

BSCI 422 -- Immunology
Summer 2020
Dr. Kenneth Frauwirth

Room/time: Online

Text: *Immunology 7th Edition* by Kuby

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Website for the Course: ELMS.UMD.EDU

The website will be used to post all course information. This will include lecture notes and recordings, problem sets, and exam keys.

Course Requirements:

There will be five lectures per week. Lectures will be posted online as Panopto recordings. PowerPoint and PDF versions of the lecture slides will be posted online in advance. In addition to lecture material, there will also be problem sets posted once or twice per week. Students will be expected to answer the problem sets on their own and submit the answers online. Students should also be prepared to discuss the answers in live Zoom discussion sessions. There will be a total of 10 points toward the final grade awarded for class participation (5 points for completing the problem sets online, and 5 points for participating in discussion sessions). There will be *3 exams plus a cumulative final*, all of which will be administered online via ELMS. Each exam will be worth 30 points toward the final grade (100 points total). **You will only be graded on your top 3 exam scores, so you have the option to drop your lowest exam grade, including the final.** Exams will emphasize material covered in lecture, but will also include information presented in the textbook and on the problems. The format of the exams will include multiple choice, T/F, matching, short answer, and some short essays.

Grading will be as follows:

A+ 97-100%	C+ 77-79.99%	F <60%
A 93-96.99%	C 73-76.99%	
A- 90-92.99%	C- 70-72.99%	
B+ 87-89.99%	D+ 67-69.99%	
B 83-86.99%	D 63-66.99%	
B- 80-82.99%	D- 60-62.99%	

There will be NO make-up exams, except for University-approved excuses. If you miss one of the exams, that exam will automatically be your drop exam. If you feel an error has been made in grading an exam, you can submit an exam for re-grading to Dr. Frauwirth no later than one week after the exam date, with an explanation *in writing* justifying why you think more points should be awarded. You should use ink to take your exam if you wish to submit a re-grade. The date of the final exam is set by the University and cannot be changed.

Additional Information:

To request disability accommodations, please contact the Disability Support Service office, 0106 Shoemaker Hall, 301-314-7682.

"The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.studenthonorcouncil.umd.edu/whatis.html>."

Lecture Schedule

<u>Date</u>	<u>Topic</u>	<u>Book Chapter -</u>
6/1	1. Introduction to Immunology Course requirements Intro: Smallpox, AIDS, Autoimmunity, Anamnestic response, CMI and humoral Antigen, epitope, hematopoiesis, nodes, cells	1, 2
6/2	2. Innate versus Adaptive Immunity Innate defense, skin, phagocytic cells TLR's and NFkB translocation Introduction to cytokines, inflammation	2, 5
*6/3	3. Antibody Structure and antigen-antibody interactions Antibody structure and function Antigen-antibody interactions, Ig Isotypes The biology of the different Ig classes	3
6/4	4. Measurement and use of antibodies in immunological assays Precipitation and agglutination, ELISA, Monoclonal antibodies, Flow cytometry	3, 20
*6/5	5. Antibody Genes and Ig gene rearrangements VDJ Rearrangement, affinity maturation Recombinase, 12/23 rule	7
6/8	6. B cell development and the germinal center IgG, IgM, IgA, IgE, Heavy chain rearrangement Isotype switching, B ₁ B cell Allelic exclusion, affinity maturation	10, 12
*6/9	7. The complement system in host defense Classical, Alternative, Biological consequences of C' activation Signaling for activation/anergy	6
6/10	Exam I	
6/11	8. Overview of CMI T cell activation, CMI, T cell expansion and activation host immunity to intracellulars	7, 11
6/12	9. The MHC gene complex The MHC genes and the proteins, MHC polymorphisms	8
*6/15	10. Antigen Processing and presentation Phagocytosis, P/L fusion,	8

	DC, Mac, B cell, Class II, Class I proteasome, TAP, etc	
6/16	11. T cell development and the T cell repertoire Positive and negative selection T cell maturation, T cell "markers"	9
6/17	12. Signaling in T cells, lymphocyte activation T cell signal transduction, ITAM, lck, Zap-70, PIPLC, NFAT, AP-1, NFKB B cell signal transduction	3, 11
*6/18	13. T cell activation and the immunological synapse Co-stimulation and signaling through CD28 TCR structure - $\alpha\beta$ TCR gene rearrangement g/d T cells	11
6/19	Exam II	
6/22	14. Adhesion receptors in the immune system FcR, CR clearance, Chemotaxis Integrins, selectins, chemokines	5, 6, 14
*6/23	15. Cytokines and cytokine receptors List of cytokines, cytokine receptor classes Receptor signaling, common γ chain receptors the Jak/Stat pathway - IFN γ , IFN α/β	4
6/24	16. Cytotoxic T cells CTL killing, activation, perforins ADCC, CD4 T cell help Apoptosis in the immune system	13
6/25	17. NK cells Activating and inhibitory receptors KIRs, DAPs, ITIMs Phosphatases and negative signaling	5, 13
*6/26	18. Immunodeficiency and Immunosuppression B cell immunodeficiencies, X-linked agamma T cell deficiencies – adenosine deaminase, X-linked SCID Immunosuppression, steroids, cyclosporin	16, 18
6/29	19. Immune deviation and disease; Th1, Th2, Th17 Th1 Th2 Th17 T cells, Receptor quantitation Scatchard analysis	4, 11
6/30	20. Immediate hypersensitivity and allergy Type 1, 2, 3, and 4 hypersensitivity Mast cell degranulation following FcER crosslinking	15
7/1	Exam III	
*7/2	21. Autoimmunity and tolerance Clonal deletion, anergy Self-tolerance, autoimmunity	16
7/3	22. Viral immunity Viral structural proteins, CD4 depletion Viral immunity, viroceptors, virokines Latency, antigenic variation Overview of viral immunity	18
*7/6	23. Alloreactivity and transplant rejection Acute and chronic rejection Graft versus host, CD4 help of CD T cells Blood group antigens	16
7/7	24. Vaccines and adjuvants Small pox, attenuation	17

	Pediatric vaccines, DNA vaccines adjuvants and their action	
*7/8	25. Tumor Immunity NK cells, novel immunotherapies antibodies, TILs DC-based vaccines	19
7/9	Bacterial infection, viral infection	
7/10	26. Review - No lecture slides	
	FINAL EXAM	

BSCI 422 - Problem Set Due Dates

<u>Due Date</u>	<u>Assignment</u>
6/2	Problem set #1
6/4	Problem set #2
6/8	Problem Set #3
6/14	Problem Set #4
6/17	Problem Set #5
6/22	Problem Set #6
6/25	Problem Set #7
7/1	Problem Set #8
7/5	Problem Set #9
7/7	Problem Set #10