Biochemistry 3A03: Biochemical Research Practice
Course Outline
2014-2015

Course Coordinator
Dr. Ishac Nazi
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Office – HSC 4H30F (by appointment only)

Instructional Assistant
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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 3A03 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 twelve week research project that can be undertaken in a laboratory during the fall, winter or summer term.

This research course will require at least as much time as a regular course for which you receive 3 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 in one term) 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
Students are responsible for arranging a suitable project, location and agreement of a supervisor using the department’s application process. Students interested in taking Biochemistry 3A03 must complete the thesis/research course application procedure found on the Biochemistry website (http://fhs.mcmaster.ca/biochem/undergraduate/forms_and_procedures.html). Click on the thesis/research course tab. Please do NOT contact the researchers directly as you will not receive a response. All students must go through this departmental application process. For questions please contact Meagan at biochemistryadvisor@mcmaster.ca.

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>Final Report</td>
<td>25%</td>
</tr>
<tr>
<td>Lab Performance</td>
<td>70%</td>
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</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></td>
<td>Term 1</td>
<td>Term 2</td>
</tr>
<tr>
<td>Safety Form</td>
<td>Monday September 15, 2014</td>
<td>Thursday January 15, 2015</td>
</tr>
<tr>
<td>Acknowledgement of Previous Work</td>
<td>Monday September 15, 2014</td>
<td>Thursday January 15, 2015</td>
</tr>
<tr>
<td>1 Page Project Summary</td>
<td>Monday September 15, 2014</td>
<td>Thursday January 15, 2015</td>
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Submit to HSC 1H6 or biochemistryadvisor@mcmaster.ca for all items.

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**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/undergraduate/forms_and_procedures.html](http://fhs.mcmaster.ca/biochem/undergraduate/forms_and_procedures.html) under thesis and research courses. This form is worth 5% of your final grade. The form must be fully completed for you to receive the 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 Emergency 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 visit the safety office, HSC 1J11, to ask for a print out of your training record. Please hand in all completed tests to the safety office.

Training is primarily available online at the following links:

<table>
<thead>
<tr>
<th>Training</th>
<th>URL</th>
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<tbody>
<tr>
<td>Laboratory WHMIS Update</td>
<td><a href="http://fhs.mcmaster.ca/safetyoffice/training_sessions.html">http://fhs.mcmaster.ca/safetyoffice/training_sessions.html</a></td>
</tr>
<tr>
<td>Biosafety Training and Updates</td>
<td></td>
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<tr>
<td>Hospital Fire Safety</td>
<td></td>
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<tr>
<td>Office WHMIS</td>
<td><a href="http://cll.mcmaster.ca/eohss/">http://cll.mcmaster.ca/eohss/</a></td>
</tr>
<tr>
<td>Campus Fire Safety</td>
<td></td>
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<tr>
<td>Asbestos Awareness</td>
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<tr>
<td>Ergonomics</td>
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<td>Slips, Trips and Falls</td>
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<tr>
<td>Violence and Harassment Program</td>
<td></td>
</tr>
<tr>
<td>AODA</td>
<td><a href="https://pinjap01.mcmaster.ca/accessibility/">https://pinjap01.mcmaster.ca/accessibility/</a></td>
</tr>
</tbody>
</table>
Acknowledgement of Previous Work
If a student has previously worked in the lab in which they will be completing Biochem 3A03 they must submit an acknowledgment 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 Biochem 3A03.

1 Page Project Summary
If a student is completing this course with a supervisor outside of the Department of Biochemistry and Biomedical Sciences they must submit a 1 Page Project Summary by the deadline above. This summary should briefly outline the project to be completed, including the purpose of the project as well as possible methods/techniques to be used. This summary does not need to be finely detailed or technical.

Laboratory Performance
The supervisor will complete an evaluation of the student at the end of the 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 sitespecific trained on all equipment used in the lab.

Lab performance will be evaluated by the supervisor based 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 practises
- 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. Please also upload a copy of your report to Avenue to Learn when you submit your report to your supervisor. 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
Title Page 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.

Abstract should be clear and concise while summarizing your main finding(s). This section should not exceed 300 words.

Introduction should place you finding in the context of the field. This should not be a long history of the field. Diagram are extremely useful in this section and should be your own creation, not copied directly from another source.

Materials and Methods 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, 3P03) may be helpful for this section. This section should be very well referenced.

Results should describe data presented in figures and tables. Ensure that you do not overanalyze or interpret the data in this section.

Discussion is 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 over-analyze or overstate the significance of your data.

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

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.

University Policies

**Missed Work or Student Absence**

If you are absent from the university for a minor medical reason, lasting fewer than 5 days, you may report your absence, once per term, without documentation, using the McMaster Student Absence Form ([http://mcmaster.ca/msaf/](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 30% 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](http://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 e-mail 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 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University’s Policy for Academic Accommodation of Students with Disabilities.