University of Guelph
College of Biological Science
Department of Integrative Biology
COURSE OUTLINE
Research Thesis in Integrative Biology
IBIO*4521, IBIO*4522
Fall 2014, Winter 2015

Course description

This course is a two semester (F,W) undergraduate Thesis project in which students conduct a comprehensive, independent research project in organismal biology under the supervision of a faculty member in the Department of Integrative Biology. The thesis can be practical or theoretical in nature. This two semester course is intended to provide a deeper, more focused research experience than that provided in the project courses or in typical upper-level lecture courses. It is offered for students of excellent academic standing and who possess a strong interest in pursuing postgraduate work in biological research. Projects must be planned in advance and involve a thorough literature review, a research proposal, original research of publication quality and a written Thesis, which is assessed through an oral presentation and defence.

Credit: 1 + 1

Restrictions: Enrollment is open to students in semesters 7 and 8 who have successfully completed a minimum of twelve (12) science credits. A **minimum cumulative average of 75% in biology courses** (all relevant course codes) taken during the first 6 semesters of a major in the College of Biological Science is normally required. Limitations of departmental resources may restrict entry into this course.

Students must make arrangements with both a faculty supervisor and the course coordinator at least one semester in advance. A departmental registration form must be obtained from the course coordinator and submitted no later than the second class day of the semester in which the project is to be initiated. This is a two semester course offered over consecutive semesters F-W. When you select this course, you must select IBIO*4521 in the Fall semester and IBIO*4522 in the Winter semester. A grade will not be assigned to IBIO*4521 until IBIO*4522 has been completed.

The project advisor must be a faculty member in the Department of Integrative Biology. The second reader must also be a faculty member at the University of Guelph, but may be from another department. Faculty who will be on leave during either semester may not serve as advisors or second readers.

Teaching team

Dr. Todd Gillis, ext. 58786, tgillis@uoguelph.ca
Office: SCIE3471, Science Complex
Office Hours: tba

Course schedule

Scheduled class/event	Date and time	
1.	Tuesday September 9, 2014 7:00 p.m. – 10:00 p.m. SCIE 3317	Introduction and background
2.	Tuesday September 16, 2014 7:00 p.m. – 10:00 p.m. SCIE 3317	Oral presentation of research; One-page research summary due
3.	Tuesday October 7, 2014	Research proposal, Completed forms for safety orientation and field work due
4.	Tuesday January 13, 2015 7:00 p.m. – 10:00 p.m. SCIE 3317	Oral presentation of progress report
5.	Tuesday January 13, 2015	Written progress report
6.	Thursday March 26, 2015	Written thesis
7.	TBD	Final oral presentation to the class
8.	TBD: Monday April 6-Friday April 17, 2015. 9:00 a.m. – 3:00 p.m. (finals period) SCIE 2486	Final oral presentation and defense

Learning Outcomes and rationale

At the end of this course, the successful student will be able to work independently and efficiently under the guidance of a faculty member to achieve the following learning outcomes:

1. Design a self-guided research question and project at the level expected for a fourth-year independent research project within the constraints imposed by the course (two semesters, 2 credits, available resources etc.).
2. Apply the scientific method to current problems in comparative animal physiology, ecology and evolutionary biology.
3. Evaluate scientific evidence and demonstrate the use of logic, in the evaluation of the literature, including information on multiple perspectives, and statistical techniques used to analyze data.
4. Construct and efficiently conduct an experimental design by actively employing sampling techniques (empirical or theoretical) necessary to obtain unbiased and sufficient data.
5. Produce a research proposal, research thesis and oral presentation and defense of your research that convincingly communicates your research to an audience with a general biology background and experts.

Course Resources

Text book: There is no required textbook for this course. A recommended book that might be useful is:

Lee, J.A. 2000. The Scientific Endeavor. A Primer on Scientific Principles and Practice. Addison Wesley Longman Inc, San Francisco.

D2L course site: Materials relevant to the course including grading rubrics will be posted on the D2L course site. In addition, research proposals and powerpoint files for oral presentations will be submitted via the D2L dropbox. The final research paper will be submitted by email to the course coordinator, advisor and second reader. Details will be provided as the deadlines approach.

Course Content

There are no traditional lectures or labs for this course. Because it is a 2 credit course, students should expect to invest 20 hours per week over the two semesters in their research project.

Methods of Assessment

Form of Assessment	Weight of Assessment	Due Date of Assessment	Learning Outcome Addressed
Written research proposal, evaluated by Course Coordinator[1]	10%	October 7th, 11 p.m. (dropbox)	1-5
Oral progress report, evaluated by Course Coordinator	10%	Slides due: January 13th, 3:00 p.m. (dropbox) Talks: SCIE 3317 7:00 p.m. – 10:00 p.m.	1-5
Written progress report, evaluate by thesis committee	10%	January 13th, 11 p.m. (email to committee and course coordinator)	1-5
Research Effort semester 1, evaluated by advisor	10%	January 13th (advisor to submit mark to coordinator)	
Written thesis, evaluated by thesis committee[2]	30%	March 26th, 11 p.m. (email to committee and course coordinator)	
Final oral presentation, evaluated by examination committee	10%	TBD: Final exam period	1-5
Final oral defense, evaluated by examination committee	10%	TBD: Final exam period	1-5
Research effort semester 2, evaluated by Advisor[3]	10%	Grades due to course coordinator, March 26th	1-4

[1]Research proposals for students enrolled in IBIO*4521 in the Fall semester will be considered for one of the Bryant Family Research Scholarships.
http://www.uoguelph.ca/registrar/studentfinance/index.cfm?app=awards&page=index&id=I0537

[2]The grade for the research thesis will be an average of the grades submitted by the advisor and the second reader. The report is to be submitted in the form of a publication-ready manuscript. The specific journal and style is to be agreed upon by the student and advisor at the beginning of the course and recorded on the Project Approval form.

[3]The requirements and the breakdown for this portion of the mark are to be agreed upon by the student and advisor, and recorded on the Project Approval form.

Important Dates

First class: introduction	September 9th
Second Class: proposal presentation[1], Project Approval Form, One-page research summary due	September 16th
Research proposal due[2], Completed forms for safety and field work due	October 7th
40th class day	October 31st
Oral research progress report	January 13th
Written progress report	January 13th
Research thesis	March 26th
Final oral presentation and defense	TBD: final examination period

[1]Students who fail to give an oral proposal presentation will be penalized 25% of the total marks for Research Effort, semester 1 unless Academic Consideration for illness or other compassionate grounds has been approved by the course coordinator.

[2]Research proposals for students enrolled in IBIO*4500 in both the Fall and Winter semesters will be considered for one of the Bryant Family Research Scholarship. The second award will be for the best research proposal for students enrolled in IBIO*4520 during the Fall semester.
http://www.uoguelph.ca/registrar/studentfinance/index.cfm?app=awards&page=index&id=I0537

Course and University Policies

Responsibilities
It is the responsibility of the student to:

- find a thesis supervisor and a committee member. Prospective students are encouraged to gauge their areas of research interest, survey the departmental web site highlighting the research interests of faculty, and approach faculty possessing similar interests. A committee member can be selected in consultation with the advisor but must be a faculty member at the University of Guelph.

- familiarize themselves and their advisor with the procedures and the roles and responsibilities of the course. The student should consult with their advisor and the course coordinator on all aspects of the course, including the guidelines and requirements for the research proposal, the first semester oral and written progress reports, and the written thesis and oral defense. Each student is strongly encouraged to meet with their advisor before or at the beginning of the course to review the procedures and the roles and responsibilities, and to discuss expectations in light of the evaluation components of the course. If conflicts arise between the student and the advisor, the student has the responsibility and right to ask the course coordinator to intervene.

- keep their committee and the course coordinator informed of their progress during the semester. The student is expected to (i) monitor their day-to-day research progress, (ii) keep their committee and the course coordinator aware of any concerns that are important to the success of the proposed research, and (iii) rely on their committee for guidance on how to troubleshoot any challenges that may arise during the research.

It is the responsibility of the advisor to:

- ensure the student is clear about what is expected from them on a week-to-week basis over the duration of the project, and ensure that their expectations are consistent with the contents of the course description. To be eligible to take on a project student, advisors cannot be away from campus for an extended period of time (e.g. on research/study or parental leave). A minimum of 30 minutes of face to face contact time per week, on average, is recommended. It is the advisor's role to offer advice and support to the student as challenges arise with the project, and to communicate and reinforce their expectations regarding the conduct of the student in the lab or field. As appropriate to the discipline and research project, the advisor will provide protocols used to track research progress, set up experiments, and collect, enter, validate, and analyze data.

- ensure the student is supported adequately and appropriately to complete their research successfully. Depending on the project, this preparation could include (i) providing specialized training (e.g. electrofishing), (ii) ensuring access to key rooms, equipment, literature, or data, and (iii) overseeing the acquisition of approval from the Animal Care or Research Ethics Committees.

- ensure the student is working safely in the lab or field. Project students are required to take the three CBS safety training modules. In addition, advisors are required to review the Safety Orientation Checklist with the student. Students working in the field must also submit the Field Research Safety Plan and the Field Trip Waiver and Contact List forms.

- ensure the student appropriately balances their time between planning, data collection, and write-up. Laboratory work and data collection should cease by mid-March to provide students adequate time to analyze their data, write an initial draft, solicit feedback from the thesis committee, and revise the thesis prior to submission.

It is the responsibility of the advisory committee to:

- meet as needed with the student to offer feedback, advice, encouragement and criticism as appropriate. This includes both preparation for and attendance at meetings to be held at the beginning and mid-point of the course series, additional meetings requested within reason by the student and the oral presentation and defense.

It is the responsibility of the course coordinator to:

- ensure students are familiar with the organization of the course. This includes organizing initial classes to review the course's organization, evaluation requirements and methods of assessment, key forms, and the schedule of important dates. It will also include scheduling of the mini-symposium of class presentations.

- ensure students have a secondary source of advice and guidance. This can include advising the class on how to communicate effectively with their committees, or providing individual counseling in the event of problems that cannot be solved between a student and their advisor.

- ensure students are assessed with similar rigor across undergraduate advisory committees. The course coordinator will act as a contact for the advisors regarding course requirements and evaluation, and will act as the Chair of the oral defense.

Lab and Field Safety

It is the student's responsibility to ensure that they participate in safety training and obtain safety instruction as required by the faculty advisor and as appropriate to the techniques and equipment to which they will be exposed (e.g., radiation safety, biosafety, first aid/CPR, autoclaves, centrifuges, electrophoresis, etc). Students conducting work in the laboratory or field must demonstrate that they have completed the online modules for CBS Health and Safety Training. Students will be contacted by email early in the semester and instructions on what to do will be provided at that time. Please note that the 3 online modules must be completed within 1 week of receiving the email message. This is a requirement of the course.

Advisors are required to provide a work-place specific Safety Orientation with project students and record it on the appropriate form. In addition, students whose research will be conducted under field conditions must, with the assistance of the faculty advisor who will sign it, fill out the Field Research Safety Plan and the Field Trip Waiver and Contact List. Forms are due to the course coordinator at the second class meeting.

Students whose research involves live, non-human vertebrates must comply with the Animals for Research Act of Ontario and University Animal Care Policies. Before proceeding with such research, permission must be obtained from the University Animal Care Committee by completing and returning the Animal Utilization Protocol form available from the Department of Integrative Biology office. Students whose research involves human subjects must consult the Research Ethics website at http://www.uoguelph.ca/research/humanParticipants/index.shtml and fill out an application form available at http://www.uoguelph.ca/research/forms/index.shtml.

Missed Course Requirements and Grading

Students who are unable to meet a course deadline for a graded component because of illness or compassionate reasons must request Academic Consideration as soon as possible by advising the course coordinator in writing, with their name, id#, and email contact. If approved, alternate deadlines will be arranged.

Deadlines for submission of written assignments that are evaluated by the advisor and second reader **cannot be altered by the committee**. Written assignments that are submitted after the deadlines indicated in the Evaluation Table **will not be accepted** unless Academic Consideration for illness or other compassionate grounds has been approved by the course coordinator.

Students who fail to give an oral presentation during week 2 of the semester will be penalized 25% of the total marks for Research Effort unless Academic Consideration for illness or other compassionate grounds has been approved by the course coordinator.

See the undergraduate calendar for further information on regulations and procedures for Academic Consideration: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email <csd@uoguelph.ca> or see the website: http://www.uoguelph.ca/csd

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who have any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Email Communication

As per university regulations, all students are required to check their <uoguelph.ca> email account regularly. Email is the official route of communication between the University and its students.

Drop Date

The last date to drop one-semester courses, without academic penalty, for Fall 2014 is October 31, 2014. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Copies of out-of-class Assignments
Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Recording of Materials
Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Academic Calendar
The calendar is the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: http://www.uoguelph.ca/registrar/calendars/index.cfm?index

Campus Resources

The Academic Calendar is the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: http://www.uoguelph.ca/registrar/calendars/index.cfm?index

If you are concerned about any aspect of your academic program:

- make an appointment with a program counsellor in your degree program. http://www.bsc.uoguelph.ca/index.shtml or https://www.uoguelph.ca/uaic/programcounsellors

If you are struggling to succeed academically:

- There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. http://www.learningcommons.uoguelph.ca/

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. https://www.uoguelph.ca/counselling/
- Student Health Services is located on campus and is available to provide medical attention. https://www.uoguelph.ca/studenthealthservices/clinic
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. http://www.uoguelph.ca/~ksomers/

If you have a documented disability or think you may have a disability:

- The Centre for Students with Disabilities (CSD) can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability. For more information, including how to register with the centre please see: https://www.uoguelph.ca/csd/