University of Guelph
Department of Molecular and Cellular Biology
Immunology II - MICR 4530
Tentative Course Outline (Winter, 2017)

Course description:

This course will focus on advanced aspects of the structure and function of the vertebrate immune system in health and disease. Various topics including inflammation, hypersensitivity reactions, immune-mediated diseases such as allergy and autoimmunity, immune response to infection, vaccine development, experimental systems, immunoinformatics and antibody engineering will be discussed.
Prerequisite(s): MICR*3230; Restriction(s): MICR*4230

Teaching team:

Course Co-ordinator and Instructor: Dr. Azad K. Kaushik, Room: SSC 4824
Extension: 54389; e-mail: akaushik(at)uoguelph.ca
Web: http://www.uoguelph.ca/~akaushik/Kaushik_Laboratory/Home.html

Teaching Coordinator: Elspeth Smith, Room SSC3505
Extension: 56583; e-mail: elspeths[at]uoguelph.ca

Course schedule: Tues, Thur; 01:00PM - 02:20PM, MACK115

Learning goals and rationale

This is an advanced 4th year senior level course that builds upon and focuses on basic and applied aspects of Immunology in health and disease. Study topics include innate and adaptive aspects of immunity, experimental systems, immunity and infection, inflammation and immune mediated diseases. Upon completion of the course, the student should be able to explain, analyze and apply:

i. innate and adaptive immunological basis of the immune responses;
ii. over-reactions of the immune system resulting in immune mediated disease;
iii. contemporary immunological and molecular methods to understand immunity;
iv. host defenses against infection;
v. understand the concept of vaccination and host defense.

Learning Strategy

An interactive lecture and integrative discussion strategy, using illustrations and multi-media will be used to emphasize the important concepts in a structured manner, outlined as 'Brief Guided Notes', via D2L. An emphasis will be on the conceptual understanding of the immune system with a focus on health and disease. The students are encouraged to read the study topics in advance to enhance their understanding and to be able to question those components that required additional explanation. The 'Launchpad', textbook website, for MICR4530 would provide helpful study support. Students are encouraged to engage in co-operative learning by signing the 'Co-operative Learning Experience' document. A learner-centered (individualized and group) approach will be used to achieve the learning objectives. A sound knowledge of cell biology, genetics, molecular biology, biochemistry and basic immunology is required as group activity will involve understanding experimental design, methods and interpretation of experimental data from scientific articles.

Course Resources

Text Book: Immunology, 7th Edition, 2013, by Judith A. Owen, Jenny Punt, Sharon A. Stanford. W.H. Freeman & Co. The textbook will be packaged with 'Launchpad' and you may register with the code provided. Additional information provided in the 'Brief Guided Lecture Notes' as discussed.

Student Help

	TUESDAY	WEDNESDAY	THURSDAY
Kaushik	Office Consultation: 2:20- 3:15PM		Office Consultation: 2:20- 3:15PM
Smith		Journal article presentation support, TBA	

Methods of Assessment

Assessment		Date of Assessment	Course Content /Activity	Learning Outcome Addressed
Form of Assessment	**Weight of Assessment**			
Journal Article Presentation (4-5 students/Group): Fifteen min. power point presentation followed by questions	15%	TBA	Journal Article presentation	1 to 5
Midterm Exam: A 1.5-hour examination will comprise objective type (e.g., True/False, multiple-choice and some multiple-part type) questions. Those missing midterm will write 85% final examination.	35%	Feb. 28, 2017	As indicated in lecture schedule: Chapters 5, 6, 15, 16 and 20 (part)	1 to 3 (Excluding chapter 16)
Final Exam: A 2-hour comprehensive examination will include all the learning materials. The exam. will involve approximately 60% objective type (e.g., True and False, multiple choice and some multiple part questions) and 40% short answer questions. Some questions may involve interpretation of experimental observations.	50%	April 12, 2017 19:00-21:00 hours	Entire course content delivered during the lectures	1 to 5

Signposts

Activity	Date
Journal article presentation Group Formation finalized	Jan. 20
Journal article selected in consultation with Professor	Jan. 27
Journal article reading and presentation preparation (TC/Professor)	Jan. 27 - March 17
Electronic version of powerpoint presentation submission via e-mail	March 17, 4:0PM
Journal Article Presentations	TBA

Course Content and Lecture Schedule

Week	Topics	Chapter	No. Of Lectures
1	**Introduction**		0.25
1-3	**a. Innate Immunity**		
	i. Innate Immunity Anatomical barriers, innate and adaptive connectivity, soluble molecules and membrane-associated receptors, toll like receptors, innate cell types, inflammatory responses	5	3
	**Tool Box: Recombinant DNA technology, Gene Transfer in Mammalian Cells (e.g., TNF-α Transgene)*		
	ii. The Complement System Complement Function, Complement Components, Complement Activation, Regulation of the Complement System, Consequences of Complement Activation, Complement Deficiencies	6	3
	**Tool Box: Immunohistochemistry, Confocal microscopy*		
4/5	Journal Article Preparation		1
4-5	**b. Immune System in Health and Disease:**		
	i. Allergy, Hypersensitivities and Chronic Inflammation Gell and Coombs Classification, Type I, II, III and IV Hypersensitivities and immune mediated diseases, Chronic inflammation	15	4
	**Tool Box: Gene transfer including knock-out (e.g., IFN-ϒ)*		
6	Winter Break		
7	**Midterm Examination: Feb. 28, 2017**		
8-9	**ii. Tolerance and Autoimmunity** Organ-Specific and Systemic Autoimmune Diseases, Animal Models for Autoimmune Diseases Mechanisms of Autoimmunity, Autoimmune Disease management	16	2 (Guest lectures by Dr. Shayan Sharif)
	**Tool Box: Whole Animal Experimental animals, Cell culture*		1 (Kaushik)
	c. Immune Response to Infectious Diseases		
9-10	**i. Infectious diseases** Viral and Bacterial Infections, Protozoan Diseases, Diseases Caused by Helminths, Emerging Infectious Diseases	17	2 1
	**Tool Box: Protein biochemistry,*		
11-12	**ii. Vaccines** Active and Passive Immunization, Vaccine strategies Adjuvants	17	3
	**Tool Box: Immunoinformatics, Phage Display (Ab)*		1
	Tool Box: Experimental Systems		
	Whole Animal Experimental animals, Cell culture, Microscopic visualization, recombinant DNA technology, Gene transfer in mammalian cells, Immunoinformatics and Phage display technology etc.	20 and Notes	
	Final Examination: TBA		

Course Readings and Article Presentations

Each student group is required to select a journal article topic for presentation from the following list:

Innate Immunity

- Iwasaki, A., Medzhitov, R., 2015. Control of adaptive immunity by the innate immune system. Nat Immunol 16, 343-353.
- Kumar, S.K.M., Bhat, B.V., 2016. Distinct mechanisms of the newborn innate immunity. Immunol Lett 173, 42-54.
- Magri, G., Cerutti, A., 2015. Role of group 3 innate lymphoid cells in antibody production. Curr Opin Immunol 33, 36-42.
- Panda, S., Ding, J.L., 2015. Natural Antibodies Bridge Innate and Adaptive Immunity. J Immunol 194, 13-20.
- Romo, M.R., Perez-Martinez, D., Ferrer, C.C., 2016. Innate immunity in vertebrates: an overview. Immunology 148, 125-139.

Immune system in Health and Disease

- Doherty, D.G., 2016. Immunity, tolerance and autoimmunity in the liver: A comprehensive review. J Autoimmun 66, 60-75.
- Landolina, N., Levi-Schaffer, F., 2016. Monoclonal antibodies: the new magic bullets for allergy: IUPHAR Review 17. Brit J Pharmacol 173, 793-803.
- Liu, J., Cao, X.T., 2015. Regulatory dendritic cells in autoimmunity: A comprehensive review. J Autoimmun 63, 1-12.
- Maverakis, E., Kim, K., Shimoda, M., Gershwin, M.E., Patel, F., Wilken, R., Raychaudhuri, S., Ruhaak, L.R., Lebrilla, C.B., 2015. Glycans in the immune system and The Altered Glycan Theory of Autoimmunity: A critical review. J Autoimmun 57, 1-13.
- Yang, C.A., Chiang, B.L., 2015. Inflammasomes and human autoimmunity: A comprehensive review. J Autoimmun 61, 1-8.

Infection and immunity

- Cornberg, M., Wedemeyer, H., 2016. Hepatitis C virus infection from the perspective of heterologous immunity. Curr Opin Virol 16, 41-48.
- Eberle, J.U., Voehringer, D., 2016. Role of basophils in protective immunity to parasitic infections. Semin Immunopathol 38, 605-613.
- Kimura, D., Miyakoda, M., Kimura, K., Honma, K., Hara, H., Yoshida, H., Yui, K., 2016. Interleukin-27-Producing CD4(+) T Cells Regulate Protective Immunity during Malaria Parasite Infection. Immunity 44, 672-682.
- Lalor, S.J., McLoughlin, R.M., 2016. Memory gamma delta T Cells-Newly Appreciated Protagonists in Infection and Immunity. Trends Immunol 37, 690-702.
- Yan, M., Wang, H.S., Sun, J.F., Liao, W., Li, P., Zhu, Y., Xu, C.F., Joo, J., Sun, Y., Abbasi, S., Kovalchuk, A., Lv, N., Leonard, W.J., Morse, H.C., 2016. Cutting Edge: Expression of IRF8 in Gastric Epithelial Cells Confers Protective Innate Immunity against Helicobacter pylori Infection. J Immunol 196, 1999-2003.

Important Dates

- January 10 - 1st lecture
- Winter break: Feb. 20-26
- March 10 - Fortieth class day--Last day to drop one semester courses
- April 7 – Classes conclude
- April 10 – Examinations commence
- Journal Article Presentation week: TBA

Course Specific Notes:

- Students are required to regularly check course announcements via CourseLink.
- No e-mail sent to professors will be considered as confidential unless otherwise clearly stated. If pertinent, these could be discussed during the lectures.
- Use of cell phones during the lecture is prohibited.
- Electronic recording of classes is expressly forbidden without prior written consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.
- Students are encouraged to participate in fair faculty and course evaluation which will be announced in advance.
- Any unusual incidence during the conduct of examination must be immediately brought to the attention of Professors in the examination hall.
- Students are not allowed to wear baseball hats (or hats that hide wandering eyes) during the examination. You may bring to examination - calculator, pen, or pencil but NOT backpack, earphones, or cell phone.

Course and University Policies

1. When You Cannot Meet a Course Requirement: When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact, and be prepared to provide supporting documentation. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml
All academic matters concerning this course (e.g., unable to meet an in-course requirement because of illness or compassionate reasons) will be subject to regulations as per university policy.

2. Accessibility: The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible. For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.csd.uoguelph.ca/csd/

The university welcomes feedback on accessibility issues: Email the Human Rights and Equity Office (HREO) at: accessibility@uoguelph.ca or hreinfo@hre.uoguelph.ca or fill in the feedback box on the University's accessibility website or at http://www.uoguelph.ca/accessibility

3. Academic Misconduct: The University is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.
The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

4. E-mail Communication: As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

5. Drop Date: The last date to drop one-semester courses, without academic penalty, is the 40th class day. To confirm the actual date please see the schedule of dates in the Undergraduate Calendar. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

6. Copies of out-of-class assignments: Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

7. Recording of Materials: Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8. Grading: Indicate all course policies regarding in-semester tests and assignment submissions, including time and place for submission of assignments and explicit penalties for late submissions.

9. Religious Matters: As for religious matters, please refer to the university policies at:
http://www.uoguelph.ca/hre/hr/hrholydays.shtml

10. Academic integrity: Academic integroty is integral to education and students are encouraged to review various policies at: http://www.academicintegrity.uoguelph.ca/integrity.cfm.

Campus Resources

The Academic Calendar is the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:
http://www.uoguelph.ca/registrar/calendars/index.cfm?index

If you are concerned about any aspect of your academic program:
- make an appointment with a program counsellor in your degree program. http://www.bsc.uoguelph.ca/index.shtml or https://www.uoguelph.ca/uaic/programcounsellors

If you are struggling to succeed academically:
- There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. http://www.learningcommons.uoguelph.ca/

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. https://www.uoguelph.ca/counselling/
- Student Health Services is located on campus and is available to provide medical attention. https://www.uoguelph.ca/studenthealthservices/clinic
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. http://www.uoguelph.ca/~ksomers/

If you have a documented disability or think you may have a disability:

- The Centre for Students with Disabilities (CSD) can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability. For more information, including how to register with the centre please see: https://www.uoguelph.ca/csd/

10. Co-operative learning

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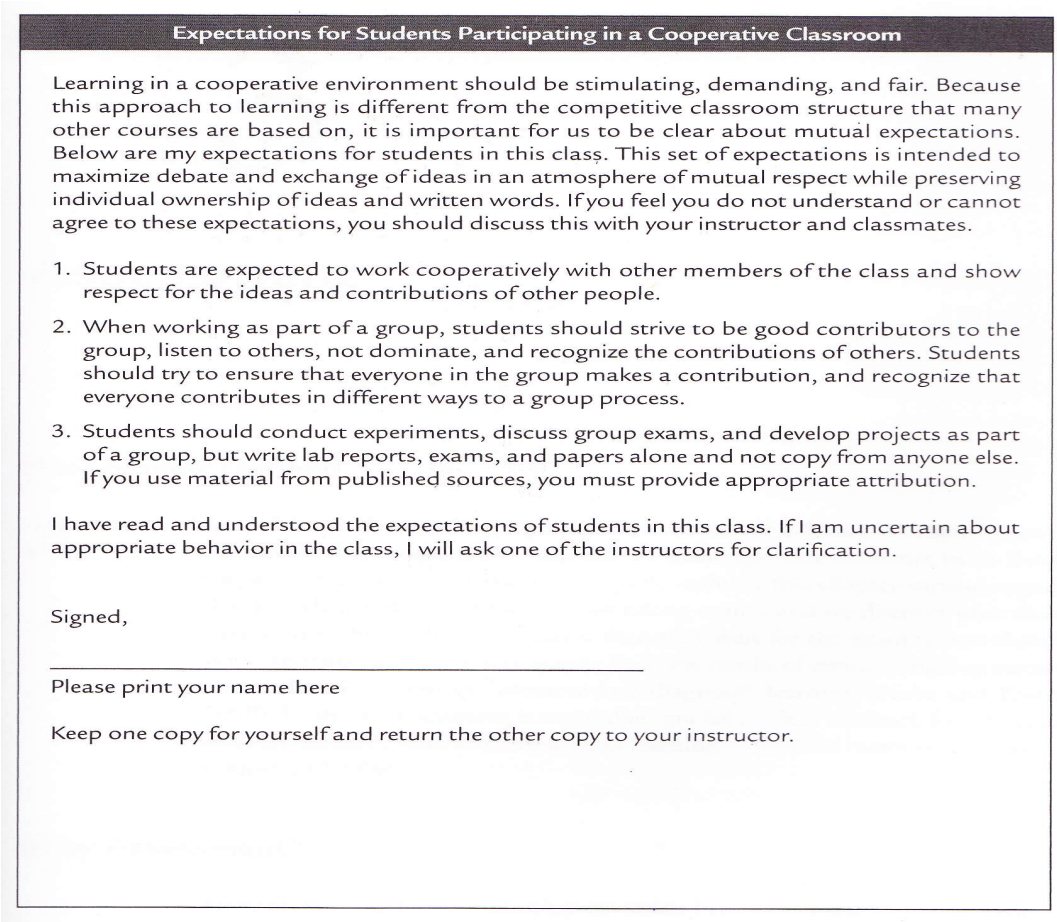

Expectations for Students Participating in a Cooperative Classroom

Learning in a cooperative environment should be stimulating, demanding, and fair. Because this approach to learning is different from the competitive classroom structure that many other courses are based on, it is important for us to be clear about mutual expectations. Below are my expectations for students in this class. This set of expectations is intended to maximize debate and exchange of ideas in an atmosphere of mutual respect while preserving individual ownership of ideas and written words. If you feel you do not understand or cannot agree to these expectations, you should discuss this with your instructor and classmates.

1. Students are expected to work cooperatively with other members of the class and show respect for the ideas and contributions of other people.
2. When working as part of a group, students should strive to be good contributors to the group, listen to others, not dominate, and recognize the contributions of others. Students should try to ensure that everyone in the group makes a contribution, and recognize that everyone contributes in different ways to a group process.
3. Students should conduct experiments, discuss group exams, and develop projects as part of a group, but write lab reports, exams, and papers alone and not copy from anyone else. If you use material from published sources, you must provide appropriate attribution.

I have read and understood the expectations of students in this class. If I am uncertain about appropriate behavior in the class, I will ask one of the instructors for clarification.

Signed,

_____

Please print your name here

Keep one copy for yourself and return the other copy to your instructor.

Journal Article Presentation Evaluation Sheet

Student Name/Group:

Title:

Evaluation	Grade (100)
1. **Background** (Introduction to topic, perspective, rationale, hypothesis, experimental approach, objective)	/20
2. **Analysis** (Understanding, critical thinking, logic)	/20
3. **Conclusions** (appropriate, relationship to objective)	/20
4. **Presentation Quality** (Quality of slides, Grammatically correct, organization, mannerism)	/20
5. **Answer to Questions** (appropriate, depth of response)	/20

Comments:

Total:	/100
Grade:	**/15**
Final Grade:	**/15**

Name and Signature: _____ **Date:** _____