test with four subcategories: cell biology, molecular biology & genetics, organismal biology, and population biology, evolution, & ecology. To pass the exam, you must earn at least the 65th percentile in at least two of the four subcategories, or a 60th percentile as your average for all four subcategories. If you do not receive a passing score in Block 3, you must re-take the exam in Block 6. If you fail the exam in Block 6, you must pass an onerous two-hour oral exam, administered by two Biology faculty, during Blocks 7 or 8.

The exam is multiple choice. Because we don’t often use multiple choice testing in our Biology courses, you may need to practice taking multiple choice tests. Look at the ETS as an opportunity to practice for other graduate exams, such as the MCAT or GRE. While a whole booklet of old ETS biology exams is not available, you could get some great practice by working with “Cracking the GRE Biology Subject Test” or “Kaplan GRE Biology illustrated guide.” You could also go to the following web sites to read a description of the test and get some practice questions:

http://www.ets.org/mft/about/content/biology


If you cannot score above the “passing” 65th percentile on two of subcategories, it is unlikely that you will somehow pass the exam by scoring above the 60th percentile when all four subcategories are averaged. So my advice would be to play to your strengths and review the course material relevant for the two subsections that you know the best, probably because you took several courses in those areas and did well in the relevant introductory level (100- or 200-level) courses. Here is a list of the subcategory, with corresponding courses that would help you prepare for that subcategory of the exam.

- Cell Biology: Introduction to molecular & cellular biology (131); Biology of microbes (107); FYE Biology of microbes (101); Bacterial genetics & physiology (359); Virology (363); Advanced cell biology (380); Stem cell biology (440); Cell signaling (440); Developmental Biology (466); Biochemistry (CH382); Seminar in bacterial pathogenesis (463); any other occasional electives focused on cells. Most of the exam questions are about eukaryotic cells.
- Organismal Biology: Biology of plants (105); Biology of animals (106); Field botany (202); Human evolution (205); Human anatomy (207); Human physiology (321); Parasitic helminthes (331); Plant physiology (365); Comparative animal physiology (366); Ornithology (410), Entomology (412). Biology of microbes (107 or 101) and Parasitology (330) might also be helpful but the exam questions are mostly about animal and plant biology.
- Genetics & Molecular Biology: Introduction to molecular and cellular biology (131), Genetics (231), Population genetics (280), Advanced genetic analysis (350); Bacterial genetics & physiology (359), Virology (363); Laboratory investigation in molecular microbiology (378), Stem Cell Biology (440), Cell signaling (440), Seminar in molecular biology (450), Seminar in bacterial pathogenesis (463), Developmental biology (466), Techniques in molecular ecology & systematics (475).
- Population biology, Evolution, & Ecology: Biology of plants (105); Biology of animals (106); Field botany (202); Human evolution (205); Ecology (208); Population genetics (280); Plant physiology (365); Comparative animal physiology (366); Advanced ecology (308); Animal behavior (332); Plant ecology (362); Animal ecology (367); Tropical forest and coral reef ecology (370), Ecology and biogeography of Patagonia (390); Ornithology (410); Entomology (412); Conservation biology (421); Techniques in molecular ecology & systematics (475). Most of the exam questions are about animals and plants (rather than microbes).
- Note that analytical skills are an important component of the exam, integrated throughout the four subject areas outlined above. Biostatistics (220), mathematical modeling in biology (256), and all coursework that emphasized experimental design and analysis, or required analysis of primary literature, would be useful in preparing for this part of the exam.

You should spend part of your summer and Blocks 1 and 2 of your senior year reviewing your notes, exams, and other materials from the relevant courses, and taking practice Biology GRE exams. Ideally, you should form a study group that meets regularly. You really need to avoid blowing this test off, which is why juniors have been included in this e-mail. Plan ahead. The oral exam for people who fail the ETS is rigorous, covers every course you took to complete the Biology major, and takes a lot more time and effort to prepare for than the ETS exam.
You might want to know why we require you to take the test. We require it because it is an objective test of your knowledge and it allows us to compare our graduates to graduates from many other institutions. Even though the Block Plan has been around for so long, we still encounter skeptics who think that “you can’t learn biology in 3.5 weeks.” Your average and individual scores on the ETS give us the data we need to respond to this criticism: we can show by direct comparison that our students do just as well as students on a variety of other calendars (semesters or trimesters, for example). Your degree from Colorado College means more because we can demonstrate our students’ knowledge of biology in this objective way. We also use your scores on the exam to critique our teaching and our curriculum, to try to improve them. For example, if students often score poorly on a specific subcategory, we faculty try to figure out how we could strengthen courses in that area. We really appreciate that you put your full effort into the exam, so that we can get an accurate picture of what our curriculum does well, and where we could do better. Finally, remember that we take the exam results into account when making competitive departmental awards that look great on your resume, when selecting paraprofessionals, learning assistants, and tutors for the following year, and when writing letters of recommendation, so it is worth the effort to earn an “Outstanding” (85th percentile in at least two sub-categories).

Please contact the OBE Office or the paraprofessionals to learn how to register for the ETS exam in Block 3, and to learn the exact date and time of the exam.