Biochemistry/Health Sciences 3R06: Research Project  
Course Outline  
2013-2014  

Course Coordinator:  
Dr. Felicia Vulcu (vulcuf@mcmaster.ca), ext. 22838, HSC 4H43  

Undergraduate Assistant:  
Meagan Heirwegh (biochemistryadvisor@mcmaster.ca), ext. 22495, office – HSC 1H6  
(11am-12:30pm Monday-Friday)  

ALL STUDENTS MUST COMPLETE THE SAFETY DOCUMENTATION FORM ATTACHED AT THE END OF THIS COURSE OUTLINE. Please note; you must complete all the safety training outlined on the form. You must also complete any additional safety training required by your lab supervisor. Please include this additional safety training documentation in the form. You NEED to complete your safety training PRIOR to starting your lab work. You will not be allowed to conduct lab work until the proper safety training has been fully completed. This completed form is due 1 week after the start of the course (at the very latest!!!).  

Course Guidelines  

Research is a vital component of an undergraduate education in Biochemistry and Biomedical Sciences. Biochemistry/Health Sciences 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 is undertaken in the laboratory of a member of the Department of Biochemistry and Biomedical Sciences. Students are responsible for finding a supervisor for the course using the department’s application process. Students interested in taking 3R06 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.  

Course Basics  
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.  

Course Assessment  
Final evaluation (completed at the end of the course by the lab supervisor) – 75% of the final mark. This includes lab performance and the final report.  
Poster presentation (April 9th, 2014) – 25% of the mark. This mark is determined by the lab supervisor with some input from a group of peers in your course).
Making Arrangements for a Research Supervisor and Project

Students interested in taking 3R06 must complete the thesis/research course application procedure found on the Biochemistry website [http://fhs.mcmaster.ca/biochem/undergraduate/forms_and_procedures.html](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.

Acknowledgement of Previous Work Related to the Project

For students who may have previously worked in the same laboratory in which they are completing the requirements for 3R06, any work completed prior to the student’s registration in 3R06 must not be included as part of the student’s evaluation or final report without clearly identifying and acknowledging it.

Laboratory Performance

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 need to consult the Material Safety Data Sheets (MSDS) for each reagent that they use. Students must also have proper safety training (the safety training documentation form included in this outline must be completed and handed it prior to the start of labs) and must be site-specific trained on all equipment used in the lab.

Safety Training

Appropriate safety training (i.e. WHMIS, Radiation Safety) must be completed prior to beginning laboratory work. It is the responsibility of the lab supervisor to ensure all undergraduate students have received their safety training and are conducting their experiments in a safe manner. It is also the responsibility of the supervisor to ensure their undergraduate students are being supervised during their time in the lab. If you require more information on this subject please ask your lab supervisor or contact Jodi Biro on the Biochemistry Department (HSC 4N59) or the FHS safety office (HSC 1J11).

Poster Presentation

Students will display their work during the Undergraduate thesis/research symposium on Wednesday April 9th, 2014. The posters will be marked by the lab supervisor and their peers in the course.

Students will be evaluated based on their:
- Understanding of the background
- Ability to answer questions
- Knowledge of the experimental approach
- Ability to analyze results
- Progress
- Overall poster esthetic

Poster layout and design is up to the student, however the he size of the poster cannot exceed 3 feet x 4 feet. Posters can be printed using the departmental poster printer at a cost of $60 (white background) & $80 (coloured background). The lab supervisor can book the poster printer ahead of time.

The Final Report
The final report must be submitted directly to the lab supervisor for evaluation NO LATER than Wednesday April 2nd, 2014.

Below is an overall description of the submission guidelines which could be followed by each student. Aside from the page length and overall formatting, the remainders of these guidelines are strong suggestions to aid in constructing the overall flow of the report (the due date is NOT a suggestion: it is a requirement). Students should consult their lab supervisors about the specifics of their report construction.

Formatting Guidelines:
- Manuscript should be formatted for 8.5 x 11 inch paper.
- Text should be formatted as Times New Roman font size 12 with double spacing throughout.
- The entire report SHOULD NOT EXCEED 20-25 pages (MAXIMUM LENGTH!!), double-spaced with 1-inch margins all around. This includes all sections from Abstract to Discussion (see below) but excludes References to Supplemental Data.
- All pages should be numbered (bottom, centre, (1, 2, etc.))
- The outline of the manuscript should follow this order:
- Title, Author(s) (your name first, your supervisor’s name last and name of all other contributing members in between) and name of institution, date of submission, name of course

Abstract
Introduction
Materials and Methods
Results (you can combine the results and discussion sections if you wish)
Discussion
References
Abbreviations
Figure Captions
Tables
Figures
Supplemental data (If applicable)

Title: should be short and straight to the point (no more than 2 printed lines)
Abstract: should be clear and concise in its summary of your main finding(s). This section should not exceed 300 words.
Introduction: should clearly place your findings in the context of the field as a whole. This section should not be used as a long summary of the field. Diagrams explaining your points are highly recommended (they must be original creations NOT copied from other sources!)
Materials and Methods: should be concise and easy to follow so that your experiments could be repeated by another student. The experiments should be clearly laid out and must spell out all buffers used (including concentrations), all equipment used, centrifuge rotors used, speeds of centrifuges, method of lysing cells, etc. PLEASE FOLLOW THE SAME GUIDELINES YOU USED IN YOUR OTHER LAB COURSES (2L06, 3P03). When constructing clones ALL primers used must be written out.
REFERENCE!!!
Results: This section should describe the data presented in your figures. Care must be taken not to over-analyze or discuss the data in this section.
Discussion: This section is designed entirely for interpreting the data. You can include future experiments that need to be done, other controls that should be performed and even your opinion on what the data might mean to the field as a whole. You can even use a diagram to make your point clear Care should be taken not to over-analyze your data. You should present your ideas in a clear, thought-out manner. References: should be cited throughout the text by number, example (1). The references should follow a format that is used by your lab (keep formatting consistent).
Abbreviations: All abbreviations used in the text should be written out in long form the first time they are introduced, example polymerase chain reaction (PCR). This section should contain all abbreviations used along with their long form.

Tables: Should contain a title and a short description of the table.

Figures/ Figure Captions: should have titles and figure legends describing the experiment in sufficient detail to allow readers to understand the figure in the absence of additional text. The figure legend should include scale bar information for images and details of data points (e.g. mean ± sem). All figures should be high quality.

Academic Integrity: You are expected to exhibit honesty and use ethical behavior 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 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.

Note: The instructor 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.

Course Requirements and Timetable for Biochemistry 3R06

□ SEEKING DEPARTMENTAL PERMISSION
Students interested in taking 3R06 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

□ SAFETY TRAINING FORM
Appropriate safety training must be completed prior to beginning laboratory work. Student must consult with the lab supervisor for safety training specifics. The safety training documentation form provided in this course outline must be fully completed and returned to the department prior to the start of labs.

□ SUBMISSION OF FINAL REPORT
The final report is due to the lab supervisor NO LATER THAN Wednesday April 2nd, 2014.

A hard copy should be submitted to your supervisor for evaluation. Late submissions will NOT be accepted (a mark of ZERO will be assigned). Some allowances will be made on a case-by-case basis if
an MSAF (http://mcmaster.ca/msaf/) APPROVAL from the Associate Dean’s office for missed work is received.

☐ FINAL PROJECT EVALUATION
The supervisor will fill out and submit an electronic copy of the final “Project Evaluation Form” NO LATER THAN 5 days after the final report due date.

The student may also request a copy of the evaluation from the supervisor. The final grade will be based upon the evaluation of a combination of the student’s lab work (experiment, result, interpretation) and final report, and will count for 75% of the final mark. The poster will count for the remaining 25% of the final mark.

Supervisors will evaluate their students based on:
1. Understanding of the problem
2. Familiarity with the relevant literature
3. Initiative
4. Work habits
5. Ability at research
6. Data analysis interpretation
7. Industriousness
8. Experimental judgment
9. Written skills
10. Quality of the final report
Project Evaluation
For 3R06
2013-2014

Please return this evaluation electronically (email: vulcuf@mcmaster.ca NO LATER THAN 5 days after the due date of the final report).

Student Name: ____________________________ Student Number: _______________
Supervisor Name: ___________________________________________________________

<table>
<thead>
<tr>
<th>PLEASE COMMENT IN THE SPACES PROVIDED BELOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Understanding the problem</td>
</tr>
<tr>
<td>2. Familiarity with relevant literature</td>
</tr>
<tr>
<td>3. Initiative</td>
</tr>
<tr>
<td>4. Work habits</td>
</tr>
<tr>
<td>5. Ability at research</td>
</tr>
<tr>
<td>6. Work completed and its significance</td>
</tr>
<tr>
<td>7. Data analysis interpretation</td>
</tr>
<tr>
<td>8. Industriousness</td>
</tr>
<tr>
<td>9. Experimental judgment</td>
</tr>
<tr>
<td>10. Written skills and overall quality of report</td>
</tr>
</tbody>
</table>

**Overall ability (numerical score out of 100)**
# Poster Evaluation

## For 3R06

2013-2014

**NOTE:** If student either does not produce a poster, or does not show up to present their poster they receive an automatic mark of zero.

**Student Name:** ________________________________

**Marker:** ________________________________

<table>
<thead>
<tr>
<th>Criteria (maximum marks = 4*)</th>
<th>Marks (/4)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Understanding the problem and its significance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Knowledge of experimental approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Experimental progress made (if progress made is inadequate please specify in the comments section reasons why)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Ability to interpret/analyze results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Ability to answer questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Overall presentation (includes flow of poster/ clarity of poster/ quality of poster/ references/ grammar and technical language)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total marks (/24)**

* Note: 1 = unsatisfactory, 2 = satisfactory, 3 = good, 4 = excellent. A mark of 0 can be given if student does not meet the criteria specified.
**Research/ Thesis Course Safety Documentation Form** - Using the form provided below, please fill out the “date completed” for the following required health and safety training courses. **Please include any other safety training courses required for your specific lab space.** You must have these dates initialed by your designated lab safety representative and the form must be returned to Meagan (HSC 1H6, biochemistryadvisor@mcmaster.ca) BEFORE the start of labs. You must submit this completed form in order to remain in this research course.

Student Name: _________________________  
Course ID: __________  
Lab Supervisor: _________________________  
Date: __________

<table>
<thead>
<tr>
<th>Course Name (please note, we only require the most updated date)</th>
<th>Date Completed</th>
<th>Initials (by Lab Safety Representative – please initial each training date to confirm that the student has received updated lab specific safety training requirements. Please add any other safety training courses required by your lab)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical WHMIS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office WHMIS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biosafety (specify level: BSL____)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asbestos Awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ergonomics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slips Trips and Falls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Handling and Spills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Violence and Harassment Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AODA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Code Awareness training (All FHS personnel working in a hospital environment)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Training Type**  
Signature of lab safety representative to verify student has acquired training and a record of their training is available in the lab safety binder  

<table>
<thead>
<tr>
<th>Training Type</th>
<th>Signature of lab safety representative to verify student has acquired training and a record of their training is available in the lab safety binder</th>
</tr>
</thead>
<tbody>
<tr>
<td>site-specific training</td>
<td></td>
</tr>
<tr>
<td>Working alone policy (if applicable)</td>
<td></td>
</tr>
</tbody>
</table>

Name of Lab Safety Representative: ________________________________