McMaster University

Guidelines for
Chemical Biology 3RP3, Research Practicum in Chemical Biology
and
Chemistry 3RP3, Research Practicum in Chemistry

Department of Chemistry and Chemical Biology,
2018-2019

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Guidelines for Chemical Biology 3RP3 and Chemistry 3RP3

About This Course

Research and inquiry are integral components of the Honours Chemistry and Honours Chemical Biology programs. The purpose of this course is to provide students with the opportunity to have laboratory training in a research environment and to gain hands-on training in the research endeavour. The course consists of a one-term research project conducted in a Chemistry or Chemical Biology laboratory, or a laboratory in a related field. Students will gain a valuable experience in preparation for a career in the private or government sector or for continued studies at the graduate level.

Pre-requisite(s): Registration in Level III or above of Honours Chemical Biology (for CHEM BIO 3RP3) or Honours Chemistry (for CHEM 3RP3); and permission of the academic supervisor and the course coordinator (or designate). Not open to students registered in the Honours Chemical Biology Co-op program or Honours Chemistry Co-op program.

Expectations

The assessment in this course is based on, at a minimum:
- Laboratory work
- Maintaining a proper laboratory notebook
- Two progress meetings
- Final written report

The investment of time in the project is expected to be a minimum of 120 hours, is to be negotiated between the supervisor and the student, scheduled when possible (e.g. for certain days/times of the week), and stated clearly on the application form.

Finding a Suitable Research Supervisor and Project

- It is the responsibility of the student to make arrangements with a research supervisor in the Department of Chemistry and Chemical Biology, or from a different Department as appropriate.
- A research project which is focused and suitable for the one-term period of the project must be discussed and agreed upon by the supervisor and the student.
- The supervisor is responsible for providing the information and guidance on the research project, explaining the assessment scheme and submitting the evaluations within two weeks of each assessment being completed.
- Students wishing to register for this course must complete an application form, available at: [http://www.chemistry.mcmaster.ca/undergraduate/](http://www.chemistry.mcmaster.ca/undergraduate/). The completed application form must be submitted to the Department no later than 30 days before the start of classes in a given term (please refer to sessional dates in the McMaster Undergraduate Calendar). The form is to be submitted via email to the Department of Chemistry and Chemical Biology using the following address: advisor@chemistry.mcmaster.ca.

The student must obtain permission to enroll in the course by completing and submitting the application form and a half-page research proposal to advisor@chemistry.mcmaster.ca. After review and approval by the Course Coordination Team, the permission will be entered on-line.
Acknowledgement of Previous Work Related to the Project

Students who may have previously worked in the same laboratory in which they are completing a research practicum in CHEM 3RP3 or CHEM BIO 3RP3 are asked to provide a one-page summary of any work that is related to the project being undertaken in the course. This summary should be submitted with the research proposal.

Any work completed prior to the student’s registration in CHEM 3RP3 or CHEM BIO 3RP3 should not be included as part of the student’s evaluation or final report without clearly identifying and acknowledging it.

Safety Training and Liability Issues

Appropriate safety training (e.g., WHMIS, Fire Safety and any other modules required) must be completed prior to beginning laboratory work. It is the responsibility of the supervisor to ensure that students have received the required safety training. The information regarding safety training can be found on the Chemistry and Chemical Biology web site.

Grading and Assessment

The minimum required academic components are as follows:

<table>
<thead>
<tr>
<th>Academic Component</th>
<th>Minimum weighting (% of course grade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progress meeting #1 (to occur by Week 4 of the project) to include a review of the laboratory notebook*</td>
<td>5 %</td>
</tr>
<tr>
<td>Progress meeting #2 (to occur by Week 8 of the project) to include a review of the laboratory notebook*</td>
<td>5%</td>
</tr>
<tr>
<td>Midterm progress report to be submitted before the end of Week 8 of the term* (refer to page 7)</td>
<td>5%</td>
</tr>
<tr>
<td>Laboratory notebook - final</td>
<td>15 %</td>
</tr>
<tr>
<td>Performance assessment of laboratory work</td>
<td>20 %</td>
</tr>
<tr>
<td>Final written report (refer to page 7)</td>
<td>30 %</td>
</tr>
<tr>
<td>Other components (optional)</td>
<td>(Maximum weighting 15%)</td>
</tr>
</tbody>
</table>

The breakdown given above contains the minimum value of each academic component however the values can be increased upon agreement by the student and the research supervisor.

*It is a requirement that a student receive grades on a minimum of 10% of the course work before the final date to drop a course, thus the midterm progress meetings will need to be completed, and grades returned to the student, before that date.
Important Dates

30 days prior to the start of classes in a given term  Submit completed application form to advisor@chemistry.mcmaster.ca
First day of classes in a given term  Earliest day you can start working in the lab
Last day of classes in a given term or last Friday of August  Latest day you can finish working in the lab
4:00 p.m. on the last day of classes in a given term or last Friday of the summer  Due Date of your Department of Chemistry and Chemical Biology Sign-Out Sheet to the Administrative Assistant (Chair)
4:00 p.m. one week after the last day of classes in a given term or last Friday of August  Due date of your Report to Administrative Assistant (Undergraduate) (1 copy) and supervisor (1 copy)

Office Hours

By appointment with the Course Coordination Team, TBA
Office: TBA
Email: TBA
Extension: TBA

NOTE: All hardcopy submissions should go to the Administrative Assistant (Undergraduate) in ABB-156

Important notes:

1. These Guidelines are here to help you succeed in the course. Please read them carefully, save this document for future reference and do not hesitate to ask the Course Coordination Team, other faculty members, or your group members for advice at any time throughout the course.

2. Notice the timeline of the course: You will work in the lab during the one term. The final report is due one week after the last day of classes (Fall, Winter terms) or one week after the last Friday of August (Summer term). Grades will be recorded and released within two weeks following the submission of the final report.

3. This research course is an exciting opportunity for you to get involved in actual research. This course counts for 3 credits, and you should plan to spend a minimum of 120 hours in the lab working on your project. This is on average about 9-10 hours per week during 13 weeks, or 8 hours per week during 16 weeks. Time per week can be adjusted to suit the
length of the project, and is to be negotiated between the student and supervisor, with expectations clearly stated on the course application form.

4. The experience you will acquire in this research course may also prepare you for the work you will carry out for a 4\textsuperscript{th} year thesis or project course (CHEM 4G09, CHEM BIO 4G03, CHEM BIO 4GG9) in terms of time management, developing specialised skills and knowledge, and research expectations.

5. However, under no circumstance can any results obtained during this research course be transferred into your future thesis or project course. If you must make mention of such results in your thesis/project, they will have to be clearly identified as previous work in the introduction of the corresponding Thesis or Project Report.

Your Research Project and Course Grade

1. Your application for permission to take the course is due no later than 30 days before the start of a given term, and must be completed by the student and the research supervisor.

2. Plan to start your research as early as possible during the term. Get in touch with your supervisor ahead of time to arrange an initial meeting and sort out any further details.

3. In some instances, you may require specialised safety training courses (e.g. X-ray safety) which are given only on certain dates. Your supervisor may require you to arrange for the training before you start the research course. Students’ attention is especially drawn to WHMIS core training, which is required for ALL lab work. This course must be attended in person, and is offered approximately monthly, but not necessarily at the start of each term. See the McMaster EOHSS web site (http://www.workingatmcmaster.ca/ehss/index.php) to register for this. Many other safety courses are available on-line. Your supervisor will provide information on the requirements for your specific project, and also arrange site-specific training relevant to the laboratory space you will be occupying.

4. In these courses you are required to keep an up to date lab notebook. This notebook will be university property. It must be kept in the lab at all times and should be presented to your supervisor immediately upon request. It will also be reviewed during progress meetings with your supervisor.

5. In order to earn academic credit for the course, you will have to prepare a formal Project Report and submit it to the Administrative Assistant (Undergraduate) by 4:00 p.m. on the appropriate Friday (see dates above). Early submissions are strongly recommended. This report will ideally be prepared with some input and feedback from your supervisor and should contain:
   - an Introduction, outlining the background and aims of the project;
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- a Results & Discussion section, describing what results you have obtained to date and how you interpret your results;
- an outline of what remains to be done.

Refer to the next section for additional details on the report.

6. Your supervisor will read your report, grade both your research progress and your report and recommend your grade for the course. S/he will also submit your marked report and proposed final grade to the course coordination team. Your final grade will be assigned by consultation between the supervisor and the Course Coordination Team.

Your Midterm Progress Report and Final Report

Your reports excluding graphs, figures and tables, should be no more than 5 pages in length (midterm progress report) and 10 pages in length (final report).

Formatting: 1.5-space; 12-pt. Times New Roman; margins: top and bottom 1 inch, left 1.25 inches, right 1 inch; reference style: ACS style, e.g. JACS.

You will need to express your ideas and results concisely, in order to stay within this page limit. Please do not exceed it. Your report should be organized according to the accepted format for such documents:

i. Abstract
   A 150-300 word synopsis of the results and their significance.

ii. Table of Contents

iii. Introduction
   A brief review of the relevant literature and a statement of the purpose of the work.

iv. Experimental
   Detailed descriptions of the experiments done, written in a way that someone else could repeat them and continue the work. Alternatively, this section may appear as section (vi), immediately after “Suggestions for Future Research”

v. Results & Discussion
   Describes the experiments carried out, presents the data, and discusses their significance. Include Tables and Figures (properly titled and captioned) where appropriate. Try to rationalize unexpected results and suggest improvements which may allow the original goals of the proposal to be better realized.

vi. Suggestions for Further Research

vii. References
   A list of references, numbered in order of their citation in the text, figures and tables.

If the research project is complete and the results are ready for publication, you may submit a draft manuscript in lieu of the written progress report, provided that the manuscript was written
by you. If the manuscript features more authors than you and your supervisor, you should append a 1-page description detailing the contributions you made to the paper during the summer.

Check-Out Procedure

If your research supervisor is a faculty member in the Department of Chemistry and Chemical Biology then upon completing your research work in your supervisor's group, the Department requires that you complete the attached "Department of Chemistry and Chemical Biology Sign-Out Sheet" (page 9 in this guide) and obtain the appropriate signatures.

Please note the "Research Checklist" contained in this form and comply with it literally. All data in the form of spectra, computer files, diagrams, etc. need to be organized, clearly labeled and presented to your supervisor prior to your departure. This includes the original copy of your laboratory notebook(s) and all related research samples and materials. While you hold the copyright to your results, these items are the property of your supervisor, and you must endeavour not to prevent or encumber his/her access to them.

The completed sign-out form is to be submitted to the Administrative Assistant (Chair) in ABB 156 not later than 4:00 p.m. on the last day of term (Fall, Winter) or the last Friday of the summer.

These Check-Out points above are required as part of your course. They reflect common practice in universities, research institutes and industry. Failure to comply will result in a reduction in your final grade. The penalty assessed in these respects will be arrived at in consultation with your research supervisor.

Academic Dishonesty

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university. For information on the various kinds of academic dishonesty, please refer to the Academic Integrity Policy located at: [http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf](http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf). The following illustrates only three forms of academic dishonesty:

- Plagiarism, e.g. the submission of work that is not one’s own, any text or ideas from books, the internet or journals, or work for which other credit has been obtained.
- Improper collaboration in group work.
- Copying or using unauthorized aids in tests and examinations

PLEASE RETAIN THIS INFORMATION FOR FUTURE REFERENCE.
DEPARTMENT OF CHEMISTRY AND CHEMICAL BIOLOGY SIGN-OUT SHEET
THIS FORM MUST BE COMPLETED BY EVERY RESEARCHER*

Please obtain the appropriate signatures and return this form to Administrative Assistant (Chair) (ABB-156)

NAME: ________________________________

If you are planning to continue doing research or doing the a 4th year thesis or project course with the same supervisor and want to keep the keys and other material borrowed, and your supervisor does not object to that, s/he has to sign here:

Supervisor’s Name_________________________Signature__________________________

Otherwise, the following signature has to be obtained:

**KEYS:** All the keys that were issued to me have been returned to: Administrative Assistant (Chair)

**THESES:** Copies of all theses borrowed by me from the departmental office have been returned: Department Administrator

**RESEARCH CHECKLIST:**
1. The work area(s) I have used for research have been cleared up to the satisfaction of my research supervisor. I have dismantled all the equipment and cleaned all of the glassware and apparatus that I have used, except for the equipment and apparatus that will be needed by others in the research group in the near future.
2. All of the laboratory notebooks, spectra, data, and experimental procedures that I have produced, developed or acquired while at McMaster are the property of my research supervisor and McMaster University. All of these items and documents have been turned over to my research supervisor and have been labeled and organized to my supervisor’s satisfaction.
3. Books, journals, etc., that were borrowed from my research supervisor or from the research lab have been returned.
4. Chemicals or items borrowed by me from other research labs have been returned.
5. All bottles containing chemicals or samples that I have prepared have been labeled with the proper workplace labels and have been stored in appropriate places.
6. All chemicals or samples which are no longer of use to me or anyone else in the research group have been destroyed or disposed of properly.
7. All computer programs, computer codes or files that I have developed or produced have been copied as back-up files on an appropriate storage medium; the back-up files have been given to my supervisor.
8. I have cleaned up and backed up all of my files and my directories on the computer(s) that I have used.

______________________________ ________________________________
Researcher Research Supervisor

*Researchers are defined as those persons who undertake any research work in the Department of Chemistry and Chemical Biology and include graduate students, undergraduate students (summer students and senior thesis students), post-doctoral fellows, research associates, visiting scholars and technicians.