**Research Project Courses**

**Syllabus and General Guidelines for Research Project Courses**

Prerequisite: Permission of the Department and Supervisor. See the current BioSci webpage for more details on each course and its requirements.

Course Objects:

Students will:

* Be introduced to various techniques used in research.
* Gain an understanding of designing and conducting experiments to test hypotheses.
* Evaluate data with regard to the hypothesis tested.
* Record and report their work and compare it with the literature on the topic.
* Present their work to their instructors and peers.

General Overview:

There are a series of courses offered by the Department of Biological Sciences where students gain direct research experience. These projects vary in their content and correspond to the diversity of research in the Department of Biological Sciences. Selected students will conduct biological research, including data collection, interpretation, and analysis. Students are expected to spend as much time on their project course as is required for a typical biology course with a lecture and a lab (at least 6 classroom hours per week).

BIOL 398 and 399 are designed for third year students who have completed at least one 200-level (3\*) biology course offered by the Department of Biological Sciences.

BIOL 498 and 499 are designed for fourth year students who have completed at least one 300-level (3\*) biology course offered by the Department of Biological Sciences.

BIOL 399 and 499 are two-term courses, for \*6, while BIOL 398 and 498 are one-term courses for \*3.

Enrolment in Research Project Courses:

Students wishing to register in Research Project Courses must make prior arrangements. **Registration Forms** are available at Student Services (CW 312 or CW 405), which must be submitted to Student Services before classes start. This form must include the project title (maximum length of 55 characters, including spaces), a brief description of the planned course of study, and supervisor’s signature (and co-supervisor’s if applicable).

Project Contract:

The student and supervisor must create a **Project Contract** that outlines the expectations for the Research Project (e.g., timeline, nature of laboratory work and written report) as well as the time commitment. The Project Contract will also be submitted to Student Services (CW 312 or CW 405) halfway through Fall or Winter Term.

Lab Work:

**Research/lab performance** will be assessed by the supervisor. The Project Contract should outline the amount of time and specific nature of the research work to be undertaken. Remember, these projects will vary widely in their content but each should correspond to the research of the supervisor. The research may range from conducting specific laboratory procedures, to the analysis of previously recorded data, to the organization of multiple techniques. The level of research expected will be appropriate for the year of the student and the area of study.

Safety:

Laboratory work involves certain risks outlined during the safety training (e.g., WHMIS). You must take care when working in the laboratory to obey all safety regulations and precautions. This includes wearing proper Personal Protective Equipment (PPE) as needed (e.g., wearing protective glasses when mixing hazardous solutions).

Deadlines:

Deadlines and assessment for these additional activities will be set by individual supervisors. The written report will be due on the date of the last scheduled final examination in the term in which the project is completed. Students must hand in a copy of a written report to the supervisor and an electronic version uploaded to eClass at the end of the term.

Timing of the Research Component:

Basic guidelines are as follows:

1. Work done and skills gained during the summer (or previous terms) may be used for a research project course, but
2. Significant work, beyond writing up, must be carried out during the term in which the student is officially enrolled in a research project course. All work completed outside the term in which a student is enrolled should be clearly identified and attributed in the written report.

Academic Recognition:

All data collected for or during the course is the property of the professor and must remain with their lab. A copy may be made for the student’s use. Students may be listed in the “Acknowledgements” section of publications (e.g., “the authors thank Student Name for assisting with histological procedures.”). Substantial contributions to research projects may lead to inclusion as an author, but more than laboratory bench work is required. This depends on making substantial intellectual contributions (e.g., ideas, study design, data analysis and interpretation, and writing). The decision on what level of recognition, if any, in publications will be made primarily by the supervisor.

Written Report:

A **written report** is required for successful completion of these courses. This is a FORMAL document and should use and follow the template given. It should include an abstract, table of contents, introduction, materials and methods, results and discussion sections, as well as an appendix. The exact nature and form will be decided in discussions between student and supervisor. In general, the format will follow that of a peer-reviewed journal article. Such papers include background introducing the study, results, supporting figures/tables/images, discussion and references. Typically the full report totals 20-50 pages. Students should discuss details of the report (e.g., formatting, relative length of the various sections of the report) with their supervisors. Students are responsible for following supervisor’s directions regarding the report in the same way that authors follow a journal’s editorial board’s directions. Depending on the supervisor, some of the weight of the report may be applied to referencing cited research, grammar, style, and clarity are also considered when grading written reports.

Guidelines on student conduct for lab and written work are subject to the Code of Student Behaviour. Students should be, or become, familiar with the CoSB and are especially encouraged to avoid intentional or unintentional plagiarism (e.g., copying sentences or even phrases without quotation marks and proper citation). Such violations lead to penalties that can include a grade of 0 in that assignment and possibly further disciplinary action as per University of Alberta policy.

All data collected as part of the Research Project Courses are the property of the supervisor (University of Alberta) and must remain with them as part of your laboratory work. You may make copies for yourself. Authorship and acknowledgements are possible with the research you undertake. Students may be listed in the “acknowledgements” section of publications (e.g., “The authors thank Student Name for assisting with procedures.”). More substantial contributions to research projects may lead to authorship, but simple laboratory bench work (e.g., crossing flies) won’t. Authorship requires making a major intellectual contribution (e.g., ideas, study design, data analysis and interpretation, and writing).

Oral Presentations (if appropriate):

These presentations usually are 12-15 minutes long, in front of a small group of other project students and their supervisors. Be sure to give a simple background as to WHY you are doing the project, WHAT your goals are and WHAT you have done so far. Note: very few students get as much accomplished as they think they will, so don’t worry if you don’t have lots of slides worth of data. You should concentrate on what you have LEARNED, not what you have FINISHED. Try to communicate to the others what you find most interesting about your project, and why.

Students are encouraged to present their research project and results in as many different forums as possible. Two particularly relevant meetings are the RE Peter Biology Conference (Department of Biological Sciences sponsored, typically in early March) and the Northwest Developmental Biology Conference (Society of Developmental Biology sponsored, in Friday Harbor WA USA, typically in late March). The lab will cover the cost of the posters, if you choose to present.

**Details of the Research/Lab Component:**

General Science:

* Learn and practice hypothesis driven science.
* Learn to design experiments based on that principle.
* Learn to evaluate data and reach conclusions based on that data.
* Learn to writing in a scientific manner.

Understand the background knowledge:

* EXAMPLE
* EXAMPLE
* EXAMPLE
* EXAMPLE
* EXAMPLE

Specific techniques to learn:

* EXAMPLE
* EXAMPLE
* EXAMPLE
* EXAMPLE
* EXAMPLE

**Details of the Written Component:**

Lab notebook:

* Keep a complete, detailed, comprehensible lab notebook.
* Find and complete notes.
* Summarize the results on a weekly basis and communicate with supervisor.

Term paper(s):

* Write a scientific paper in a manuscript-like format to summarize the research accomplished. This will include a title page, abstract, introduction, materials & methods, results, and discussion sections.

Record keeping:

* Hours each week.
* Weekly summary of crosses completed, those underway, and future scheduled work.
* Maintain an organized lab notebook.
* Turn over all notes, computer files, etc. for lab record keeping.

Assessment (Grading)

Students are expected to treat this course as equivalent to that with lectures and a lab (at least 6 classroom hours per week, plus homework/study). The final assessment process will be completed by the supervisor (and co-supervisor if appropriate). The final grade will be based on research/lab performance and a written report. The specific procedures used to determine the final grade in each of these two parts will vary with supervisor and should be described in the Project Contract. The supervisor, in consultation with other professors in the research area, will maintain appropriate grading standards. There will be a mid-term review at the end of Reading Week.

Grading Rubric for Research Project Courses:

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| --- | --- | --- | --- | --- |
| Grades: Areas: | Grade of "A" | Grade of "B" | Grade of "C" | Grade of "D" or "F" |
| Techniques Learned | All topics learned and proficient. | Most topics learned and most proficient. | Most topics learned and some only competent. | Few topics learned and none competent. |
| Background Understanding | All topics learned and very knowledgeable. | Most topics learned and somewhat knowledgeable. | Some topics learned. | Few topics learned and none knowledgeable. |
| Written Component | All notes (etc.) are complete, detailed, and comprehensible. Written introduction is thorough and excellent. | Most notes (etc.) are completed, detailed, and comprehensible. Written introduction and Discussion is broad and good. | Few notes (etc.) are complete, detailed, and comprehensible. Written Introduction and Discussion is completed. | Little notes and record keeping. Written introduction and Discussion is incomplete or missing. |
| Housekeeping Record | Records are complete, detailed, and organized. | Records are mostly complete, somewhat detailed and organized. | Records are incomplete, not detailed and/or not organized. | Little or no record keeping. |
| Independence | Works independently and informs supervisor of progress/problems. | Works somewhat independently and informs supervisor of progress/problems. | Rarely works independently and informs supervisor of progress/problems. | Requires constant supervision. |
| Scientific Value of research done | Data and finds are solid and reliable and probably suitable for publication. | Some data and findings are reliable. | Little/few data and findings are reliable. | No data or findings are reliable. |