ILLINOIS
Bioengineering
GRAINGER COLLEGE OF ENGINEERING

BIOE 202: Cell and Tissue Engineering Lab

Credit hours: 2
Semester: Fall 2025
Pre/Co-requisite: MCB 150, BIOE 206
Canvas: https://canvas.illinois.edu/courses/58058
Gradescope: https://www.gradescope.com/courses/1065700

Instructor

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Teaching Assistants

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Laboratory Assistants

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Office hours

Wednesdays, 3-4 pm (virtual)

Class meeting time and location

Lecture (all sections):	Fridays	1:00 pm - 1:50 pm	Everitt Lab 2310
Lab section AB1:	Mondays	10:00 am - 1:50 pm	Everitt Lab 3109
Lab section AB2:	Mondays	3:30 pm - 7:20 pm	Everitt Lab 3109
Lab section AB3:	Tuesdays	2:00 pm - 5:50 pm	Everitt Lab 3109

Required materials

- Laboratory coat.
- Notebook – We will be using electronic notebooks for official recording and analysis of experimental details and results. We will provide printouts of experimental protocols for your use during lab. You may record results, observations, calculations, etc., on these printouts or you may wish to bring your own paper notebook to take notes that you will later transfer to your electronic notebook for grading. More details on e-notebooks will be provided in class.

Textbook – recommended (not required)

- *Molecular Biotechnology: Principles and Applications of Recombinant DNA*, 6th Edition (2022); Bernard R. Glick and Cheryl L. Patten

Course Description

Students will explore the field of cell and tissue engineering, with a focus on understanding and mastering the quantitative molecular and cellular techniques used in modern biomedical research. Lectures and laboratory exercises will expose students to the design principles and engineering approaches used to address critical needs in human health. Students will gain a detailed understanding of the cellular and molecular biology fundamentals that underlie research approaches, including methods for manipulating nucleic acids and proteins; strategies for studying gene expression; bacterial and mammalian cell culture; and imaging and measurement systems to quantify cellular and molecular function. Critical analysis of laboratory results will be facilitated through lectures, in-lab instruction, quizzes, lab reports, poster presentations and exams.

Course Objectives

- Strengthen and expand fundamental knowledge of cellular and molecular biology basics.
- Gain hands-on experience with cellular and molecular methodologies used in diagnostic and research labs, including:
    - Culturing and using bacterial and mammalian cells in experiments.
    - Identifying and interpreting experimental controls, replicates, and sources of experimental error.
    - Using experimental techniques to manipulate, quantify, and analyze DNA, RNA, proteins, and cells.
    - Analyzing, interpreting, and troubleshooting quantitative data from molecular biology experiments, including use of related software programs (e.g., ImageJ).

- Documenting experimental procedures and recording data using electronic lab notebooks.
- Preparing figures.
- Writing technical reports.
- Designing and presenting scientific posters.
- Following good laboratory practices, including laboratory safety.

Course grades

Grade distribution:

Laboratory notebook	5%
Quizzes	10%
Lab reports	20%
Practical Exam	20%
Poster presentation	20%
Final exam	25%

Grading policies

- **Late assignments:** For lab reports, a 10% reduction in points will be applied to any late assignment submitted up to 24 hours after the deadline, a 50% deduction will be applied for submissions received 24-48 hours after the deadline, and no credit will be given for assignments not submitted by 48 hours after the deadline. For other assignments, no submissions will be accepted after the deadline.
- **Regrades:** After grades are posted, there will be a 3-day window in which you will be able to submit regrade requests. Regrade requests may result in a lower grade. Regrade requests will not be considered after the 3-day window.
- **Final grades:** At the end of the semester, numerical grades will be converted to a letter grade. Numerical grades will not be rounded up to calculate the letter grade.

  Final grade scale for course (%):

A+	97 – 100	**B+**	87 – 89.99	**C+**	77 – 79.99	**D+**	67 – 69.99	**F**	< 60
A	94 – 96.99	**B**	84 – 86.99	**C**	74 – 76.99	**D**	64 – 66.99		
A-	90 – 93.99	**B-**	80 – 83.99	**C-**	70 – 73.99	**D-**	60 – 63.99		

- **Attendance:** Attendance in your lab section is mandatory. The penalty for the first unjustified absence will be an automatic 25% reduction in the grade for the corresponding lab-related assignment (lab reports or posters). The penalty for the second unjustified absence will be an automatic 75% reduction in the grade for the corresponding lab-related assignment (lab reports or posters). The penalty for a third unjustified absence will be a failing grade for the course. Students who arrive late to lab (if lab is scheduled to start at 10:00 am, 10:00:01 am is considered late) will be allowed to participate but will receive a grade penalty for an unjustified absence. Leaving a lab session early without permission will be recorded as an absence. Absences will only be excused if they are verified (e.g., by a note from the Dean of Students). For absences known in advance, you must inform the instructor at least one week in advance of the planned missed lab and you will be required to complete a written make-up assignment related to the material covered in lab which will be due by the last day of instruction.
- **Extra credit:** There is no extra credit in this course.
- **Additional considerations:** If your specific situation is not described on this syllabus, it is your responsibility to contact the instructor to determine the best course of action. Ignorance or lack of information on the syllabus are not acceptable excuses.

Schedule *(subject to change)*

WEEK	DATE	TOPIC		ASSIGNED	DUE
1	Aug 25-26	No Lab			
	Aug 29	Lecture	Course Overview: Introductions, Safety Briefings, Review of Course Policies	Pre-lab quiz	

			Lab Topic: Measurements and Bacterial Growth		
2	Sept 1-2 - Labor day	No Lab			
	Sept 5	No lecture			
3	Sept 8-9	Lab	Measurements and Bacterial Growth		Monday, 10 am: - Pre-lab quiz (Canvas) - Lab notebook entry for safety training (Benchling)
	Sept 12	Lecture	Bacterial Transformation and Bacterial Culture	Pre-lab quiz	
4	Sept 15-16	Lab	Bacterial Transformation and Bacterial Culture		Monday, 10 am: - Pre-lab quiz (Canvas) - Lab notebook entry for last week (Benchling)
	Sept 19	Lecture	Plasmid DNA Extraction and PCR	Pre-lab quiz	
5	Sept 22-23	Lab	Plasmid DNA Extraction and PCR		Monday, 10 am: - Pre-lab quiz (Canvas) - Lab notebook entry for last week (Benchling)
	Sept 26	Lecture	Agarose Gel Electrophoresis	Pre-lab quiz	
6	Sept 29-30	Lab	Agarose Gel Electrophoresis		Monday, 10 am: - Pre-lab quiz (Canvas) - Lab notebook entry for last week (Benchling)
	Oct 3	Lecture	Mammalian Cell Culture and Transfection	Pre-lab quiz	
7	Oct 6-7	Lab	Mammalian Cell Culture		Monday, 10 am: - Pre-lab quiz (Canvas) - Lab notebook entry for last week (Benchling)
	Oct 10	Lecture	No lecture	Pre-lab quiz	
8	Oct 13-14	Lab	Transfection		Monday, 10 am: - Pre-lab quiz (Canvas) - Lab notebook entry for last week (Benchling)

	Oct 17	Lecture	Fluorescence Microscopy and Cell Lysis	Pre-lab quiz	
9	Oct 20-21	Lab	Fluorescence Microscopy and Cell Lysis		Monday, 10 am: - Pre-lab quiz (Canvas) - Lab notebook entry for last week (Benchling)
	Oct 24	Lecture	Protein Quantification	Pre-lab quiz	
10	Oct 27-28	Lab	Protein Quantification		Monday, 10 am: - Pre-lab quiz (Canvas) - Lab notebook entry for last week (Benchling)
	Oct 31	Lecture	Western blot	Pre-lab quiz	
11	Nov 3-4	Lab	SDS PAGE		Monday, 10 am: - Pre-lab quiz (Canvas) - Lab notebook entry for last week (Benchling)
	Nov 7	Lecture	No Lecture	Pre-lab quiz	
12	Nov 10-11	Lab	Protein Detection by Western Blot		Monday, 10 am: - Pre-lab quiz (Canvas) - Lab notebook entry for last week (Benchling)
	Nov 14	Lecture	Review	Pre-lab quiz	
13	Nov 17-18	Lab	Cell Culture Practice		Monday, 10 am: - Lab notebook entry for last week (Benchling)
	Nov 21	Lecture	No Lecture		
14	Nov 24-25	**FALL BREAK**			
	Nov 28	**FALL BREAK**			
15	Dec 1-2	Lab	Practical exam		
	Dec 5	Lecture	Exam		
16	Dec 8-9	Poster Presentations			

Disability-Related Accommodations: We are committed to assisting students with disabilities requiring course accommodations that are registered with DRES. To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217-333-4603, e-mail disability@illinois.edu or go to https://www.disability.illinois.edu. If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available that can help diagnosis a previously undiagnosed disability. You may access these by visiting the DRES website and selecting "Request an Academic Screening" at the bottom of the page.

Please discuss these accommodations with us as early in the semester as possible. If you plan on using accommodations for any assignments, please let us know as early as possible.

Emergency Response Recommendations: Emergency response recommendations can be found at the following website: http://police.illinois.edu/emergency- preparedness/. We encourage you to review this website and the campus building floor plans website within the first 10 days of class. http://police.illinois.edu/emergency-preparedness/building-emergency-action-plans/.

Sexual Misconduct Reporting Obligation: The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: wecare.illinois.edu/resources/students/#confidential.

Other information about resources and reporting is available here: wecare.illinois.edu.

Academic Integrity: The University of Illinois at Urbana-Champaign Student Code should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: http://studentcode.illinois.edu/.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: https://studentcode.illinois.edu/article1/part4/1-401/. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding.

When in doubt, you should ask the instructor about what constitutes plagiarism, cheating, or any other breach of academic integrity since policies may differ from other courses. Again, ignorance is not an excuse.

Religious Observances: Illinois law requires the University to reasonably accommodate its students' religious beliefs, observances, and practices in regard to admissions, class attendance, and the scheduling of examinations and work requirements. You should examine this syllabus at the beginning of the semester for potential conflicts between course deadlines and any of your religious observances. If a conflict exists, you should notify your instructor of the conflict and follow the procedure at https://odos.illinois.edu/community-of-care/resources/students/religious-observances/ to request appropriate accommodations. This should be done in the first two weeks of classes.

Family Educational Rights and Privacy Act (FERPA): Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See https://registrar.illinois.edu/academic-records/ferpa/ for more information on FERPA.