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BIOM 502.01: Advanced Immunology

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Advanced Immunology (BIOM 502)
Spring 2022 Semester
Syllabus

Professor: Scott Wetzel Office: CHCB 216 Phone: 243-2168

Email: scott.wetzel@umontana.edu

Meeting Time: Wednesday 9:00 – 10:30 and Friday 9:00 - 10:30

Meeting Location: SB 270 and <https://umontana.zoom.us/j/98691232615>.

Textbook: None Required. Course will be based on current review articles and primary literature.

Recommended for reference: Kuby Immunology 8th ed. or Janeway's Immunobiology 9th ed.

Course Overview: This course is designed as a literature survey of current topics in immunology. Each session (or week) we will cover a topic by reading a review article as well as one or more related research articles from the primary literature. This is a discussion-based course and as such these **ARTICLES MUST BE READ BEFORE ATTENDING CLASS**. The review articles are listed in the schedule below. In order to keep the class as current with the literature as possible, under extraordinary circumstances substitutions of the primary literature articles may be made up to 2 weeks prior to the class in which they will be discussed. No changes in reading material will be made within the 2 weeks of a particular lecture.

Grading will be based on the following:

100 points – Midterm exam (take home exam)

105 points – Grant Proposal (100 for paper, 5 pts for Letter of Intent)

50 points – Research Article Reviews

35 Points – Grant review

30 points – attendance, participation, preparation, and consciousness

Final grades will be based upon a straight 10% grading scale based upon the total number of points (90% for A, 80% for B, 70% for C, 60% for D, below 60% = F). Late policy is outlined below.

ASSIGNMENT DUE DATES

Midterm Exam: Emailed out April 1, Due 5 PM April 8

Grant Letter of Intent: Due 5 pm April 15

Final Grant Proposal: Due 5 pm Wednesday May 4

Grant Reviews: Due 5 pm Monday May 9

* ALL Papers turned in electronically, MUST be in .doc/.docx or .pdf format (as indicated)

Class Schedule

Week	Dates	Monday	Wednesday
1	Jan 21		Syllabus, Review of Immunology
2	Jan 26 Jan 28	Review of Immunology	No Class
3	Feb 2 Feb 4	Review of Immunology	Review of Immunology
4	Feb 9 Feb 11	Review of Immunology	Immunological Methods
5	Feb 16 Feb 18	Immunological Methods	Pillars of Immunology
6	Feb 23 Feb 25	Pillars of Immunology	1 st SARS-CoV-2 paper
7	Mar 2 Mar 4	mRNA vaccination elicits potent memory B cells that recognize SARS-CoV-2 variants	A SARS-CoV-2 antibody broadly neutralizes coronaviruses and variants
8	Mar 9 Mar 11	Robust SARS-CoV-2 T cell immunity is maintained at 6 months following 1° infection	Lung-Resident T Cells Do Not Mediate Protection against 2° SARS-CoV-2 Infection
9	Mar 16 Mar 18	Early IFN- α signatures & persistent dysfunction are distinguishing NK features in severe COVID-19	Antigen and checkpoint receptor engagement recalibrates T cell receptor signal strength
10	Mar 23 Mar 25	NO CLASS – Spring Break	
11	Mar30 Apr 1	CD8 ⁺ T Cells Expressing an HLA-DR1 CAR Target Autoimmune CD4 ⁺ T Cells	Blockade of the PD-1 unleashes ILC2-dependent antitumor immunity in melanoma Midterm Mailed out Apr 1
12	Apr 6 Apr 8	NO CLASS – Work on Midterm	NO CLASS – Work on Midterm Midterm DUE Apr 8 at 5PM
13	Apr 13 Apr 15	LN Stromal MHC Class II Expression Promotes MHC Class I – Restricted CD8 T Cell Conversion to CD4 T _{reg}	Decidual NK Cells Transfer Granulysin to Selectively Kill Bacteria in Trophoblasts Grant LOI Due Apr 15
14	Apr 20 Apr 22	Environmental allergens trigger type 2 inflammation through ripoptosome activation	Metabolic Consequences of IgE- and Non-IgE –Mediated Mast Cell Degranulation
15	Apr 27 Apr 29	FDC restrict IL-4 availability in GC & foster memory B cell	Ribosome-Targeting Antibiotics Impair T Cell Effector Function
16	May 4 May 6	Endotoxin induces Coagulation via Gasdermin D FINAL Grant DUE May 4 5PM	Sequence of signaling Determines T Cell Activation copy
Week of May 9-13		Grant Reviews DUE MAY 9 AT 5PM Final Grant Review Session	

Reading:

All posted articles will be on the course Moodle site. While no changes are anticipated, as noted above the primary literature articles are subject to substitution up to 2 weeks prior to the class meeting. You will be notified in class and I will email you .pdf files of any substituted papers. **ALL ARTICLES AND REVIEWS ARE TO BE READ BEFORE CLASS!**

Research Article Reviews:

Students will read and write a synopsis/review of 5 separate immunologically-related, primarily literature articles. They should be related to topics covered in this course. They must be double-spaced with a MAXIMUM of 2 pages each. The articles are to be chosen by the students and must be in peer-reviewed journals from 2017 to present. I have not given specific due dates for these summaries and they can be turned in any time during the semester. I STRONGLY URGE you to write these summaries throughout the semester rather than waiting for the last day. The last date they will be accepted is May 11. These must be in PDF format.

Grant Proposal

Each student will be responsible for writing a grant proposal **based upon one of the topics presented in the course.** We will follow the format of a postdoctoral fellowship application to the Life Science Research Foundation (LSRF.org).

Letter of Intent (Due 5 p.m. April 15)

Each student will submit a letter of intent (LOI) to me on or before 5 p.m. April 3. The letter will be a 1 PAGE summary of your topic. In your letter, you will include an introductory paragraph, your aims of the project, and a paragraph of expected results and relevance to knowledge of the field. You want to identify the question you are asking, and relate why you have chosen this area to examine and why it is important.

I will review your LOI and will return it with suggestions on how to proceed. If there are significant problems with your intended proposal, I will meet with you individually to formulate an alternative approach.

Grant Application (Due 5 p.m. Wednesday May 4)

There is a **10 PAGE MAXIMUM including references.** You are limited to 10 pages, single-spaced with at least a 1 inch margin on all sides. You must use Arial font, no smaller than 11 pts. You do NOT have to fill 10 pages. If you can be more concise and do it in less than 10 pages, do it. **These MUST be in .doc or .docx formats ONLY.**

Cover Page (1 page):

Include Title of Project, Author, Institution and Abstract. Your abstract should be a single paragraph (200 words maximum) summarizing the goals of the research project and should contain a brief description of your planned research (i.e. your approach to address your goals)

Specific Aims (1 page):

In a paragraph define the purpose of the proposal and then numerically list your specific aims of the research proposal. The specific aims should be in the form of a testable hypothesis (e.g. "We hypothesize that HAART therapy for HIV infection causes a significant decrease in CD8⁺ T cells" rather than "We want to see if HAART therapy for HIV infection does something to CD8 T cells". Don't get too carried away here, two or three aims will usually suffice. Remember that a successful

grant will have 2 or 3 specific aims that are related, but not dependent upon the others. In other words if specific aim 1 fails, specific aim 2 should still be a viable project.

Background and Significance (1 - 2 Pages):

You want to summarize very briefly the background findings from the literature that support your hypothesis and lead you to the specific aims you listed above. This should also include in a separate paragraph or two the significance of the proposed project in the area of your grant and to our knowledge of immunology as a whole. This is where you want to sell your ideas – tell the reader why your ideas are better than everyone else's in the applicant pool and why you deserve the \$51,000 a year salary.

Research Proposal: 5 pages

In a logical sequence, explain and justify the methods you will use to accomplish your research goals outlined in the specific aims section. Identify potential pitfalls with your approach. Do you have any alternative approaches in case the first one fails? You should use citations from the literature and adequate protocol descriptions to explain the findings for the reviewer.

References: (1 Page maximum)

Citations and references must follow the format of the Journal of Immunology (<http://www.jimmunol.org/misc/authorfulllength.shtml#manuscript>). References must be numbered as they appear in the text. All authors must be listed for each reference. If citations are included in tables or in figure legends, they must be numbered according to the position of citation of the table or figure in the text. Only published papers and papers "in press" may be included in the References.

Grant Review:

Due 5PM Monday May 9

When grants are received, they will be given a grant number and distributed to members of the study section after removal of identifying information. Each student will serve as a primary reviewer of one other grant and is responsible for writing a comprehensive 2 page critique of that grant. Directions for the review will be given when grants are distributed. This critique is to be turned in and distributed to the entire class prior to our final meeting. We will meet during finals week to discuss each grant and determine which are to be funded (using current NIAID paylines). Please note, these reviews will not affect the grading of the proposal, but your critique of the grant will be graded. This is your final exam so be thorough!

Late Work:

Late work is strongly discouraged. **For assignments with a specified due date, a late penalty of 10% per day of tardiness will be subtracted from the grade.** There is **ONE EXCEPTION** to this rule – **THE GRANT APPLICATION WILL NOT BE ACCEPTED LATE!**

Learning Outcomes:

- By the end of semester the students should be able to critically evaluate primary literature.
- They should be able to explain scientific methods including flow cytometry, production of transgenic animals, and imaging techniques.
- They will be able to critique experimental approaches and identify any shortcomings.

- They should be able to propose alternative approaches and methods to address any issues that they have identified in a paper.
- They should be able to propose experiment to extend/expand on the focus of a manuscript.
- They should be able to identify gaps in the scientific knowledge.
- They should be able to write a cogent, and comprehensive grant application that addresses gaps in the scientific knowledge and proposes experiments that will function to fill in these gaps.
- They will be able to evaluate and critically review grant proposals and identify shortcomings in the designed experiments.

ODE Accommodations: The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (ODE <http://www.umt.edu/dss>). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. I will work with you and DSS to provide appropriate accommodation.

Please note: You are bound by the University of Montana student conduct code. All work will be performed solely by the student. Plagiarism and cheating of any kind will result in referral for disciplinary action and you will receive a zero on the assignment. This will significantly impact your final course grade.