Course Syllabus – IMS 510

Course Information

Course Number: IMS 510 WI23
Course Name: Immunology
Term: WI 2023
Start Date: 01/03/2023
End Date: 03/24/2023
Credits: 3.0

Meeting Days / Times

Tuesdays, Thursdays, and Fridays, 12:00-1:00pm PT / 3:00-4:00pm ET
(See Calendar in Canvas for the most up-to-date schedule.)

Location

CA: Graduate Dining Room (Hazen Theory Building)
FL: C212
Online via Zoom

Course Managers

Role	Last Name	First Name	Email Address
Course Director	Constantinides	Michael	constantinides@scripps.edu
Course Director	Nemazee	David	nemazee@scripps.edu
Course Director	Pipkin	Matthew	mpipkin@scripps.edu
TA	An-Adirekkun	My	janadirekkun@scripps.edu
TA	Mosure	Sarah	smosure@scripps.edu

Course Description

This is a team-taught didactic course that assumes little prior knowledge of immunology. Topics to be explored will span the breadth of host defense, immunology and microbiology, and will cover myeloid and lymphoid cell development, innate immunity, immune recognition, immune tolerance and memory, leukocyte signaling, bacteriology, microbial evasion and immune mediated pathology. Virology will be avoided to some extent because it is offered in an independent course. Tuesday and Thursday lectures will be 1-hour long didactic learning sessions. Each Friday one or two students will be assigned to present an assigned paper and to lead the discussion. These sessions will be organized by Professors Constantinides, Nemazee, and Pipkin.

Program Learning Outcomes

By the end of the program, students will have accomplished these objectives:
PLO1: Original Research – graduate students are expected to develop the skills critical for generating high-quality research output. This would include absorbing, recalling, and contextualizing scientific knowledge, evaluating scientific information and data, creating testable hypotheses and investigating hypotheses, mastering scientific tools and techniques, displaying ethical behavior, and receiving and giving feedback.
PLO2: Communication – graduate students are expected to demonstrate the oral, written, and media skills to effectively communicate the impact of a study or a body of work to the greater scientific community and to the public at large using a number of methods.
PLO3: Critical Thinking – graduate students are expected to develop a self-directed process to analyze information, form opinions or judgments, and use this process to improve the quality of their scientific thoughts, navigate problems, and make informed decisions.
PLO4: Intellectual Curiosity – graduate students are expected to acquire the capacity to build their intellectual curiosity and demonstrate problem solving approaches that serve their professional growth and ability to impact a field.
PLO5: Career and Professional Development – graduate students are expected to develop a variety of transferable skillsets throughout their graduate experience, including management and leadership, inclusiveness, resilience, scientific rigor, collaboration, accountability, time management, teamwork, networking, and career planning.

Course Learning Outcomes

Upon completion of this course students will be able to:
CLO1: Identify the cells involved in immunity and hematopoiesis and their specific functions.
CLO2: Understand the multilayered nature of host defense including innate and adaptive immune mechanisms, including the diversity of innate immune sensing.
CLO3: Be familiar with the diversification mechanisms associated with the antigen receptors of adaptive immune cells.
CLO4: Understand the effector mechanisms of immunity, the regulatory mechanisms that promote self tolerance, and the mechanisms that promote immune memory.
CLO5: Understand the role of histocompatibility proteins, the mechanisms of antigen presentation and how they facilitate immune activation and allograft graft rejection.
CLO6: Be familiar with the broad mechanisms of cell movement in response to chemokine and integrin signaling, and of leukocyte trafficking in tissues.
CLO7: Understand the concepts of costimulation and the biochemical nature of coreceptor signaling.
CLO8: Understand the role of cytokines and their important functions in differentiation and lineage commitment.
CLO9: Be familiar with the role of cell survival signals, homeostasis and cell competition in immune regulation.
CLO10: Demonstrate proficiency in designing “thought” experiments using techniques typical of immunological research.
Note: The three goals of the discussion classes are to a) reinforce the didactic learning, b) improve the understanding of frequently used experimental models and techniques, and c) to critically analyze the design, rationale and rigor of published experiments.

Background Preparation (Prerequisites)

Students will find it helpful to read assigned material for each class from the textbook. Individual class instructors may also assign papers or review articles and PowerPoint lectures.

Course Materials

Required: Murphy & Weaver (2016). *Janeway's Immunobiology*. ISBN: 978-0815345053.

Class Format

Lectures are 60 min, given typically with PowerPoint presentations. A total of 23 lectures will be given by thirteen different faculty members. Typically, lecturers are experts in their assigned topics. The assigned textbook is Murphy and Weaver *Janeway's Immunobiology* 9th Edition but individual lecturers are free to assign additional reading, typically recent review articles.

Final Exam: Specific Aims Page

To demonstrate understanding of the course topics, students will write a specific aims page for an original research idea that's unrelated to their research rotation topics (previous, current, or future). The suggested format is an introductory paragraph that describes a significant problem, a second paragraph that introduces your proposed solution, 2-3 specific aims with a description of the experimental approach, and a concluding paragraph that describes why your approach ins innovative. An example of this can be found here: https://www.biosciencewriters.com/NIH-Grant-Applications-The-Anatomy-of-a-Specific-Aims-Page.aspx

Length is limited to a single page written in size 11 font with 0.5" margins, per NIH guidelines. References can be listed on a second page. A 3-4 sentence description of your proposed project should be emailed to the TAs by **Friday, March 3rd** for approval, with the final specific aims page due **Friday, March 17th.**

Expectations and Logistics

Students are expected to attend class, read the assignments and take the scheduled tests according to the rules and guidelines.

Attendance Statement

Students are expected to attend all classes. Students who are unable to attend class must seek permission for an excused absence from the course director or teaching assistant. Unapproved absences or late attendance for three or more classes may result in a lower grade or an "incomplete" for the course. If a student has to miss a class, he or she should arrange to get notes from a fellow student and is strongly encouraged to meet with the teaching assistant to obtain the missed material.

Scientific and Professional Ethics

The work you do in this course must be your own. Feel free to build on, react to, criticize, and analyze the ideas of others but, when you do, make it known whose ideas you are working with. You must

explicitly acknowledge when your work builds on someone else's ideas, including ideas of classmates, professors, and authors you read. If you ever have questions about drawing the line between others' work and your own, ask the course professor who will give you clear guidance. Exams must be completed independently. Any collaboration on answers to exams, unless expressly permitted, may result in an automatic failing grade and possible expulsion from the Graduate Program.

Technology Requirements and Support

For issues related to Canvas, please contact the Graduate Office by email at: gradprgm@scripps.edu or by phone at: 858-784-8469.

Course Grading

Grading is in accordance with the academic policies of the Skaggs Graduate School. The breakdown of grading is as follows:

- Paper Presentations and Participation: 50%
- Exams (3 take-home quizzes and an original grant proposed Specific Aims page): 50%

Letter Grade	Percent	GPA	Description
A	93-100	4.00	Outstanding achievement. Student performance demonstrates full command of the course subject matter and evinces a high level of originality and/or creativity that far surpasses course expectations.
A-	90-92	3.67	Excellent achievement. Student performance demonstrates thorough knowledge of the course subject matter and exceeds course expectations by completing all requirements in a superior manner.
B+	87-89	3.33	Very good work. Student performance demonstrates above-average comprehension of the course subject matter and exceeds course expectations on all tasks as defined in the course syllabus. There is notable insight and originality.
B	83-86	3.00	Satisfactory work. Student performance meets designated course expectations and demonstrates understanding of the course subject matter at an acceptable level.
B-	80-82	2.67	Marginal work. Student performance demonstrates incomplete understanding of course subject matter. There is limited perception and originality.
C+	77-79	2.33	Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course subject matter. There is severely limited or no perception or originality. Course will not count toward degree.
C	73-76	2.00	Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course subject matter. There is severely limited or no perception or originality. Course will not count toward degree.
P	73-100	0.00	Satisfactory work. Student performance demonstrated complete and adequate understanding of course subject matter. Course will count toward degree.

F	0-72	0.00	Unacceptable work/Failure. Student performance is unacceptably low level of knowledge and understanding of course subject matter. Course will not count toward degree. Student may continue in program only with permission of the Dean.
I		0.00	Incomplete is assigned when work is of passing quality but is incomplete for a pre-approved reason. Once an incomplete grade is assigned, it remains on student's permanent record until a grade is awarded.
W		0.00	Withdrew from the course with Dean's permission beyond the second week of the term.

- All courses will be recorded and maintained in the student's permanent academic record; only courses that apply towards the degree will appear on the academic transcript. Non-credit or audited courses will not appear on the transcript.
- 4 core courses taken for a letter grade (pass = B- or higher for a core course)
- 2 elective courses taken pass/fail (pass = A, B, C for an elective)

Course Summary:

Date	Details
Mon Jan 2, 2023	**No Class (New Year's Day day off)**
Tue Jan 3, 2023	**Overview (Nemazee)**
Thu Jan 5, 2023	**Innate Immunity I: bacteria, TLRs, NFkB Jak/STAT (Nemazee)**
Fri Jan 6, 2023	**Innate Immunity II: C', inflammosome (Nemazee)**
Tue Jan 10, 2023	**Innate Immunity III (Nemazee)**
Thu Jan 12, 2023	**Innate Immunity IV: NK cells (Paust)**
	Midterm Exam 1 on Innate Immunity, NK cells
Fri Jan 13, 2023	**Paper Discussion Template (TAs)**
Mon Jan 16, 2023	**No Class (Martin Luther King Jr. Day)**
Tue Jan 17, 2023	**MHC (Teyton)**
Thu Jan 19, 2023	**Antigen Presentation (Teyton)**
Fri Jan 20, 2023	**Paper discussion (Pipkin)**
Tue Jan 24, 2023	**Antibody and Antigen Receptor Signaling (Nemazee)**
Thu Jan 26, 2023	**V(D)J Recombination, B Cell Development (Nemazee)**
Fri Jan 27, 2023	**Paper Discussion (Constantinides)**
Tue Jan 31, 2023	**Antibody Class Switch, Somatic Mutation (Nemazee)**
Thu Feb 2, 2023	**Germinal Centers and B Cell Memory (Voss)**
	Midterm Exam on Aspects of B Cell Development, VDJ, MHC, Ag Presentation
Fri Feb 3, 2023	**Paper Discussion (Nemazee)**
Tue Feb 7, 2023	**TCR and T Cell Development (Constantinides)**
Thu Feb 9, 2023	**TCR Signaling (Solt)**
Fri Feb 10, 2023	**Paper Discussion (Pipkin)**
Tue Feb 14, 2023	**CD8 T Priming, Costimulation, Cross-Presentation, Memory (Pipkin)**
Thu Feb 16, 2023	**T Cell Mediated Immunity to Infection (Teijaro)**
Fri Feb 17, 2023	**Paper Discussion (Constantinides)**

Mon Feb 20, 2023	**No Class (President's Day)**
Tue Feb 21, 2023	**CD4 T Priming, Costimulation, Polarization, Memory (Mendoza)**
Thu Feb 23, 2023	**Immunodeficiency (Mendoza)**
	Midterm Exam on B Cell Immunity, TCR and T Cell Development
Fri Feb 24, 2023	**Paper Discussion (Nemazee)**
Tue Feb 28, 2023	**Innate and innate-like lymphocytes (Melamed)**
Thu Mar 2, 2023	**Barrier immunity and the microbiota (Constantinides)**
Fri Mar 3, 2023	**Paper Discussion (Pipkin)**
Tue Mar 7, 2023	**T Cell Mediated Immunity to Tumors (Sherman)**
Thu Mar 9, 2023	**Allergy (Kawakami)**
Fri Mar 10, 2023	**Paper Discussion *if needed* (Constantinides)**
	Lightning Round: Feedback
Tue Mar 14, 2023	**Autoimmunity (Kono)**
Thu Mar 16, 2023	**Transplantation (McKay)**
Fri Mar 17, 2023	**Original Grant Specific Aims**
Tue Mar 21, 2023	**Student grant scores due**