1. Course Information

**Course Description:**
This course will familiarize students with several common immunology techniques that are widely used to assess the overall immunocompetence of humans/animals in clinical/veterinary settings (e.g. diagnostic labs, research labs and biopharma). Students will also gain advanced scientific writing skills. Overall, this course will prepare students to competently perform immunological methodologies relevant to 4th-year/graduate research projects in microbiology & immunology, plus write a 4th-year/graduate thesis and scientific paper.

**Learning Outcomes:**
1. Gain an understanding and practical experience performing common methodologies in immunology.
2. Understand the structure of primary scientific articles.
3. Develop advanced scientific writing skills.
4. Give, receive and integrate peer feedback to improve your scientific writing skills.
5. Appreciate and comply with health & safety and ethical responsibilities of a scientist.

**Course Objectives:** To provide students with an understanding of/practical experience with:

1. **Immune responses occurring in vivo following vaccination or microbial infections.** Specifically:
   1) Development of antibody responses
   2) T cell proliferation and cytokine secretion
   3) Activation of macrophages (cytokine production and cell signalling)
2. **Common immunology methodologies.**
   Techniques learned include vaccine production, immunoelectrophoresis, chromatography, ELISA, MTT assay, TNF bioassay, Western Blot and RT-PCR. Students will also learn basic mouse handling, blood collection, intraperitoneal injections, splenocyte and bone marrow cell isolation. A student can decline from handling mice/mouse work without penalty, however it is imperative that you make Dr. Summers aware of this prior to/during the first week of class.
3. **Advanced scientific writing skills and peer review.**
   This course prepares students to critique and competently write a 4th-year thesis, graduate thesis and primary manuscript through lectures, a “Guide to Writing Hypothesis-Testing Papers” document (created for this course), online scientific writing modules, and 3 lab reports. Former students felt “well-prepared to undertake research and write their honors thesis after taking this course.”

**Lectures:** Tuesdays @ 1:30 – 2:20 pm, DSB-2016. **Lecture on Jan 15th is mandatory.**
- Attendance will be taken at each lecture as they constitute the pre-lab talk.

**Labs:** Tuesday or Wednesday @ 2:30 – 5:20 pm. **Lab 1 on Jan 15/16 is mandatory.**
- Some follow-up labs occur 24 or 48 hours later to harvest plates and obtain results (see Schedule).
- All labs are held in the student lab in MSB-120. Lab 1 is a mandatory mouse training lab.
- **Provide your own lab coat and lock.** No Lab Coat = No Lab!
- Lockers are located outside the lab for your belongings. Locks must be removed after the lab.
- Only stationary is allowed in the lab (no phones, tablets, laptops, etc.).
**Requirements to be permitted to work with mice in this course:**
In accordance with federal, provincial and university laws, all individuals at Western using animals must obtain the proper information and training. Therefore, it is mandatory that all students in Microimm 3620G complete each of the following to be permitted to work with mice during the course:

1. Attend the Animal Care and Veterinary Services (ACVS) lecture on January 15th.
   A student absent from this lecture must obtain Dean’s approval, in which case they must instead complete and pass the online ACVS Animal Ethics Course and Quiz.

2. Pass a quiz on the above ACVS lecture material with a minimum 70% mark (quiz is held during Lab 2).

3. Attend Lab 1: Animal Training on January 15th (Tues lab group) or 16th (Wed lab group).
   There is no makeup lab so students who miss this lab will not be allowed to handle mice in this course.

**Course Requisites:**

- **Antirequisite(s):** the former Microbiology and Immunology 3600G
- **Prerequisite(s):** Biochemistry 2280A with a mark of at least 65%; Biology 2581B; Chemistry 2213A/B and 2223B with marks of at least 60% in both courses; Microbiology and Immunology 2500A/B.
- **Pre- or Co-requisite(s):** Biology 2581B, Microbiology and Immunology 3300B

Senate regulation regarding the student’s responsibility for 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.

Please contact the course instructor if you require material in an alternate format or if any other arrangements can 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 questions regarding an accommodation.

2. **Instructor Information:** *available by appointment*

<table>
<thead>
<tr>
<th>Instructors</th>
<th>Email</th>
<th>Office</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Kelly Summers</td>
<td><a href="mailto:Kelly.Summers@schulich.uwo.ca">Kelly.Summers@schulich.uwo.ca</a></td>
<td>DSB-3024</td>
<td>519-661-3432</td>
</tr>
<tr>
<td>Course Coordinator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Sung Kim</td>
<td><a href="mailto:Sung.Kim@schulich.uwo.ca">Sung.Kim@schulich.uwo.ca</a></td>
<td>SDRI-119</td>
<td>519-850-2961</td>
</tr>
<tr>
<td>Instructor</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. **Course Materials**

- **Textbook:** There is no textbook requirement. However, “Kuby Immunology” by Owen, Punt and Stranford will be useful for supplementing lecture material, knowledge on methodologies, or general interest.

- **WebCT:** Students are responsible for checking OWL at regular intervals. OWL will be used to communicate information about the course, access lecture notes and online modules, submit lab reports to Turnitin, and post questions. Students with OWL problems should contact the ITS Helpdesk by phone (519-661-3800), web form (itshelp.uwo.ca) or in person (Support Services Building, main floor).

- **Copyright Statement:** Course material produced by faculty is copyright protected and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws. This includes posting any course material (e.g. lecture notes, lab manual) on public domains.
4. Evaluations

<table>
<thead>
<tr>
<th>Component</th>
<th>% Value</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Skills and Participation Mark</td>
<td>5</td>
<td>marks given in Labs 2-10 not Lab 1: mouse training lab</td>
</tr>
<tr>
<td>Lab Preparation Reports</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Lab Notebook</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>online Lab Health &amp; Safety Quiz</td>
<td>2</td>
<td>Jan 15 - mandatory</td>
</tr>
<tr>
<td>online Ethical Responsibilities Quiz</td>
<td>2</td>
<td>Jan 15 - mandatory</td>
</tr>
<tr>
<td>online Scientific Writing Modules:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>3</td>
<td>Jan 22</td>
</tr>
<tr>
<td>Abstract</td>
<td>3</td>
<td>Jan 29</td>
</tr>
<tr>
<td>Figures</td>
<td>3</td>
<td>Jan 29</td>
</tr>
<tr>
<td>Written Assignment: Title, Abstract &amp; Results for Labs 2&amp;3</td>
<td>5</td>
<td>Feb 5/6 @ 2:30 pm</td>
</tr>
<tr>
<td>Lab Report 1: B cell Immunity</td>
<td>10</td>
<td>Feb 15 @ 6 pm. Submit to OWL.</td>
</tr>
<tr>
<td>Methodology Quiz 1</td>
<td>10</td>
<td>March 5 (in-class)</td>
</tr>
<tr>
<td>Submit Lab Report 2 (T cell Immunity) for Peer Review</td>
<td>late penalty 5% per day</td>
<td>March 5/6 @ 2:30 pm. Submit to OWL and ComPAIR.</td>
</tr>
<tr>
<td>Peer Review of Lab Report 2 (2% TA; 2% peers)</td>
<td>4</td>
<td>March 12/13 @ 2:30 pm. Submit to ComPAIR.</td>
</tr>
<tr>
<td>Self-Review of Lab Report 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Final Lab Report 2 (after peer/self-reviews)</td>
<td>10</td>
<td>March 19/20 @ 2:30 pm. Submit to OWL.</td>
</tr>
<tr>
<td>Methodology Quiz 2</td>
<td>10</td>
<td>March 26 (in-class)</td>
</tr>
<tr>
<td>Lab Report 3: Macrophage Activation and Signaling</td>
<td>25</td>
<td>Friday April 5 @ 6 pm. Submit to OWL.</td>
</tr>
</tbody>
</table>

Additional Information on Evaluations

Make-up Evaluations:
Late submissions for the online Lab Health & Safety Quiz, Ethical Responsibilities Quiz, and Scientific Writing Module Assignments will not be accepted for any reason. Make-up evaluations for written assignments, peer/self-reviews and methodology quizzes will be permitted only for students with medical or legitimate non-medical reasons approved by an Academic Counsellor from the Faculty in which the student is registered in. The due date and make-up quiz format are up to the discretion of the instructor. Thus, the make-up quiz may be multiple-choice questions, short answer questions, oral or mixed.

Policy on the Rounding and Bumping of Marks:
Across the Basic Medical Sciences Undergraduate Education programs and within the Dept. of Microbiology and Immunology we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. Final grades on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.4 becomes 74, and 74.5 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g. a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark “bumping” will be denied.

15% Assessment Rule:
A detailed and comprehensive set of regulations concerning the scheduling of tests, assignments, etc. is available at: [http://www.uwo.ca/univsec/academic_policies/examinations.html](http://www.uwo.ca/univsec/academic_policies/examinations.html). At least three days prior to the deadline for withdrawal from a course without academic penalty, students will receive assessment of work accounting for at least 15% of their final grade. For more details, refer to the link below: [http://www.uwo.ca/univsec/pdf/academic_policies/exam/evaluation_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/exam/evaluation_undergrad.pdf)
5. Course Policies

Missed Labs: There is no make-up lab for any reason. Absence without penalty will be given to students with reasons approved by the Dean’s Office. Penalty for an unexcused absence is 5% deducted from the final grade for each lab missed.

Mandatory Requirements (note due dates):
- “Code of Conduct” Form. Please read, sign and submit it in the “Assignments” link on OWL due Jan 8th.
- Online Lab Health and Safety Module/Quiz. You are expected to follow standard lab health and safety procedures. Western has a “Laboratory Health and Safety Manual for General Laboratory Practices” document available here. Sections relevant to this course are essential for you to know and have been incorporated into a course-adapted version called “Lab Health & Safety in Microimm 3620G” (posted on OWL). Please read this version, then complete the mandatory online Lab Health & Safety quiz due Jan 15th.
- Online Ethical Responsibility Module/Quiz. You are expected to conform to the ethical responsibilities of a scientist. Scholastic offenses relevant to paper submissions include Plagiarism, Data Falsification and Data Fabrication. Please complete the mandatory online Ethical Responsibilities quiz due Jan 15th.

6. Course Expectations

1) Online Scientific Writing Modules:

Late modules will not be accepted for any reason. The goal of each module is to improve your understanding of specific aspects of scientific writing. There are three scientific writing modules: Introduction, Abstract, Figures. Each module comprises graded assignments. Read the relevant section in the “Guide to Writing Hypothesis-Testing Papers” document prior to completing each module as it contains more comprehensive information and examples.

2) Lab Skills & Participation:

You will be working in pairs within a small group supervised by a TA. The TA will assign each student a “Lab Skills & Participation” mark for every lab (excluding Lab 1). This mark is based on attendance at all lectures and labs, arriving to the lab on-time and prepared (with lab coat, lock, etc.), conversing freely with your lab partner, lab group and TA to share ideas, help each other, ask/answer knowledge-based (not just clarification) questions, discuss science, M&I courses/modules, graduate studies, etc., and actively participating in formal discussions led by your TA. In addition, you are expected to follow lab rules and safety, perform lab techniques with proficiency, and share the experimental work equally with your lab partner (one partner should not do all the work).

3) Lab Notebook:

The goal is to help you develop record-keeping habits expected of all lab personnel. Your TA will check and mark your lab notebook at each lab. Use any bound notebook of your preference. Your notebook should be well-organized into sections (listed below in bold), clear, legible and thorough. Notebook entries should be an up-to-date, accurate account of the following items:

- Lab # and Title
- Objective(s).
- Methods. Flowchart
  Also, record any changes to the protocol, errors made during the procedure, etc.
- Results. Document raw data, calculations, drawings, graphs, answers to questions posted in the lab manual, OD readings, etc.
- Overall Findings in 1-2 sentences.

Lab Preparation Report (see below)
4) Lab Preparation Report:

For best performance and understanding of the lab objectives and methods, it is important to prepare for each lab in advance. This includes reading the lab manual and preparing a “Lab Preparation Report” before you enter the lab. This report gives an account of what you are going to do during the lab. Your TA will mark your report at the start of each lab as evidence of your advanced preparation.

Include:

1. **Lab # and Title**, as stated in the lab manual, e.g. Lab 5: Lymphocyte Proliferation

2. **Objective(s):** 1-2 handwritten sentences, and

3. **Methods:** Create a Flowchart Diagram that outlines the general methodical steps (what procedures you will be doing and when). It can either be handwritten or prepared on a computer and pasted into your notebook. The flowchart should help orient you for the experimental approach so that you and your partner can get organized to obtain the necessary reagents/materials and prepare for subsequent experimental steps in a timely manner. Exclude specific details like concentration (e.g. state HCl, not IN HCl) or descriptive information (e.g. state ‘get column’, not ‘get DEAE-cellulose anion exchange column’) as this information is not necessary for you to perform the experimental procedure, plus these specific details can be found in the lab manual.


Example of a Flowchart:

```
get plate; label it
make Con A solution
add media to wells A-H in columns 1-3
add Con A to Column 1
Row 1: transfer 100 uL from well A1 to B1; mix gently
repeat for well B1 to C1
discard 100 uL from well C1
Row 2: repeat above
make Con A solution
```

5) Written Assignments, including Lab Reports:

A major learning outcome of this course is for you to gain advanced scientific writing skills to prepare you to write a 4th-year thesis, graduate thesis, and scientific paper. You will be given “Guidelines” for each lab report. Discussions of the data and interpretations are encouraged with your peers and TA prior to writing your reports, however each student must write her/his assignment independently (i.e. in your own words). Appropriate information must be cited and referenced. Academic dishonesty will not be tolerated.

**Submission:** Upload an electronic copy of your written assignment in PDF format to OWL (Turnitin) by the due date/time. Late penalty is 25% per day. No written assignment will be accepted after 2 days without a valid reason approved by the Dean's office. If approval is issued, the assignment will be due at the discretion of Dr. Summers or Dr. Kim.

6) Methodology Quizzes:

The goal of these two in-class quizzes is to test your understanding of the immunology methodologies you have performed in the labs, including data analysis, data interpretation and experimental design. They may comprise short answer, true-false questions and multiple-choice questions.
7) Peer Review and Self-Review of Lab Report 2:

Please refer to the document “ComPAIR in Microimm 3620G” for instructions and important information.

ComPAIR is an anonymous peer-to-peer review software. If you do not have a ComPAIR account, in the course OWL site, click on the “ComPAIR” link which will take you to the ComPAIR login page. Use your UWO ID as your username (do not include @uwo.ca). Choose a display name that will not identify you. The course TAs and instructors will know a student’s identity, but you will be anonymous to your peers.

Peer review occurs prior to manuscript submission and often leads to significant improvement in revision of the manuscript. You will submit Lab Report 2 to the peer review process where two randomized and anonymous peers will evaluate your report and provide constructive feedback and suggestions for improvement. Peer’s feedback, along with a self-review of your own report, can be incorporated into a revised and expectantly improved final lab report 2 for grading. It is expected that each student will peer review at least two lab reports.

6. Additional Information/Statements

Cell Phone and Electronic Device Policy

The Schulich School of Medicine & Dentistry is committed to ensuring that testing and evaluation are undertaken fairly across all our departments and programs. It is the policy of the School and the Department of Microbiology and Immunology that any electronic devices, i.e., cell phones, tablets, cameras, or iPod are strictly prohibited during student laboratories, tests and exams unless otherwise stated. These devices must be left either in a locker, at home, or with the student’s bag/jacket at the front of the room and must not be at the test/exam desk or in the individual’s pocket. Any student found with one of these prohibited devices will receive a grade of zero on the test/exam. Non-programmable calculators are only allowed when indicated by the instructor. The Dept. of Microbiology and Immunology is not responsible for stolen/lost or broken devices.

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/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

All required written assignments will be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between Western University and Turnitin.com (http://www.turnitin.com). Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Medical/Non-Medical Relief Program Policy.

Notify the Course Coordinator immediately. It is current policy that students who are unable to write a test or examination or other form of course evaluation are required to obtain a medical certificate or other supporting documentation in the case of an unexpected absence on compassionate grounds. Take this documentation to the Western Science Academic Counselling Office (Science and Basic Medical Science students) located in the North Campus Building Room 280, or to your appropriate Home Faculty Counseling Office. Do not submit the documentation to the instructor. An academic counselor in that office will review and either approve or deny the accommodation request. It will be the Academic Counseling office that will determine if accommodation is warranted. This policy applies to all forms of assessment, including evaluations that are less than 10%. Once the accommodation has been approved, it is the student's responsibility to make alternative arrangements with the Academic Counsellor and Course Coordinator. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Academic Counselling Office immediately and signed by the appropriate department.
A. Absence for Medical Reasons:

Students must familiarize themselves with the Policy on Accommodation for Medical Illness for Undergraduate Students, located at:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_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:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

B. Absence for Non-Medical Reasons:

Bereavement or Compassionate Reasons. Petitions for permission to write a special examination will be entertained only when they are submitted on compassionate grounds with supporting documents (e.g. a death in the family, not weddings, vacations, etc.). Such documentation must be submitted by the student directly to your appropriate Academic Counsellor as soon as possible and not to the instructor. It will subsequently be the Academic Counselling Office that will determine if accommodation is warranted.

Religious Holiday. Students must familiarize themselves with the Policy on Accommodation for Religious Holidays.

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.

Students must familiarize themselves with the University policy and fixed dates for special examinations:
http://www.uwo.ca/univsec/pdf/academic_policies/exam/definitions.pdf

Support Services

Registrarial Services: http://www.registrar.uwo.ca/

Academic Counselling (Science and Basic Medical Sciences): http://www.uwo.ca/sci/counselling

USC Student Support Services: http://westernusc.ca/services/

Student Development Services: https://www.uwo.ca/health/

Student Health Services: https://www.uwo.ca/health/


Students that are in emotional/mental distress should refer to Mental Health@Western https://www.uwo.ca/health/mental_wellbeing/index.html for a complete list of options how to obtain help.

Microimm 3620G: Immunology Laboratory