Immunology 850: Experimental Immunology

Room 1515 BSRB: Wednesdays 1:30-4:30 p.m.

Course Directors: **Venkat Keshamouni** and **Michal Olszewski**

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2017 Course outline

Jan. 4, 2017: Introduction to Course and Example Presentations

1. *Monoclonal Antibodies –*

Jan. 11, 2017: Cellular Immunology Techniques

2. *Cell Culture and stimulation--*
3. *Assessing cellular functions –*
4. *Microscopy and Imaging techniques***---**

Jan. 18, 2017: Cellular and Molecular Immunology Techniques-I

5. *Flow Cytometry-1-*

6. *Flow Cytometry Based Analyses-2 : Applications-*

7. Manipulation of Protein Expression in experimental systems-

Jan. 25, 2017: Molecular Immunology Techniques- II

8. Analysis of proteins and their interactions
9. Assessing gene expression and regulation---
10. Signal Transduction mechanisms in the immune system and targeting strategies

Feb.0 1, 2017: Animal models of human disease-I

11. Cell isolation/purification
12. Commonly Used Inbred and Knockout Strains ---
13. Transgenic Mice and BMT---

Feb. 08, 2017: Animal models –II

14. Animal Models of Autoimmunity and tumor immunology ---
15. Allergy and Infection Models---

Feb. 13, 2017: Human studies

16. Immunologic Approaches in Forefronts of Medicine (Diagnostics, Prognosis and Therapy)----
17. Epidemiology, Vaccinations and Immunological tests in Humans---

Feb. 22, 2017: Written Exam and Paper Assignments

Mar. 1, 2017: NO CLASS- Spring Break

Mar. 8, 2017: Paper presentations:

1. Antiviral CD8+ T Cells Restricted by Human Leukocyte Antigen Class II Exist during Natural HIV Infection and Exhibit Clonal Expansion https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5077698/pdf/main.pdf **Eli Olson**
2. The Brazilian Zika virus strain causes birth defects in experimental models https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4902174/pdf/nihms784700.pdf **Emily Yarosz**

Mar. 15, 2017: Paper presentations (2 papers)

3. Trans-presentation of IL-6 by dendritic cells is required for the priming of pathogenic TH17 cells http://www.nature.com/ni/journal/v18/n1/pdf/ni.3632.pdf **Hanna Hong**

4. NLRC3 is an inhibitory sensor of PI3K–mTOR pathways in cancer. http://www.nature.com/nature/journal/v540/n7634/pdf/nature20597.pdf **John Charpentier**

Mar. 22, 2017: Paper presentations (2 papers)

5. RASGRP1 deficiency causes immunodeficiency with impaired cytoskeletal dynamics http://www.nature.com/ni/journal/v17/n12/pdf/ni.3575.pdf **Sephanie Kim**
6. Immunogenic Chemotherapy Sensitizes Tumors to Checkpoint Blockade Therapy http://www.cell.com/immunity/pdf/S1074-7613(16)00033-9.pdf **Emily Yarosz**

Mar 29, 2017: Paper presentations (2 papers)

7. Origin, fate and dynamics of macrophages at central nervous system interfaces http://www.nature.com/ni/journal/v17/n7/pdf/ni.3423.pdf **Eli Olson**
8. A sestrin-dependent Erk–Jnk–p38 MAPK activation complex inhibits immunity during aging http://www.nature.com/ni/journal/v18/n3/pdf/ni.3665.pdf **John Charpentier**

April 5, 2017: Paper presentations (2 papers)

9. Candidalysin is a fungal peptide toxin critical for mucosal infection http://www.nature.com/nature/journal/v532/n7597/pdf/nature17625.pdf **Sephanie Kim**
10. Metabolic gatekeeper function of B-lymphoid transcription factors http://www.nature.com/nature/journal/vaop/ncurrent/pdf/nature21076.pdf **Hanna Hong**

April 7th 2017: Specific Aim due by 5 PM.
Specific aims will be assigned for review by 5 PM on April 8th.
Specific aim Critiques are due by 5 PM on April 11 th.

April 12, 2017: Critiquing of specific aims and conclusion of the class.

Course Objective: To learn basic principles of common immunological techniques with particular emphasis on interpreting published data and problem solving. At the end of this course, the student should be able to better understand how specific methods have been used to overcome obstacles to our understanding of immunology, be better able to analyze the use of specific methods in research articles and the appropriateness of data interpretation, and be better able to design a novel research project and choose effective techniques to explore a new area.

Overview: This course is designed to be highly interactive. Attendance and enthusiastic participation are expected. Students will give ~45 minute-1h assigned PowerPoint slide presentations regarding methodologies (based on the detailed module descriptions) and assigned papers. Presentations should focus less on details of particular protocols and more on general principles and discussion of how techniques are used to solve specific problems. All sessions will be student led and emphasis will be placed on understanding, accuracy, clarity of presentations, and ability to interpret appropriate uses of the methods.

In Class Schedule: The first half of the semester will be devoted to didactic talks on the main techniques used by immunologists as listed in the course schedule. At the end of this section, there will be a written test on the materials presented in class. In the second half of the semester, several journal articles will be assigned for each class time to be discussed as a group. The discussion of each paper will be led by an assigned student, but all students will be responsible for reading the papers and participating in the discussion. At the end of each class session we hope to have an open discussion of the day's topic which may include questions about the specific techniques or a problem solving session in which the students will be asked to apply techniques to a hypothetical research problem. Students are invited and encouraged to suggest topics and papers that they would like to discuss that are not currently covered in the syllabus, but the professors will make final decisions on topic selection.

Outside of Class Suggestions: All students will be expected to have read the assigned papers and to have a working knowledge of the techniques that will be discussed when they come to class each week. There are many resources available to learn about immunological methods including: Current Protocols in Immunology, methods journals, corporate websites, other immunology websites, textbooks and colleagues. Wikipedia is not an accepted source of information unless the student confirms information through other sources. Students are required to be original in preparing their presentations and to cite references.

Specific Aims: At the end of the semester, each student will design a specific aim and write a research design and method section to approach that aim (as for a grant proposal) based on one of the papers assigned in the class. These will be no more than 5000 characters (not including spaces) in length. Two other students will be randomly chosen as anonymous reviewers to critique each proposal. Critiques should be brief (<2000 characters) and are expected to contain constructive criticism of the aims and experimental design. Critiques should be turned in to the instructors at least one day prior to the last class session.

Grading: Letter grades will be based on attendance and participation in the class (5%), score on the midterm exam (40%), presentations (30%), specific aims project (20%), and reviews (5%). There will be no grading curve, and each student will only be graded on the basis of their own work, not on a comparison with how other students performed. Scale: A+ (97-100), A (93-97), A- (90-93), B+ (87-90), B (83-87), B- (80-83), C+ (77-80), C (73-77), Fail (<73). It is hoped that every student will make a concerted effort not only to learn from this class, but also to enhance the learning experience of the other students and the instructors.