CELL BIOLOGY 398/498

Cell Biology Undergraduate Research Project Registration

YOU ARE RESPONSIBLE FOR MEETING THE DEADLINES AND COMMUNICATING WITH THE CELL BIOLOGY UNDERGRADUATE COORDINATOR, AS INDICATED.

Cell 398/498 final reports without presentations are due one day following the last scheduled examination of term enrolled.

PART I (of III)

CELL 398 (*3) ☐ **Fall or** ☐ **Winter or** ☐ **Sp/Su**
CELL 498 (*3) ☐ **Fall or** ☐ **Winter or** ☐ **Sp/Su**

Complete Part 1 and submit a copy to the Cell Biology Course Coordinator or Student Program Advisor by the end of the second week of the semester.

Student's Name: _____ SID#: _____ e-mail:_____

Date signed: _____

Project Title: *(needs to be 55 characters or less including spaces so that it fits the transcript)*

Supervisor's Name (print): _____

Supervisor's Department (if not Cell Biology): _____

Building and Room #: _____

Supervisor's signature: _____ Date: _____

Co-supervisor (if necessary): _____

Relevant courses and experience: _____

Note: *Projects can be undertaken outside the Department of Cell Biology but require Co-supervision by the Cell Biology Course Coordinator.*

Provide a brief description of the project to be undertaken on a separate page.

CELL BIOLOGY 398/498

General Guidelines

Students wishing to register in CELL 398/498 must make arrangements with a faculty member in the Department of Cell Biology who is willing to supervise the program. A co-supervisor is required for projects carried out in labs outside of Cell Biology. This is typically the course coordinator. To proceed with your registration, a complete project registration form must be handed into the Student Services Office (MSB 5-16). This form must include the project title, a brief description of the project, and supervisor/co-supervisor signature(s). To finalize your registration, complete an Add/Drop form available from the Student Program Advisor (MSB 5-16). CELL 398/498 projects vary in the same way that research varies across a department as diverse as ours. Therefore, these guidelines allow for flexibility and we must rely on experts in the various research areas to maintain standards appropriate to those areas.

Procedures

By end of second week of September (or January for Winter 398/498):
Students must have their Supervisor and Co-supervisor selected. These names and the project title should be communicated to the Student Services Office (MSB 5-16) using a copy of Part I of the CELL 398/498 form. [Note: the original form should remain with the student so that subsequent deadlines can be noted as they are met]. The form will be kept on file with the Student Program Advisor.

By end of third week of September (or January for Winter 398/498):
Students must submit the Cell 398/498 Project Worksheet to the Course Coordinator. This will be graded and an opportunity for revision provided (Part II of Cell 398/498 form). Revised worksheet is due at the end of the sixth week of term.

By end of term exam period (December or April):
Students must submit the final written report to their Supervisor and Co-supervisor. A copy of the final report is also required by the Student Services Office (submit to MSB 5-16). Students must have Part III of the CELL 398/498/499 form signed and dated by their Supervisor

Final Grades must be submitted by Supervisors by May 2.
Early May: A final grade for CELL 398/498 must be submitted to the Department of Cell Biology Student Services Office. This is necessary to allow entry of grades, signing of forms and transmission to the Registrar, all of which must be accomplished by no more than five days after the last regularly scheduled exam.

Missing this deadline will jeopardize graduation for many students.

Expectations and Grading Scheme

Cell 398
Project worksheet (5%)
Final paper (25%)
Laboratory performance (70%)

Cell 498
Project worksheet (5%)
Final paper (35%)
Laboratory performance (60%)

Expectations for students:

1. Students are expected to spend at least 8 hours/week in the laboratory working on their research projects. This would include performing experiments, data analysis, literature reviews and preparation of the written report and oral presentation. Realistically, to maintain experimental momentum, the students should spend 12-20 hours/week and sometimes more depending upon the type of experiment, stage of the project, etc. Consultation with supervisor is expected before making adjustments to time spent in the laboratory. This is particularly key around midterm and final exam weeks. While studying or writing papers for other classes in the laboratory is encouraged, time spent on these activities does not factor into the time spent working on the research project.

2. Respect the time of all laboratory members. This includes not only the time of your supervisor, but also the time of those individuals involved in daily project oversight and/or training. Attendance at scheduled meetings with all laboratory members and completing expected tasks prior to meeting are encouraged but allowances need to be made depending upon class schedules. The expected tasks could include literature review, data analysis and completion of parts of the oral presentation or written report to name but a few. Mutual agreement between the student and laboratory members and an understanding of the expected tasks is important.

3. Students are strongly encouraged to immerse themselves within the laboratory environment and attend laboratory meetings, journal clubs and seminars whenever possible. These venues provide an excellent opportunity for the student to expand their knowledge base on their project and field of study, improve presentation skills and learn how to interact with other scientists.

4. Care and attention to each experiment and efficient use of laboratory resources and time is critical. In particular, adhere to concepts of good laboratory practice and biosafety and chemical safety guidelines. If unsure of anything (experimentally or safety issues), immediately consult the supervisor or the individual directly overseeing your project.

5. Proper record keeping is an essential part of science and therefore a complete and up to date laboratory notebook is to be maintained throughout the project. This notebook along with all the primary data generated is to be left in the laboratory with the supervisor.

Overall, work hard and ask questions. Be resourceful in finding and reading relevant papers. Be active participants in lab discussions. Seek feedback from supervisors and colleagues in the lab. Take an active role in interpreting data and planning next steps. Think critically. The ultimate goal is to gain technical and intellectual independence.

Expectations for supervisors:

Provide initial reading (3-5 papers) that will lead the student in their own exploration of the literature. Be available to answer questions. Provide theoretical background on assays and approaches. Provide monthly assessments of laboratory performance to guide improvements in student performance. Provide guidance for written and oral communication of scientific ideas (focused on final paper and/or seminar).

Project: Design a project that has a good chance of being successful within the timeframe of the course. Try to avoid risky projects preclude the undergraduate student from generating solid and interpretable data. Also avoid projects that rely completely on development of new methodology or techniques not yet established in the laboratory.

Mentoring: Establish and maintain scheduled one on one meeting times throughout the term. At a minimum, schedule a one-hour meetings every two weeks so the student can discuss background information, experimental design, data interpretation and conceptual ideas related to the project.

Training: Students should receive direct training in techniques and instrumentation from experienced personnel. Ideally, one senior member of the lab (PI, RA, PDF, senior PhD student or technician) would be involved day-to-day supervision of the student. *Junior graduate students (within 12 months of beginning their project) should not be expected to train and oversee a 398/498 student.* Students are also expected to have taken a WHMIS training course (either offered by MMI or another department) and receive laboratory specific biosafety and chemical safety training as mandated by EHS and any other training dictated by the project (animal ethics for example).

Paper Feedback: The supervisor is expected to provide feedback on a draft of the written report. As this is a graded course, supervisors should not extensively edit the written report as they would a manuscript, rather, they are encouraged outline the general format of the report (see **General Report Guidelines** document) and comment on any and all glaring errors and omissions. Often the students have not had experience with this type of writing, so positive, constructive feedback is required.

Time expectations: Please remember that these are undergraduate students often in their final year of the Honors or Specialization program taking four other demanding courses per semester. The students are advised that 8 hours/week is the absolute minimum amount of time they are expected to be working in the laboratory, but realistically they should expect to be spending 12-20 hours/week or more depending on the experiment, etc. Work together with the student to devise an experimental schedule that fits with their class schedule taking into consideration mid-term and final exam times.

Guidelines for assignment of grades (laboratory performance):

A+

This is a grade reserved for truly exceptional students. These students are exceptional for their course level relative to their peers. They have intellectual command of the project, take the lead in interpreting results, take the lead in trouble-shooting, and there is evidence that they understand both the technical/methodological details of the project as well as its place in the context of the field. These students ask insightful questions, are resourceful in finding information on their own, and contribute to the scientific discourse of the lab. These students are technically competent and achieve a high degree of independence in their work. They read and understand the papers provided to them by their supervisor and also identify, read, and understand relevant papers on their own.

A

This is a grade for excellent students. These students have intellectual command of the project, contribute to the interpretation of results, contribute to trouble-shooting, and there is evidence that they understand both the technical/methodological details of the project as well as its place in the context of the field. These students ask insightful questions, are resourceful in finding information on their own, and contribute to the scientific discourse of the lab. These students are technically competent and achieve some independence in their work. They read and understand the papers provided to them by their supervisor and also identify, read, and understand relevant papers on their own.

A-

These students have some intellectual command of the project, and understand how the supervisor interprets results and trouble-shoots experiments (even if they cannot easily do it on their own), and there is clear evidence that they understand the technical/methodological details of the project. These students ask questions, and are capable of finding information on their own. These students are technically competent and achieve some independence in their work. They read and understand the papers provided to them by their supervisor.

B+

This a grade for good students who do not have a clear intellectual command of the project. These students are largely following instructions but do so without making a large number of mistakes. These students understand the technical details of the work and can produce results. When things don’t work, they ask questions to find a reason for why the experiments aren’t working. These students do not require a large amount of day to day supervision and can be trusted to follow protocols carefully.

B

This is a grade for students who are largely following instructions. They may not have a clear understanding of the technical details of the protocols but can follow instructions well enough to produce results. They have read the papers provided by the supervisor but may not understand them.

B-

This grade is for students who are largely following instructions and also beginning to fall short in their effort and time spent in the lab. They may not have a clear understanding of the technical details of the protocols but can follow instructions well enough to produce results. They have read some of the papers provided by the supervisor but there is evidence they don’t understand them.

C+ (and below)

This grade is for students who are largely going through the motions. They are showing up but putting in minimal effort. There is a lack of understanding of both the project and the details of the assays they are tasked with carrying out. There is little evidence of critical thinking and/or engagement with the project.