



Biochemistry 550: Topics in Medical Biochemistry

Credits: 2

Canvas Course URL: <https://canvas.wisc.edu/courses/125830>

Course Designations and Attributes

Level: Advanced

Breadth: Biological Sciences; counts toward the Natural Science requirement

L&S Credit; counts as Liberal Arts and Science credit

Meeting Time and Location

Tu Th; 8:50-9:40AM; 175 Biochemistry (Khorana Auditorium)

Instructional Mode: all face-to-face

How Credit Hours are met by the Course

This class meets for two 50-minute class periods each week over a fall/spring semester of approximately 15 weeks. Classroom instruction includes lectures, question and answer, discussion, and review with faculty instructors, occasional guest lecturers, and a graduate teaching assistant. Students are expected to spend a minimum of 4 hours/week on learning activities outside the classroom (reading, problem sets, studying, and preparing a poster). Most students spend 6-8 hours/week on these activities.

INSTRUCTORS AND TEACHING ASSISTANTS

Instructor Title and Name

Dr. Colleen Hayes, Professor

2260 Biochemical Sciences

cehayes@wisc.edu

Dr. Mark Meyer, Instructor

545 Biochemistry Laboratories

markmeyer@wisc.edu

Instructor Availability

Recognizing that specific office hours may not accommodate students who have other obligations during those times, and that the staff are actively engaged in research, the staff will be available for student consultations by appointment

Instructor Email/Preferred Contact

Please contact the instructors by e-mail

Teaching Assistant

Ms. Delia Scoville, Teaching Assistant
435 Biochemistry Laboratories
dscoville@wisc.edu

TA Office Hours

By appointment

TA Email/Preferred Contact

Please contact the TA by e-mail

OFFICIAL COURSE DESCRIPTION

Course Description

Lectures. Biochemical and molecular analysis of selected human diseases. Topics will include lipid metabolism and atherosclerosis, cell cycle regulation and oncogene function in cancer, and human immunodeficiency virus (HIV) structure, life cycle, and mechanism of acquired immunodeficiency disease syndrome (AIDS).

Requisites

Students must complete Biochemistry 501 or Biochemistry 507 (or the equivalent) before enrolling in Biochemistry 550

LEARNING OUTCOMES

Course Learning Outcomes: students who complete this course will be able to:

- Apply the scientific method to generate new mechanistic knowledge
- Distinguish between correlated observations and a true chain of causal relationships
- Describe basic biochemical mechanisms underlying these diseases: cancer, HIV-AIDS, cardiovascular disease, metabolic syndrome, type-2 diabetes
- Identify at least one significant unanswered question that constitutes the research frontier and informs the research agenda for these diseases
- Read and understand reviews and original research papers in these disease areas
- Interpret published data in these disease areas
- Collaborate with others in small working groups
- Prepare a scientific poster

- Develop scientific problem solving skills to deploy in the future workplace

GRADING

- 25% Cancer exam (10 lectures)
- 20% HIV exam (7 lectures)
- 15% Cardiovascular disease, metabolic syndrome, diabetes exam (5 lectures)
- 20% Problems (8 sets)
- 20% Poster Project
- Point totals out of 100 points will be fitted to a curve
- In the past 5 years, the class means were 84, 84, 85, 84, and 86%
- Students with scores clustering near the mean will be awarded a B
- Students with scores significantly above the mean will be awarded an A; typically these students comprise 20-25% of the class
- Students with scores significantly below the mean will be awarded a C; typically these students comprise 5-10% of the class
- Students with scores very significantly below the mean will be awarded a letter grade of D or F; this is very rare (2/250 students between 2013 and 2017)

DISCUSSION SESSIONS

The TA will conduct a discussion session before each exam

LABORATORY SESSIONS

Does not apply

REQUIRED TEXTBOOK, SOFTWARE & OTHER COURSE MATERIALS

- No textbook is required; PDF files of reading assignments (scientific research papers and reviews) will be available for download from the course website.
- Microsoft Word and PowerPoint software for preparing problem set answers and posters is freely available for personally-owned computers from the Campus Software Library ([campus software library](#)) and on machines in several Campus Computer Labs. Most computer labs have staff available to assist, Mac and Windows OS, evening and weekend hours, and assistive technology ([campus computer labs](#)).
- Adobe Illustrator software for preparing posters is available in some Campus Computer Labs. We recommend the CALS computer lab (1675 Observatory Dr; [Cals computer lab](#)) and the WisCel center on the 4th floor of Wendt Commons (215 N Randal Ave; [Wendt WisCel](#)). These labs have the most complete software collections.
- Large format poster printing is available (\$4/ft²) at Steenbock Library ([Steenbock poster printing](#)) and College Library ([College Library poster printing](#)).

EXAMS

- There will be three 50-minute exams, each covering only one topic; questions will be drawn from lectures and problem sets
- The exams on cancer and human immunodeficiency virus mechanisms will be given in class; the exam on cardiovascular disease, metabolic syndrome, and diabetes will be given during the summary period
- All exams are closed-book with no access to notes and electronic devices (phones and calculators); exam dates are shown in the table on p. 5
- Exams may only be re-scheduled for a student attending an out-of-town scientific meeting on the exam date (discuss your plans with the instructor well in advance of the exam date), a student with a serious illness requiring confinement, medical care, and/or hospitalization, or a student whose immediate family member (parent, grandparent, or sibling) is stricken by a serious illness or death

HOMEWORK & OTHER ASSIGNMENTS

Problem Sets

- Students must work independently but are permitted to consult with the TA
- The problems are drawn from research papers and lectures; problems involve data evaluation, interpretation, and/or calculations
- Nine problem sets will be posted on the course website; students must complete and submit 8 of 9 problem sets, or complete all of them and select one problem set to be dropped
- Problem sets are submitted online at the Canvas Assignments Page, or handed to the TA before 5:00PM on the due date (shown in the table on p. 5)
- Answer keys will be posted 24 h after the due date and time; late submissions for a maximum of 50% credit will not be accepted after answer keys have been posted

Poster Project

- Students will work in teams of 3 to prepare a poster presenting a high impact published research paper
- Teams will be assigned to present one of three research papers they have chosen from a menu of papers selected by the instructors
- The TA will assist students in the formation of teams and selection of research papers
- Posters will be displayed in the Biochemistry Atrium during the final two weeks of class

OTHER COURSE INFORMATION

TOPICS IN MEDICAL BIOCHEMISTRY						
Biochemistry 550						
Syllabus	2019					
CLASS #	DATE	TOPIC	INSTRUCTOR	SUBJECT	POSTER PROJECT; Scoville	PROB. DUE
1	Jan 22	Overview	Hayes	Course overview, cancer overview, oncogene theory		
2	Jan 24	Cancer	Hayes	Eukaryotic cell cycling and survival	TA & students start forming poster teams	
3	Jan 29	Cancer	Meyer	Cell cycle regulators: extrinsic signals (recep. Tyr. kinases)		#1
4	Jan 31	Cancer	Meyer	Cell cycle regulators: intrinsic signals (RAS; kinase cascades)		
5	Feb 5	Cancer	Meyer	Cell cycle regulators: extrinsic and intrinsic death signaling		#2
6	Feb 7	Cancer	Meyer	Genome instability: DNA damage and repair		
7	Feb 12	Cancer	Meyer	Guardians of genome stability: tumor suppressors		#3
8	Feb 14	Cancer	Meyer	A case study: breast cancer	TA finalizes poster teams	
9	Feb 19	Cancer	Meyer	Molecular therapy and cancer genomics	Teams view research paper choices	#4
10	Feb 21	Cancer	Hayes	Breakthrough: immunotherapy		
11	Feb 26	Cancer	Scoville	Discussion and review		
12	Feb 28	Cancer	Meyer	EXAM 1		
13	Mar 5	HIV	Hayes	HIV natural history and pathogenesis	Teams submit 3 paper choices to TA	
14	Mar 7	HIV	Hayes	HIV structure and life cycle	TA finalizes research paper assignments	
15	Mar 12	HIV	Hayes	HIV cDNA integration and transcription		#5
16	Mar 14	HIV	Hayes	HIV RNA translation and assembly		
Mar 16-24 SPRING BREAK						
17	Mar 26	HIV	Hayes	HIV APOBEC defense and immune defense		#6
18	Mar 28	HIV	Hayes	HIV dynamics, immune system defeat, and vaccine failure	Optional: submit poster draft for critique	
19	Apr 2	HIV	Meyer	HIV anti-retroviral therapy		#7
20	Apr 4	HIV	Scoville	Discussion and review	Reserve time at a poster print shop	
21	Apr 9	HIV	Hayes	EXAM 2		
22	Apr 11	POSTERS	Scoville		Display poster, Biochem. Atrium, 8:50 am	
23	Apr 16	CVD	Meyer	Cardiovascular disease overview		
24	Apr 18	CVD	Meyer	Lipid metabolism and familial hypercholesterolemia		
25	Apr 23	CVD	Meyer	Tangier disease		#8
26	Apr 25	CVD	Meyer	Metabolic syndrome		
27	Apr 30	CVD	Meyer	Type II diabetes		#9
28	May 2	CVD	Scoville	Discussion and review	Remove poster by 5:00 pm	
29	May 9	CVD	Meyer	EXAM 3; 7:45-9:45AM; room to be announced		
C.Hayes	2260 Biochem. Sciences Bldg, hayes@biochem.wisc.edu					
M. Meyer	545 HF DeLuca Biochem. Laboratories, markmeyer@wisc.edu					
D. Scoville	435 HF DeLuca Biochem. Laboratories, dscoville@wisc.edu					

RULES, RIGHTS & RESPONSIBILITIES

- See the Guide's [Rules, Rights and Responsibilities](#)

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA." <http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>

DIVERSITY & INCLUSION

Institutional statement on diversity: "Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." <https://diversity.wisc.edu/>