Medical Biophysics 4971E – Research Projects in Medical Biophysics

1. Course Information

Medical Biophysics 4971E: Research Projects in Medical Biophysics

Fall Term 2017 – Spring Term 2018

Major laboratory course in experimental biophysics for students registered in an Honors Specialization Medical Biophysics (Clinical Physics Concentration). The three components are a major experimental project related to Clinical Physics (topic and advisor chosen in consultation with the student), scientific communication (student presentation and reports), and electronic information processing (data capture, computer analysis of biophysical signals).

Lectures/Tutorials:
Monday and Wednesday 12:30-13:30 in MSB-193AB

Laboratories:
Monday 9:30-12:30 in MSB-113
Friday 14:30-17:30 in MSB-113

Antirequisite(s):
Medical Biophysics 4970E.

Prerequisite(s):
Medical Biophysics 3970Z and registration in Year 4 of the Honors Specialization module: Medical Biophysics (Clinical Physics Concentration).

Extra Information:
15 hours weekly on average, 1.5 course.

Senate regulation regarding the student’s responsibility regarding requisites:
Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no
adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

**Accessibility Statement**

*Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.*

### 2. Instructor Information

<table>
<thead>
<tr>
<th>Instructors</th>
<th>Email</th>
<th>Office</th>
<th>Phone</th>
<th>Office Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Jeffrey Carson</td>
<td><a href="mailto:jcarson@lawsonimaging.ca">jcarson@lawsonimaging.ca</a></td>
<td>Lawson</td>
<td>64767</td>
<td>Email for appointment</td>
</tr>
<tr>
<td>(Course Coordinator)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TA – Lawrence Yip</td>
<td><a href="mailto:lyip4@uwo.ca">lyip4@uwo.ca</a></td>
<td>Lawson</td>
<td>64190</td>
<td>Email for appointment</td>
</tr>
<tr>
<td>Mr. Dan Sich</td>
<td><a href="mailto:dsich2@uwo.ca">dsich2@uwo.ca</a></td>
<td>Taylor</td>
<td>81419</td>
<td>Email for appointment</td>
</tr>
</tbody>
</table>

**Course Website:**

Please access the course website through OWL at [https://owl.uwo.ca/portal](https://owl.uwo.ca/portal)

### 3. Course Syllabus

**General Overview:**

This is the major laboratory course in experimental biophysics for fourth-year students. The three components are a major experimental project (topic and supervisor chosen in consultation with the student), scientific communication (student presentation and reports), and the data acquisition and processing laboratory.
Course Structure:

Laboratory

The laboratory consists of experiments to be conducted in small groups or individually. The emphasis of the laboratory will be to provide an understanding of measurement systems, and their application to experimental biophysics. This will involve signal classification, data collection and analysis, and the application of appropriate statistical techniques. A complete lab manual containing the relevant theory and materials can be downloaded from the course website. A completed pre-lab report is required for each laboratory and due at the start of the pre-lab demonstration. A written lab report is required. The due dates for the reports can be found on the schedule page. It is the responsibility of the student to complete the data collection, the lab report and the pre-lab report before the set deadlines.

Assignments

The assignments consist of exercises related to literature searching techniques, organization of references, statistics, and development of a plan for the research project. Assignments have similar submission rules to the laboratory and due dates are available on the schedule page.

Research Project

Students will be responsible for finding a research project and supervisor. Supervisors must have a faculty appointment in the Department of Medical Biophysics. Preference should be given to professors who have submitted projects that appear on the resources/projects page. Projects must be clinical in nature. Examples include analysis of patient derived data, research on methods and instrumentation that are used for patient care, and clinical trials. A clear link must be established between the outcome of the research project and an impact on patient care. Projects involving wet-lab work with cultured cells, experiments on animals, and biophysical modelling are generally not permitted.

In the event that the student has arranged to work with a specific supervisor who has not submitted a project description, then the student and supervisor must provide a project description for upload to the project page within 1 week of the first class. Please send the project description to the course coordinator by email. Please note that supervisors must have a faculty appointment in the Department of Medical Biophysics. Each student is required to make multiple presentations on their research project. These include 2 Quick Pitch, 2 Mini Seminar, and a Seminar
presentation. The Quick Pitch is a 3 minute, in-class presentation that provides a quick overview of the project with emphasis on the objectives, methods, and progress made to date. It is intended as a warm-up for the Mini Seminar. Each Mini Seminar presentation will be 7 minutes in length, with 2 minutes for questions. Each Seminar presentation will be 12 minutes in length followed by 2 minutes for questions. Students should invite their lab colleagues, supervisor(s) and mentor(s) to attend the Seminar. The Final Report represents the write-up of the research project. It should be up to 35 pages in length (double spaced), but no shorter than 25 pages (double spaced). The format of the Final Report will be distributed later in the Fall. The Final Report should discuss the project rationale, materials and methods that were used to conduct the experiments, results of the experiments, and a comprehensive discussion of the results, the problems encountered, and recommendations for future work. Students should submit a draft version of the Final Report to their supervisor for feedback and the course TA for grading and feedback prior to final submission of the Final Report. Deadlines are posted on the schedule page.

4. Learning Objectives
1. Knowledge
Students will be able to explain the motivation, objectives, methods, results, and discuss the meaning of the results related to a research topic. Students will be able to analyze and solve problems, and identify new opportunities for research.

2. Literacies and Interdisciplinarity
Students will be able to understand and use technical language, theory, numerical methods, and research methods. They will be able to explore a complex research question from a variety of perspectives, recognizing bias, and identifying missing knowledge. Students will be able to use knowledge to answer research questions. They will be able to describe limitations of the sources and methods they use.

3. Communication
Students will be able to interact and collaborate effectively on research topics. Students will be able to present research work in a way that is clear and accessible to a variety of audiences. Students will be able to communicate research work through written and oral means.
4. Resilience and Life-long Learning
Students will be able to adapt to research challenges by being self-aware, resilient, and self-reflexive. In addition to their mastery of discipline specific knowledge and methods, students will be able to articulate a clear understanding of their own interests and goals as well as the limitations of their own knowledge.

5. Global and Community Engagement
Students will be able to interact ethically, compassionately, and thoughtfully with peers and researchers.

6. Critical Inquiry and Creative Thinking
Students will have developed habits of constructive skepticism, differentiation and intellectual adaptability in their approaches to research. They will be able to identify underlying assumptions and evidence thereby arriving at conclusions about reliability. They will bring habits of careful judgment, an appetite for further refinement, and highly developed problem-solving skills to research problems.

7. Professionalism and Ethical Conduct
Students will be able to recognize the ways in which their conduct affects others in their field of research. They will be able to work effectively with others practically (e.g. time management, conflict resolution); ethically (e.g. division of intellectual responsibility and credit) and socially (e.g. respecting cultural differences, work preferences).

5. Course Materials

Course Website:
The course webpage can be accessed at [https://owl.uwo.ca/portal](https://owl.uwo.ca/portal)

Textbook:
There is no single text that encompasses the material in the course.

Contact with Instructors regarding course materials:
We encourage students to approach and discuss any course-related problems with the relevant instructor. Please make an appointment (preferably via email) utilizing the contact information provided above.
Collaborative work:
Students are encouraged to work together, but each student must take total responsibility for their submitted work. Note on Plagiarism: “Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence” (see Scholastic Offence Policy in the Western Academic Calendar).

6. Evaluation
The final grade will be based on the laboratory component (21%), the assignments (15%), and the research project (64%). There is no written test or written final exam. An oral exam will be scheduled during class or laboratory periods near the end of the second term.

Final grade breakdown:

Laboratory
Lab #1 – 7%
Lab #2 – 7%
Lab #3 – 7%

Assignments
Project Plan – 5%
Library Resources – 5%
Statistics – 5%

Research Project
Quick Pitch I – 1%
Quick Pitch II – 3%
Mini Seminar I – 1%
Mini Seminar II – 6%
Seminar - 14%
Draft Report – 5%
Final Report - 20%
Oral examination - 14%
7. Additional Information/Statements

Workload
Students are expected to spend a minimum of 15h per week (includes class time) on MEDBIO 4971 related course assignments, labs, and the research project.

Correspondence
Email is the preferred method of correspondence. All emails must include 'MEDBIO 4971' in the subject line. In emails related to the Research Project, the supervisor(s) and the mentor(s) must be cc'd to the email.

Handing in work late and academic misconduct
Late reports, presentations, and assignments will receive a penalty of 10% for each 24h period or fraction thereof after the due date (e.g. reports submitted a few minutes after the deadline will be penalized 10%). Penalties can only be avoided with official academic accommodation. The student must notify the supervisor, course coordinator & course TA by email of potential failure to meet any deadline at least 2 days prior to the deadline. Failure to send a timely email will result in a grade of zero for the report, presentation or assignment. In the event a student has been involved in academic misconduct (e.g. plagiarism) with respect to a report, presentation or assignment, the student will receive a grade of zero for the report, presentation or assignment and be subject to UWO penalties for academic misconduct (see below).

Interaction with supervisor and mentor
Students will meet with their supervisor or mentor at least once every 2 weeks, preferably every week. During each meeting, the supervisor/mentor must be informed of the student's progress on the research project. The lab notebook must be presented to the supervisor/mentor for appropriate signatures. The Course Coordinator may request to see the laboratory notebook at any time. If the supervisor holds regular lab meetings, then the student must attend.

Other
- Please follow the guidelines when preparing lab reports.
- Students are expected to obtain and maintain a laboratory notebook that clearly describes the progress on the research project.
Statement on Use of Electronic Devices:
Use of mobile phones to email, text, or call in/out is not permitted under any circumstances during classes, tutorials, seminars, talks, oral exam, or labs. If you must use your phone, then please leave the room to do so.

Statement on Academic Offences:
“Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following website:
http://www.uwo.ca/univsec/appeals_discipline/index.html

Absence from course commitments:
A. Absence for medical illness:
Students must familiarize themselves with the Policy on Accommodation for Medical Illness: https://studentservices.uwo.ca/secure/index.cfm
Statement from the Dean’s Office, Faculty of Science:

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's Office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. For further information please see: http://www.uwo.ca/univsec/handbook/appeals/medical.pdf

A student requiring academic accommodation due to illness, should use the Student Medical Certificate when visiting an off-campus medical facility or request a Record's Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found at:

https://studentservices.uwo.ca/secure/medical_document.pdf

B. Absence for non-medical reasons:

If you are unable to meet a course requirement due to non-medical reasons, then please contact the instructor and the course coordinator. Accommodation will only be granted in cases where there are extraordinary circumstances.

C. Special Examinations:

A Special Examination is any examination other than the regular examination, and it may be offered only with the permission of the Dean of the Faculty in which the student is registered, in consultation with the instructor and Department Chair. Permission to write a Special Examination may be given on the basis of compassionate or medical grounds with appropriate supporting documents. A Special Examination must be written at the University or an Affiliated University College no later than 30 days after the end of the examination period involved. To accommodate unusual circumstances, a date later than this may be arranged at the time permission is first given by the Dean of the Faculty. The Dean will consult with the instructor and Department Chair and, if a later date is arranged, will communicate this to Registrarial Services. If a student fails to write a scheduled Special Examination, permission to write another Special
Examination will be granted only with the permission of the Dean in exceptional circumstances and with appropriate supporting documents. In such a case, the date of this Special Examination normally will be the scheduled date for the final exam the next time the course is offered.

**Support Services:**

Office of the Registrar: http://www.registrar.uwo.ca
Academic Counselling: http://www.uwo.ca/sci/undergrad/academic_counselling/
Accessibility: http://accessibility.uwo.ca/resources/support_services.html
Student Center: http://student.uwo.ca
Student Development Centre: http://www.sdc.uwo.ca
Student Health Services: http://www.shs.uwo.ca/
Students that are in emotional/mental distress should refer to Mental Health@Western http://www.uwo.ca/uwocom/mentalhealth/ for a complete list of options about how to obtain help.