



School of Molecular & Cellular Biology
MCB 354, Spring 2024
Biochem & Phys Basis of Life, 3 Credit Hours

Instructor/Instructional Team

MCB Instructional Program Office
127 Burrill Hall
phone/voicemail: 244-6239

Melissa Reedy, Coordinator for Instruction, MCB 150/151/354
415 Burrill Hall
email: murray@illinois.edu
office/voicemail: 217-265-6379

Dr. Chu-Young Kim, Professor, MCB 354
Email: chuyoung@illinois.edu

Dr. Auinash Kalsotra, Associate Professor, MCB 354
Email: kalsotra@illinois.edu

Class Meeting Schedule (*all times are recorded in CST*)

Lecture MWF from 9-9:50 AM (124 Burrill Hall)

Discussion for 50 minutes based on individual class schedule

Instructor Office Hours: Monday and Friday 10-11 AM in 5 Burrill Hall, check Canvas page for updated information throughout the semester.

TA Help Sessions: TBD, check Canvas page for updated information.

Student Learning Outcomes

At the end of the course, through assignments, discussions, activities and assessments, students will be able to:

- understand current biochemistry terms and concepts.
- analyze and interpret data sets.
- implement the chemistry and metabolism of macromolecules and their coenzymes.
- evaluate the relationship and processes of organisms, cells, and cellular components.

Course Calendar

Day	Date	Lecture Topic	Reading Assignment*		
W	January 17	1: Amino Acids	Chapter 3; Sections 3.1		
F	January 19	2: Peptides and Proteins	Chapters 3; Section 3.2 & 3.4 Article 1		
M	January 22	3: Protein 1°, 2° Structures	Chapter 4; Section 4.1 & 4.2 Article 2	Discussion 1	
W	January 24	4: Protein Tertiary and Quaternary Structures	Chapter 4; Sections 4.3 Article 3		
F	January 26	5: Protein Denaturation/Folding and Biomolecular Structures	Chapter 4; Section 4.4 & 4.5 Article 4		
M	January 29	6: Reversible Binding of a Protein to a Ligand (Part 1)	Chapter 5; Section 5.1 Article 5		
T	January 30	Quiz 1; 12-10 PM			Discussion 2
W	January 31	7: Reversible Binding of a Protein to a Ligand (Part 2)	Chapter 5; Section 5.1 Article 6		
F	February 2	8: Protein Interactions	Chapter 5; Section 5.2 & 5.3 Article 7		
M	February 5	9: Enzyme Introduction	Chapter 6; Sections 6.1 & 6.2 Article 8	Discussion 3	
W	February 7	10: Enzyme Kinetics	Chapter 6; Section 6.3 Article 9		
F	February 9	11: Enzymatic Reactions	Chapter 6; Section 6.4 Article 10		
M	February 12	Exam 1 Review	Article 11		
T	February 13	Exam 1; 7-9 PM			Discussion 4
W	February 14	12: Mono/Disaccharides	Chapter 7; Section 7.1 Article 12		

F	February 16	13: Polysaccharides	Chapter 7; Section 7.2 Article 13		
M	February 19	14: Glycoconjugates and Carbohydrates as Informational Molecules	Chapter 7; Section 7.3 & 7.4 Article 14	Discussion 5	
W	February 21	15: Storage Lipids	Chapter 10; Sections 10.1 Article 15		
F	February 23	16: Lipids in Membranes	Chapter 10; Sections 10.2 Article 16		
M	February 26	17: Membrane Composition and Architecture	Chapter 11; Sections 11.1 Article 17		
T	February 27	Quiz 2; 12-10 PM			
W	February 28	18: Membrane Dynamics	Chapter 11; Section 11.2 Article 18	Discussion 6	
F	March 1	19: Membrane Transport	Chapter 11; Section 11.3 Article 19		
M	March 4	Exam 2 Review	Article 20		
T	March 5	Exam 2; 7-9 PM			
W	March 6	20: Bioenergetics and principles of metabolism	Chapter 13; Sections 13.1, 13.2	Discussion 7	
F	March 8	21: ATP and high-energy compounds; electron carriers			
M-F	11-15 March	Spring Break			
M	March 18	22: Glycolysis I	Chapter 14; Sections 14.1, 14.2, 14.3		Discussion 8
W	March 20	23: Glycolysis II			
F	March 22	24: Gluconeogenesis and Other Carbohydrates			
M	March 25	25: Regulation of Carbohydrate Metabolism; Pentose Phosphate Pathway	Chapter 14; Sections 14.5, 14.6	Discussion 9	
T	March 26	Quiz 3; 12-10 PM			
W	March 27	26: Tricarboxylic Acid Cycle I	Chapter 16		
F	March 29	27: Tricarboxylic Acid Cycle II			

M	April 1	28: Oxidative Phosphorylation & ATP synthase	Chapter 19; Section 19.1	Discussion 10
W	April 3	Exam 3 Review		
R	April 4	Exam 3; 7-9 PM		
F	April 5	29: Lipoproteins & Fat Metabolism	Chapter 17; Section 17.1 Chapter 21; Section 21.4	
M	April 8	30: Fatty Acid Synthesis	Chapter 19; Section 19.2 Chapter 21; Section 21.1	Discussion 11
W	April 10	31: Fatty Acid Catabolism I	Chapter 17	Discussion 12
F	April 12	32: Fatty Acid Catabolism II		
M	April 15	33: Cholesterol & Steroid Metabolism		
W	April 17	34: Eicosanoids	Chapter 10; Section 10.3 Chapter 21; Section 21.2	
F	April 19	35: Amino Acid Biosynthesis	Chapter 22; Sections 22.1, 22.2	
M	April 22	36: Amino Acid Catabolism & Urea Cycle	Chapter 18	Discussion 13
T	April 23	Quiz 4; 12-10 PM		
W	April 24	37: Porphyrins & Nucleotides	Chapter 22; Section 22.3	
F	April 25	38: Metabolic Integration; Diabetes	Chapter 23; Section 23.3, 23.5	
M	April 29	Final Exam Review		Discussion 14
W	May 1	Final Exam Review		
R	May 2	Reading Day		
F	May 3	Final Exam	7-10 PM	

*Article reading assignments have been made for Lecture 1-20 by Dr. Kim (see **Additional Required Readings (Lectures 1-20)** in Canvas for details.

Section Change, Add, and Drop Information

Students may use the UI-Integrate Self-Service System to add or change MCB 354 discussion sections before 5:00 PM, Monday, January 29, 2024.

Students must always attend the discussion section in which they are currently enrolled. Students will not be allowed to sit in other sections at other times for any reason without permission from the course staff.

Friday, March 8, 2024, is the last day to drop the course or to elect the Credit/No Credit option. Students may use the UI-Integrate Self-Service System to drop MCB 354 until this deadline.

To drop the course after the drop deadline, students must petition a dean in their college office. These petitions should be sent to the Course Coordinator for completion of attendance and grade information.

To elect the Credit/No Credit option, students must apply in their College Office.

Course Overview and Description

Introduction to biochemistry and structural biology emphasizing the physical and chemical properties of macromolecules.

Course Prerequisites, Requirements met (general education, major, minor)

MCB 354 Biochem & Phys Basis of Life

Credit: 3 hours

Students should be enrolled in the lecture (AL1) and a discussion section.

Credit is not given for both MCB 354 and MCB 450.

Prerequisite: Chem 232 or Chem 236, and MCB 250 and MCB 252, or consent of instructor.

Text/Materials Information

MCB 354 is participating in the Day1Access Program to help save you money. All students enrolled in this course will have immediate access to the digital materials during the Illinois' course opt-out period. If you want to purchase the materials in another manner, you may opt-out of the program via Canvas. All students who keep the digital materials (that is, those who do not opt-out) will have the discounted course materials charge billed to their bursar account.

If you choose to opt-out, the following items are required:

Required Texts & Supplies

1. Lehninger Principles of Biochemistry, 8th edition with Achieve and iClicker. ISBN 9781319408886. It is available at the IUB for \$150.
2. Scientific calculator (non-graphing) for use on exams. Graphing calculators will NOT be allowed.

Course Website, Course Gradebook, and Canvas

Official Course Gradebook: <https://apps.atlas.illinois.edu/Gradebook>

Canvas: <https://canvas.illinois.edu/>

Grading Information and Breakdown

The MCB 354 ATLAS Gradebook can be accessed directly at the following URL:

<https://apps.atlas.illinois.edu/Gradebook>

Scores on quizzes, exams, and assignments will be available for student review on the MCB 354 ATLAS Gradebook. All students are responsible for checking their scores on the ATLAS Gradebook after each grade type is returned to them. Each student is responsible for reporting possible discrepancies to their TA and if immediate action is not taken, the student is responsible for bringing this to the attention of MCB 354 Course Staff within one week of receiving their graded work. Students are encouraged to keep all graded papers returned to them until after final grades are issued.

**The final deadline for Web Gradebook corrections is
5:00 PM, Wednesday, May 1, 2024**

No Web Gradebook scores will be altered after this deadline.
Please be certain to check all scores before this time.

Discussion Problem Sets/Participation

Discussion problem sets should be completed before discussion each week. The problem sets are an opportunity for students to practice the material that may be covered on exams (and exams will have short answer portions).

Students can earn 4 points per discussion starting on Discussion 1. Completion of problem sets is required before attending discussion to facilitate group work and make the most of class time. Students will discuss the questions in groups and will be responsible for answering an assigned question. The TA may assist the groups and verify correctness. Points will be based on coming to class prepared, actively participating in group work, and ultimately presenting the assigned question to the class.

Attendance will be recorded at every discussion session. Students must arrive within the first five minutes of class, remain present for the entire class period, and be an active participant to receive credit. If you are more than 5 minutes late, you forfeit your discussion points for that week, but you may stay for the class period. If you are on time but are not contributing to your group, you also forfeit attendance points for that week at the discretion of the TA. You will be allowed to drop 26 discussion points throughout the semester. Questions or clarifications should be addressed to the TAs in discussion or in their help session.

Homework

There will be adaptive quizzes in the Achieve platform each week of the semester. These are based on the assigned readings. Students can start the assignment and reference their reading assignment within the question set OR students may choose to read the assignment, then take the adaptive quiz. Adaptive means that the assignment requires that you answer the concept questions correctly to move to the next content topic. If you get a question incorrect, you will get additional questions about the same content until you've shown mastery of that content. This semester these assignments consist of 75 points, but fifteen points will be dropped. Students can earn a maximum of 60 points in this grade category that

will be used in your final grade calculation. There is a 50% penalty of points for assignments submitted up to 7 days late. After 7 days, the work can no longer be submitted.

iClicker

There will be iClicker questions during lecture periods throughout the semester. Students will earn two “units” for each correct response to these questions in class. If the student is present in class, but chooses the incorrect response, they will earn 1 point. If the student is absent, they will earn zero points. At the end of the semester, the scale below will be used to determine the total number of points earned in this grade category. The maximum points that can be earned in this grade category is 100.

% Correct	Points student earns
80%	100
75%	85
70%	80
65%	75
60%	70
55%	65
50%	60
45%	55
40%	50
35%	45
30%	40
25%	35
Below 20%	0

Quizzes

Four 25-point quizzes will be administered online in Canvas. Quizzes will be opened for a designated time slot on the day they are assigned and will be timed (time limits will be announced before each quiz). Please note that computer problems, server issues, or other technical problems are NOT sufficient means for extensions of deadlines. If students have any technical problems they must contact Melissa Reedy immediately at murray@illinois.edu, Assistance will not be provided after 10:00 PM. Students are responsible for knowing the quiz date schedule; forgetting to do a quiz is not an acceptable excuse for accommodations.

Schedule of Quizzes		
Quiz 1	Tuesday, January 30, 2024	12:00-10:00 PM
Quiz 2	Tuesday, February 27, 2024	12:00-10:00 PM
Quiz 3	Tuesday, March 26, 2024	12:00-10:00 PM
Quiz 4	Tuesday, April 23, 2024	12:00-10:00 PM

Exams

Evening exams and the final exam may be in multiple choice, true-false, short answer, essay, and/or problem-solving format. Material for exams and quizzes will be drawn from the lectures, lecture materials, assignments, associated text readings, and reserved reading, if any.

All grades are entered into the online gradebook. Once the exams have been administered, they become the property of the students. Within one week of each exam, answers are posted. It is the student's responsibility to make certain that the grade on the online gradebook is correct. If a student believes that an error has been made, it should be brought to the TA's attention immediately. If an explanation cannot be found, the student should contact Melissa Reedy via email.

The final exam is the property of the course and is not returned to students, nor are answers posted or made available in any way. Should a student feel that an error has been made in the grading of the final exam, that student should contact Melissa Reedy.

Schedule of Exams		
Exam 1	Tuesday, February 13, 2024	7:00-9:00 PM
Exam 2	Tuesday, March 5, 2024	7:00-9:00 PM
Exam 3	Thursday, April 4, 2024	7:00-9:00 PM
Final Exam	Friday, May 3, 2024	7:00-10:00 PM

Course Grades

Each course has a grade scale. The grade you earn in the course will be based on the points that you earn. Effort is reflected in points earned. We will adhere to the grade scale when assigning grades in order to avoid capriciousness and to adhere to fairness and equity for all students.

Student grades in MCB 354 will be based on total of 1000 points. Categories listed below are approximate but should closely resemble the final distribution.

Point Distribution	
3 Exams (@ 175 points each)	525
Final Exam (non-cumulative)	175
4 Quizzes (@ 25 points each)	100
Discussion Participation (14 @ 4 points, drop 16 points)	40
Scaled iClicker	100
Homework (Achieve PreClass/Adaptative)	60
Total	1000 points

All point totals are estimates and may be altered slightly throughout the course of the semester.

This course will use the University-assigned grade point values for each letter grade (see table below). MCB 354 will use the plus/minus system, and students who earn the points shown below (out of 1000 possible points), will be guaranteed the indicated letter grade.

At semester's end, after the final exam, the faculty will analyze the course grade distribution, and may decrease (to accommodate poor class performance), but will not increase, the points needed for each letter grade.

Letter Grade	Point Ranges	Grade Point Value
A+	1000-890	4.000
A	889-850	4.000
A-	849-810	3.667
B+	809-770	3.333
B	769-730	3.000
B-	729-690	2.667
C+	689-650	2.333
C	649-610	2.000
C-	609-570	1.667
D+	569-530	1.333
D	529-490	1.000
D-	489-450	0.667
F	449-0	0.000

Course Policies

Regardless of whether a student has read the Course Policies for MCB 354, a student is charged with knowledge of them. These policies were developed in agreement with the Student Code.

Adding the Course after the Semester Start:

We understand that the University has an add deadline 10 days into the semester, but the University lets individual courses and/or programs determine their policies for late adds. We feel that students who choose to add a course late do so at their own discretion with knowledge that there may be points lost in the process.

Inclusivity Statement

The effectiveness of this course is dependent upon the creation of an encouraging and safe classroom environment. Exclusionary, offensive or harmful speech (such as racism, sexism, homophobia, transphobia, etc.) will not be tolerated and in some cases subject to university harassment procedures. We are all responsible for creating a positive and safe environment that allows all students equal respect and comfort. I expect each of you to help establish and maintain an environment where you and your peers can contribute without fear of ridicule or intolerant or offensive language.

Netiquette

In any social interaction, certain rules of etiquette are expected and contribute to more enjoyable and productive communication. The following are tips for interacting

online via e-mail or discussion board messages, adapted from guidelines originally compiled by Chuq Von Rospach and Gene Spafford (1995):

- Remember that the person receiving your message is someone like you, deserving and appreciating courtesy and respect.
- Avoid typing whole sentences or phrases in Caps Lock.
- Be brief; succinct, thoughtful messages have the greatest effect.
- Your messages reflect on you personally; take time to make sure that you are proud of their form and content.
- Use descriptive subject headings in your e-mails.
- Think about your audience and the relevance of your messages.
- Be careful when you use humor and sarcasm; absent the voice inflections and body language that aid face-to-face communication, Internet messages are easy to misinterpret.
- When making follow-up comments, summarize the parts of the message to which you are responding.
- Avoid repeating what has already been said; needless repetition is ineffective communication.
- Cite appropriate references whenever using someone else's ideas, thoughts, or words.

Contacting MCB Course Personnel

1. MCB course personnel are more than happy to assist students.
2. Emails to instructors, TAs, or course coordinators will only be answered if they come from an @illinois.edu account. As a student, please remember that when you email a staff member, it is important to include all pertinent information so that we can assist you in the most efficient and effective manner possible. This information includes:
 - The course rubric in the subject line
 - Your full first and last name
 - Your NetID (the first part of your illinois.edu email account)
 - Your UIN (9-digit number that you use to register for classes)
 - The course that you are concerned about (the course personnel often work with multiple courses)
 - Your section letter/number
 - The previous email "thread" or previous communicated information pertinent to the situation
3. Your cooperation will help us respond much more quickly to your concerns

Religious Observances and Practices

1. Students are required to submit the Request for Accommodation for Religious Observances Form (which can be found at: <https://odos.illinois.edu/community-of-care/resources/students/religious-observances/>) to their instructors and the Office of the Dean of Students requesting accommodation by the end of the second week of the course. Requests that are not submitted within this time frame may not be granted.

Disability Resources and Educational Services (DRES) Accommodations

1. We are committed to providing a learning environment where our students can succeed. If you require special accommodations, please contact us and the DRES as soon as possible. To contact DRES, you may visit 1207 S. Oak Street, Champaign, call 217-333-4603, or email disability@illinois.edu. We will try to meet all accommodations once the process has started. Please note that accommodations are not retroactive to the beginning of the semester, but begin the day you contact your professor, instructor, or coordinator with a current letter of accommodation from DRES.
2. If a student has DRES accommodations, documentation must be submitted to course personnel by the end of the second week of class.
3. If a student believes that they need DRES accommodations, they should contact DRES at disability@illinois.edu.

Exam Conflicts

1. If you have a regularly scheduled University course that conflicts with an exam, you should complete the online Conflict Request Form on the Canvas site. This request must be made by 5:00 pm not less than 3 business days prior to the Exam. Requests made after 5:00 pm and less than 3 business days prior to the exam will not be granted. See course policies for a specific deadline for your course.
2. Work schedules should be adjusted, if possible, to eliminate a conflict with scheduled Exams. Please plan accordingly at the beginning of the semester. If eliminating a conflict is not possible, the student should complete the online Conflict Request Form on the Canvas site. This request must be made by 5:00 pm not less than 3 business days prior to the exam. Requests made after 5:00 pm and less than 3 business days prior to the Exam will not be granted.
3. Students with DRES accommodations should also submit the online Conflict Request Form by 5:00 pm no later than 3 business days prior to the exam. Requests made after 5:00 pm and less than 3 business days prior to the exam will not be granted.
4. Students that are formally participating in officially recognized groups, such as athletic teams and performance groups, with a conflict should request a conflict exam by 5:00 PM not less than 3 days prior to the exam via the Conflict Request Form on the Canvas site. Formal participation does not include general meetings of RSOs or any other recognized groups. Documentation of the event will be required prior to scheduling the conflict exam. Requests made after 5:00 PM and less than 3 business days prior to the exam will not be granted.
5. Students taking the conflict exam will be allowed to take their exam at a different time to accommodate their request. This conflict date/time will be before the regularly scheduled exam.