

# Guidelines for B.Sc. Thesis Research Courses (BIOL 498 and BIOL 499) in Biology

The goal of the Thesis Research Courses is to provide students with experience conducting independent research. At the end of the two thesis research courses the student will have written and defended a research-based thesis. These courses allow you to earn credit for research-based work. You can apply the knowledge you've previously learnt in other courses and discover if further studies or a career in research is for you. There are many perks to working in a lab during your undergraduate program: Excitement of making new discoveries; working in an environment that promotes independence; pursue work that is of personal interest; enjoyment of working in an intellectually stimulating and dynamic environment. Successful completion of Thesis Research courses gives students a competitive advantage for future employment and entrance into graduate school and professional programs. The two Thesis Research courses are a requirement for the completion of a B.Sc. Honours Degree (See guidelines for Honours Degree), however, neither entrance into the Honours Program nor completion of the Honours Degree are requirements for admission into the Thesis Research Courses.

## 1) Entrance into the Thesis Research Courses

Admission into Thesis Research Courses begins with the student finding a research supervisor from among the faculty members of the Biology Department (or Associate members of the Department) who will supervise their thesis research. Once a thesis supervisor has been identified application for admission into Thesis Research courses is must be made in writing to the Department Head by completing a Registration Permit/Override Form (available from the Faculty of Science Student Center) and the Honours Program Application Form available on the Department of Biology website ([https://www.uregina.ca/science/biology/assets/docs/pdf/HonoursApplicationForm\\_2016\\_05\\_02.pdf](https://www.uregina.ca/science/biology/assets/docs/pdf/HonoursApplicationForm_2016_05_02.pdf)). The later is only required should the student also wish to enrol in the Honours Program. Applications should be completed one month before the start of the term in which the student wants enroll in Biol498.

## 2) Thesis Research Supervisory Committee

Each Thesis Research student will have a Thesis Supervisory Committee consisting of three individuals: a supervisor, a committee member who is accredited by the Faculty of Graduate Studies and Research and the Honours Coordinator. The purpose of the Committee is to approve the research proposal, guide the research, and act as the examining committee.

## 3) Thesis Research Proposal

The Thesis Research student will submit a research proposal and participate in a discussion on the proposal with their Thesis Supervisory Committee. The proposal will clearly indicate the working hypothesis (or hypotheses), the experimental design and methodology, and, if applicable, the manner of statistical analyses. The proposal will be in a 12-point font, double-spaced, and will have a length of *approximately 5 pages* (excluding references etc.). The completed proposal is due 4 weeks after the start of the semester in

which the student is registered in BIOL 498, with the proposal meeting to occur within the 2-3 weeks that follow. The proposal meeting may involve the student providing a brief oral presentation (5-10 minutes) of the proposed research followed by an informal discussion and question period with the Thesis Supervisory committee. Importantly, there is no grade assigned to the Research Proposal or Meeting; it is an opportunity for a Student to meet their Supervisory committee, and obtain experience presenting and discussing their research and to obtain feeding back on their research. The proposal meeting is typically 45-60 min in duration.

#### **4) Thesis Document**

In the second semester of the Thesis Research (BIOL 499) students will complete their research and write their thesis. The thesis should be formatted similar to that of M.Sc. or Ph.D. theses. See the web- site of the Faculty of Graduate and Research for thesis format details (<https://www.uregina.ca/gradstudies/thesis-defense/thesis/thesis-procedures/guide-thesis-preparation.html>). Copies of Undergraduate Theses from previous years are available in the Biology Office for viewing and can be used as guides for length, structure and formatting. Figures and tables should have appropriate legends and titles and be inserted immediately after the location in which they are first mentioned in the text. The Literature Cited section should be modelled on the format of a reputable journal in the sub-discipline.

The deadline for the submission of the final thesis to the entire thesis committee is the last day classes of the term the student is enrolled in BIOL 499. A draft of the thesis must be submitted to the Thesis Supervisor and Honours Coordinator 14 days prior to the last day of classes.

#### **5) Thesis Examination**

There will be an oral examination of the Thesis Research Student on their written thesis and research project by the supervisory committee. The student will provide the committee with their completed thesis on the final day of classes, with the oral examination to normally take place in the final examination period. A thesis can be submitted and defended earlier than these dates if so desired.

The oral examination will begin with a brief (10 - 15 minutes) presentation by the student summarizing the research, followed by questions by the supervisory committee. Defenses typically are 1.5 hours in duration. Typically, there will be minor revisions to the thesis as a result of the defense; thus there is no need to have the thesis bound at this point

#### **6) Submission of Final Copy**

Two final copies of the thesis (incorporating the minor revisions resulting from the defense) will be submitted to the Department of Biology (one copy for the Department, and one copy for the supervisor). The final copies should be bound in an inexpensive softcover format (e.g., "Cerlox"). Binding (and duplicating) may be done at Printing Services at the University, or off-campus. The student should also retain a copy of the final version of the thesis. Final copies will be submitted in the semester in which the student has registered for BIOL 499.

#### **7) Credits/Grading**

Six credits are allocated to the research and the thesis. Students will enroll in BIOL 498 (Thesis Research I) and BIOL 499 (Thesis Research II). The grade for the courses will be determined by the Supervisory Committee, based upon the quality of the written thesis, oral presentation, and performance during oral defense, and the student's engagement in the scientific process. It is important to note actual science is often full of pitfalls and a good grade is not dependent upon the generation of positive data. The quality of the written thesis has the greatest impact on the student's grades. Students will be assigned the same grade for both BIOL 498 and 499. A grade of "incomplete" will initially be assigned for BIOL 498 until completion of BIOL 499 and the final grade is assigned to both courses.

## 8) Off-Campus Honours Research

All students who intend to carry out their research off-campus under the supervision of an external (to the UofR) scientist will establish an Honours Research Supervisory Committee, consisting of the external supervisor, departmental co-supervisor, departmental faculty member and Honors Coordinator. The second faculty member will have direct contact with the scientist who supervised the research, and will help supervise the writing of the thesis.

## 9) Schedule and Time-lines

The following tables includes firm due dates and general guidelines for the nature and scheduling of work to be undertaken by student assuming BIOL 498 and BIOL 499 are taken in consecutive terms.

**Table 1. Deadlines for Biology Thesis Research Courses**

<b>THESIS RESEARCH I – BIOL498: Fall 2017 example</b>	
<b>Data</b>	<b>Product or Activity</b>
First week of classes	<ul style="list-style-type: none"> <li>Meet with Honours Coordinator</li> <li>Establish Supervisory Committee</li> </ul>
<b>October 4, 2017</b> (4 weeks after 1 <sup>st</sup> day of classes)	<ul style="list-style-type: none"> <li>Submission of the completed research proposal to supervisory committee</li> </ul>
<b>October 11 – 25</b> (Week 5 - 7)	<ul style="list-style-type: none"> <li><b>Proposal meeting</b></li> </ul>
<b>THESIS RESEARCH II – BIOL499: Winter 2018 example</b>	
<b>Date</b>	<b>Activity</b>
<b>March 30, 2018</b> Two weeks before final day of classes	Submit completed thesis draft to Supervisor and Honours Coordinator
<b>April 13, 2018</b> Last Day of Classes	Submit final thesis document to Thesis Supervisory Committee
<b>April 17 – 30, 2018</b> Final exam period	Thesis defense

**Table 2: Schedule and timelines for progression through Biology Thesis Research courses.**

<b>THESIS RESEARCH I – BIOL498: Fall term example</b>	
<b>Date</b>	<b>Activity</b>
First week of classes	<ul style="list-style-type: none"> <li>• Meet with Honours Coordinator</li> </ul>
First 4 weeks	<ul style="list-style-type: none"> <li>• Establish thesis supervisory committee</li> <li>• Review of pertinent literature, establishment of purpose of thesis and methods to be employed.</li> <li>• Writing of the research proposal.</li> <li>• <b>Submission of the completed research proposal 4 weeks after the first day of classes for Fall or Winter terms (2 weeks for Spring or Summer terms)</b></li> </ul>
Week 5	<ul style="list-style-type: none"> <li>• Schedule proposal meeting</li> </ul>
Week 6 or 7	<ul style="list-style-type: none"> <li>• <b>Proposal meeting</b></li> </ul>
Remainder of first term	<ul style="list-style-type: none"> <li>• Conduct research</li> <li>• Continue reading pertinent literature</li> <li>• Commence writing (e.g. Introduction, methods etc..)</li> <li>• Analyze data and prepare figures and tables as the data are generated</li> </ul>
<b>THESIS RESEARCH II – BIOL499: Winter term example</b>	
<b>Date</b>	<b>Activity</b>
First 4 – 6 weeks (Jan. to mid-Feb.)	<ul style="list-style-type: none"> <li>• Continuation of research and data collection               <ul style="list-style-type: none"> <li>◦ Research and data collection should be completed by mid-February</li> </ul> </li> <li>• Commence data analyses, and figure and table generation</li> <li>• Writing of the materials and methods</li> </ul>
Weeks 7- 8 (Mid-Feb. to Mar.)	<ul style="list-style-type: none"> <li>• Completion of data analyses</li> <li>• Writing of the thesis results section</li> </ul>
Weeks 9 -10	<ul style="list-style-type: none"> <li>• Writing of the thesis discussion</li> <li>• Finalizing the thesis package               <ul style="list-style-type: none"> <li>◦ The small details associated with preparation of the final thesis document always take much longer than students anticipate</li> </ul> </li> </ul>
Two weeks before final day of classes	<ul style="list-style-type: none"> <li>• <b>Submit completed thesis draft to Supervisor and Honours Coordinator</b></li> </ul>
Last day of classes	<ul style="list-style-type: none"> <li>• <b>Submit final thesis document to Thesis Supervisory Committee</b></li> </ul>
Final exam Period	<ul style="list-style-type: none"> <li>• <b>Thesis defense</b></li> </ul>

## 10) Overview of Evaluation

After the defense, the supervisory committee will discuss the final mark and student will be provided with a grade range. The final grade will be assigned for BIOL 498 and BIOL 499 by the Honours Coordinator after all students have completed their oral defense in order to ensure consistent and uniform evaluation of students within a given year and across years.

The grades for BIOL 498 and BIOL 499 are an overall aggregate of their performance in the following 3 areas. Although a specific rubric or weighting is not employed in assigning the final grade, the quality written thesis has the greatest impact on a student's final grade.

- a) The written thesis.
- b) The defense, including both the oral presentation and examination.
- c) The initiative, degree of independence and enthusiasm displayed by the student in executing his/her thesis project.

**Table 3:** Suggested guidelines for assigning grades in BIOL 498/499. Categories are not given specific weighting nor are always mutually exclusive. For instance, assessment in one category may be derived by considering multiple categories (i.e. research potential and research initiative):

	<b>Outstanding &gt;90%</b>	<b>Very good 85-89%</b>	<b>Good 80-84%</b>	<b>Acceptable 70-79%</b>	<b>Unsatisfactory 40- 70%</b>
<b>Defense:</b>	<b>Excellent defense:</b> The student demonstrates a thorough understanding of the research and beyond	<b>Very good defense:</b> The student demonstrates very good knowledge of topic, with only minor gaps in knowledge.	<b>Satisfactory defense:</b> The student demonstrates good knowledge of research topic, with certain misconceptions.	<b>Acceptable:</b> The student exhibits basic knowledge. Several serious deficiencies "in advanced understanding" are evident.	The student failed to provide sufficient evidence he/she had a basic understanding of the material.
<b>Writing and organization:</b>	Very well organized and superbly written document. The research is placed in the greater context of the literature which is well-synthesized throughout. No, or only very minor, revisions are required. This document approaches the quality of research manuscript or graduate thesis	Well-written, well-organized document. Only, minor revisions required mostly with respect to presentation and not content.	Good but some sentences, ideas, concepts are not clear. Some deficiencies in content and literature interpretation.	A good portion of the text could use substantial revision. The document suffers from organizational and content issues.	Serious deficiencies in content, organization, preparation of graphs and tables are evident throughout the document. The text provides little indication of the students understanding of the material but rather is a grocery list of paraphrased facts from other sources.
<b>Research initiative:</b>	<b>Exemplary:</b> The student went beyond the mandate: worked both independently and creatively.	<b>Very good (above average):</b> The student performed very well, showing reasonable independence and creativity.	<b>Good (satisfactory):</b> The student performed at a satisfactory level, but with more limited independence and creativity.	<b>Limited but acceptable:</b> The student was able to perform only basic research, showed little independence and creativity.	The student required constant supervision, showed no independence and/or did not put in an appropriate amount of time and effort.
<b>Future research potential:</b>	The student is ready to start an independent research project with minimal supervision.	The student could start independent research with some supervision.	The student is capable of research under close supervision.	The student would require considerable support from their supervisor to conduct research.	Although the student has many talents at this time they are not suited for research.