Biochemistry 3R06: Biochemical Research Practice
Course Outline
2016 - 2017

Course Coordinator
Dr. Ishac Nazi
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Office – HSC 3H53 (by appointment only)

Undergrad Admin Assistant
Shari McCollin
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Course Description
The Department of Biochemistry and Biomedical Sciences considers research to be a vital component of an undergraduate education in Biochemistry. Biochemistry 3R06 offers students the opportunity to gain valuable research experience and provides excellent preparation for a future in industry or graduate school. The course is a full year research project that can be undertaken in a laboratory of a member of the Department of Biochemistry and Biomedical Sciences during the fall/winter or summer term.

Tutorials will be held throughout the course of the year. These tutorials are optional but recommended. These tutorials will focus on presentation skills and report writing. You will have the opportunity to get feedback on your poster from other students in the courses. The dates and locations of the tutorials will be announced.

This research course will require at least as much time as a regular course for which you receive 6 units of credit and differs from a regular course in terms of the more independent nature of the work and the degree of student responsibility and initiative. Assessment in this course is based on laboratory work (approximately 12 hours per week over two terms), a poster presentation, and a final written report. The written report is submitted to, and marked by, your lab supervisor. Students may not receive remuneration for the coursework, but may be compensated for any time that the supervisor wishes to employ the student beyond completion of the course requirements.

How to Find a Supervisor
As of September 1st, please feel free to contact any faculty member in the Department of Biochemistry and Biomedical Sciences about a potential thesis position. If you would like to work with someone outside of the department, please contact Dr. Ishac Nazi (nazii@mcmaster.ca) to ensure that the supervisor is suitable and the project fits our departmental criteria. Once you have secured a position, please submit your permission form to HSC 4H45 or mccolls@mcmaster.ca by March 31st.
Grade Breakdown

<table>
<thead>
<tr>
<th>Item Graded</th>
<th>Percentage of Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Form</td>
<td>5%</td>
</tr>
<tr>
<td>Mid-Year Lab Performance</td>
<td>15%</td>
</tr>
<tr>
<td>Poster</td>
<td>25%</td>
</tr>
<tr>
<td>Final Report</td>
<td>25%</td>
</tr>
<tr>
<td>Year End Lab Performance</td>
<td>30%</td>
</tr>
</tbody>
</table>

Dates and Deadlines

<table>
<thead>
<tr>
<th>Item Due</th>
<th>When? (all items due by 1pm)</th>
<th>Where?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Form</td>
<td>Tuesday, September 20, 2016</td>
<td>Submit to HSC 4H45 or <a href="mailto:mccolls@mcmaster.ca">mccolls@mcmaster.ca</a></td>
</tr>
<tr>
<td>Acknowledgement of Previous Work</td>
<td>Tuesday, September 20, 2016</td>
<td>Submit to HSC 4H45 or <a href="mailto:mccolls@mcmaster.ca">mccolls@mcmaster.ca</a></td>
</tr>
<tr>
<td>Poster Title and Authors</td>
<td>Wednesday, March 22, 2017</td>
<td>Email to <a href="mailto:mccolls@mcmaster.ca">mccolls@mcmaster.ca</a></td>
</tr>
<tr>
<td>Final Report</td>
<td>Monday, April 3, 2017</td>
<td>Project Supervisor – hard copy or electronically, based on your supervisor’s preference.</td>
</tr>
<tr>
<td>Poster Session</td>
<td>Monday, April 10, 2017</td>
<td>Ewart Angus Lobby (HSC)</td>
</tr>
</tbody>
</table>

Course Requirements

Safety Form
All safety training MUST be completed prior to the beginning of lab work. The safety form can be found here [http://fhs.mcmaster.ca/biochem/documents/ThesisandResearchSafetyForm2016.pdf](http://fhs.mcmaster.ca/biochem/documents/ThesisandResearchSafetyForm2016.pdf) under thesis and research courses. This form is worth 5% of your final grade. The form must be fully completed for you to receive 5%. Late forms will lose 1% of the final grade per day. It is the responsibility of the supervisor to ensure that students have all of the required safety training as well as any site specific training that may be needed.

All students, regardless of project type, must complete Technical WHMIS, Office WHMIS, Fire Safety (hospital or campus, depending on the location of your supervisor’s lab/office), Asbestos Awareness, Ergonomics, Slips, Trips, and Falls, Violence and Harassment Program and AODA.

If your project involves you working in a wet lab (i.e., using a pipette or chemicals) for any period of time you must also complete Biosafety (relevant to the level of your lab) and Chemical Handling and Spills.

If your lab or supervisor’s office is in a hospital you need to complete FHS Code Awareness.

Please note that you have already completed some of this training for Biochemistry 2L06 and will probably only need to do updates. If you are unsure of your training status please go to the Mosaic main page and click the Health and Safety Link, then click training summary.
Training is available online at the following link:

<table>
<thead>
<tr>
<th>Safety Training</th>
<th>Course Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHMIS 2015</td>
<td>WHMS15</td>
</tr>
<tr>
<td>FHS Code Awareness</td>
<td>FHSCDA</td>
</tr>
<tr>
<td>Hospital Fire Safety (update)</td>
<td>FHSFSF (FHSFUP)</td>
</tr>
<tr>
<td>Campus Fire Safety</td>
<td>FIRETR</td>
</tr>
<tr>
<td>Asbestos Awareness</td>
<td>ASBEST</td>
</tr>
<tr>
<td>Ergonomics</td>
<td>ERGON</td>
</tr>
<tr>
<td>Slips, Trips, and Falls</td>
<td>SLPTRP</td>
</tr>
<tr>
<td>Chemical Handling and Spills</td>
<td>CHEMHS</td>
</tr>
<tr>
<td>Violence and Harassment Program</td>
<td>VHPW</td>
</tr>
<tr>
<td>AODA</td>
<td>AODA</td>
</tr>
<tr>
<td>Biosafety (Level 1 or 2)</td>
<td>BSL1WK or BSL2WK</td>
</tr>
</tbody>
</table>

http://mosaic.mcmaster.ca

Acknowledgement of Previous Work
If a student has previously worked in the lab in which they will be completing Biochemistry 3R06 they must submit an acknowledgement of previous work by the deadline above. Please write a brief paragraph outlining the work that was previously completed. This work cannot be included in any student evaluations or reports without clearly acknowledging that the work was completed outside of Biochemistry 3R06.

Laboratory Performance
The supervisor will complete an evaluation of the student at the end of each term. The results of the evaluation and any comments should be shared with the student. To ensure the greatest success with their project, students will be expected to spend an adequate number of hours in the laboratory each week (approximately 12 hours per week). Problem-solving, creativity, innovation, and good experimental technique are the qualities of a good scientist. Students are encouraged to explore alternative interpretations of data or to suggest what line of investigation should be next. Safety in any laboratory setting is first and foremost. Before performing any protocol, students need to be familiar with the materials, reagents, and possible hazards involved in the experiment. Students must be site-specific trained on all equipment used in the lab.

Lab performance will be evaluated by the supervisor based on the following criteria:

- Familiarity with relevant literature
  - Reading and applying concepts learned from research articles
- Initiative and work habits
  - Willingness to take on experiments and complete them within the timeframe of the course
- Progress
  - Ability to adopt good research practices
- Data analysis and interpretation
  - Ability to interpret and troubleshoot data and research
  - Ability to choose appropriate controls
- Time management
  - Viable experimental timeline, proper pacing, ensuring all research is not packed into the final weeks
- Communication skills
- Clarity and level of engagement during meeting
- Other transferable skills
  - Punctuality, professionalism, lab conduct including maintaining a clean lab area, keeping an up-to-date lab notebook, contributing to lab jobs

**Final Report**
The report should be submitted to the supervisor by the deadline above. If the student would like a 1-2 day extension it must be worked out between themselves and the supervisor directly. The deadline for the supervisor to submit the grade to the course coordinator cannot be changed so the supervisor must be willing to mark the report in a condensed timeframe.

Below are report guidelines which could be followed by each student. Aside from the page length and overall formatting, the remainders of the guidelines are suggestions to aid in constructing the overall flow of the report. The report should be a continually evolving document, meaning that the student should be working on sections of the report throughout the course. Please do not leave the report for the last minute. Students should consult their lab supervisor for specific guidelines about their report.

**Formatting Guidelines**
- 8.5 x 11 inch paper
- Times New Roman, font size 12, double spaced with 1-inch margins on all sides
- Maximum length – 20 pages. This is not a challenge to write 20 pages, it is the maximum length. This length encompasses all sections from Abstract to Discussion but not References to Figures (see below)
- All pages should be numbered

**Report Sections**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title Page</td>
<td>Should include the title (no more than 2 lines), authors (student name first, supervisor name last, other contributors in between), name of institution, date of submission, and course name.</td>
</tr>
<tr>
<td>Abstract</td>
<td>Should be clear and concise while summarizing your main finding(s). This section should not exceed 300 words.</td>
</tr>
<tr>
<td>Introduction</td>
<td>Should place your finding in the context of the field. This should not be a long history of the field. Diagrams are extremely useful in this section and should be your own creation, not copied directly from another source.</td>
</tr>
<tr>
<td>Materials and Methods</td>
<td>Should be concise and easy to follow so that another student could repeat your experiments. This section should include information such as buffers used (including concentrations), equipment used, cell lysis methods used, centrifuges used, and primer sequences etc. Guidelines from other lab courses (2L06) may be helpful for this section. This section should be very well referenced.</td>
</tr>
<tr>
<td>Results</td>
<td>Should describe data presented in figures and tables. Ensure that you do not overanalyze or interpret the data in this section.</td>
</tr>
<tr>
<td>Discussion</td>
<td>Designed to interpret the data. This section should include troubleshooting, future experiments, controls that should have been used and what the data means to the field as a whole, when relevant. Ensure that you do not overanalyse or overstate the significance of your data.</td>
</tr>
</tbody>
</table>
References

Should be cited throughout the text by number, i.e., (1). The references should be consistent with the style used in the lab.

Abbreviations

Any abbreviations used in the text should be written out in long form the first time they are used in the text. This section should contain all abbreviations used in the report.

Tables

Should contain a title and short description of the table. Tables normally have the title above the table.

Figures

Should have titles and captions describing the experiment in enough detail to allow readers to understand the figure without additional text. The figures should be of high quality and include a scale bar when relevant.

The report will be graded using the following criteria:

- Understanding of problem and background information
  - Understanding the context of the problem within the field
- Results
  - Interpretation and analysis of results
- Problem Solving
  - If problems were encountered, how were they approached and resolved? Was the troubleshooting proposed feasible and logical?
- Clarity and Overall Impression
  - Flow of ideas, smooth transition between concepts, referencing style, scientific language used etc.

Poster Title and Authors

Please send the title of your poster and the authors to mccolls@mcmaster.ca. The information will be added to our Undergraduate Research Symposium brochure. The authors normally include yourself, your supervisor, and any graduate students or laboratory technicians that helped you with your research.

Poster Presentation

Students will display their work at the Undergraduate Research Symposium. Poster layout and design is up to the student but the poster may not exceed 3 feet x 4 feet (horizontal or vertical). If the student wishes, posters can be printed using the departmental poster printer at a cost of $60 (white background) and $80 (coloured background). Information will be sent out about poster printing and booking times for the departmental printer in March. If you have any questions about the poster please contact mccolls@mcmaster.ca

Posters will be marked by the lab supervisor based on the following criteria:

- Understanding of the background
  - Significance of the project and where it fits within the field
- Ability to answer questions
  - Includes troubleshooting and future implications
- Knowledge of the experimental approach
- Ability to analyze results
- Research progress
- Overall poster esthetic
University Policies

Missed Work or Student Absence
If you are absent from the university for a minor medical reason, lasting fewer than 3 days, you may report your absence, once per term, without documentation, using the McMaster Student Absence Form (http://mcmaster.ca/msaf/). Absences for a longer duration or for other reasons must be reported to the Associate Dean of Science office, with documentation, and relief from term work may not necessarily be granted. When using the MSAF, report your absence to nazii@mcmaster.ca Please note that the MSAF may not be used for term work worth 25% or more, nor can it be used for the final examination.

Academic Integrity
You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour 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.
It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at www.mcmaster.ca/academicintegrity.

The following illustrates only three forms of academic dishonesty:
1. Plagiarism, e.g., the submission of work that is not one’s own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations

Avenue to Learn
In this course we will be using Avenue to Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster email accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

Course Modifications
The instructors and the university reserve the right to alter this outline if necessary. The instructors and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

Student Accessibility
Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each
term of study. Student Accessibility Services can be contacted by phone (905) 525-9140 x28652 or email sas@mcmaster.ca. For further information, consult McMaster University’s Policy for Academic Accommodation of Students with Disabilities.