

- Course: **BME 553/753 Cell and Tissue Biology** Fall-2023, TR 2 -3:15 pm, BH 323
- Instructor: Dr. J. Belovich, Professor, Chemical and Biomedical Engineering, 466 Fenn Hall, 687-3502; [j.belovich@csuohio.edu](mailto:j.belovich@csuohio.edu);
- Office hours: TR 3:30-4:30 pm; or email for an appointment, or stop in when my door is open.
- Textbook: *Essential Cell Biology*, 6th edition, 2023, Alberts et al., Norton Publishers; access to online homework assignments is required. E-book cost is \$85 for 6 month access; hardcopy (which includes E-book features) is about \$186. It is essential that you purchase the textbook so that you have access to electronic homework assignments and submission process. If you already have access to the textbook, you can purchase the smartworks access for \$30.
- Course Objective: Essential concepts and technologies in biochemistry, cellular and molecular biology, as relevant to the design, application, and evaluation of biological constructs in tissue engineering.
- Homework: Readings assignments are shown in the syllabus. You are strongly encouraged to watch the animations included with each chapter. Homework will be assigned through Blackboard on each chapter, "Smartworks". The Smartworks problems due dates are shown in the syllabus. Homework will be accepted up to three days late, but with a 20% penalty per day. **Your two lowest homework scores from each category will be dropped (i.e. not count towards your grade). I encourage you to answer the "Check your understanding" questions while you read the chapter, but they will not be recorded as a grade. I also encourage you to solve the questions in the book, and check your answers with the back of the book answers.**
- Project: All BME 753 students are required to do an oral presentation on a specific experimental technique used in cellular or molecular biology. The topic must be approved by the instructor. Additional details on the assignment will be provided later.
- Grading: I do not curve! Exams are designed to reflect reasonable expectations for student learning. All final letter grades will be assigned according to the scales shown below.
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|-------------------------|------------------------------|-------------------------|------------------------------|
| <b>BME 553 Grading:</b> |                              | <b>BME 753 Grading:</b> |                              |
| Exam 1                  | 25%                          | Exam 1                  | 25%                          |
| Exam 2                  | 25%                          | Exam 1                  | 25%                          |
| Final Exam              | 30%                          | Final Exam              | 25%                          |
| Homework                | 20%                          | Homework                | 15%                          |
|                         |                              | Project                 | 10%                          |
| <b>Attendance</b>       | <b>up to 5% extra credit</b> | <b>Attendance</b>       | <b>up to 5% extra credit</b> |
- Grading scale:**
- A : 90 - 100%  
A-: 85 - 89%  
B+ : 80 - 84%  
B : 75 - 79%  
B-: 70 - 74%  
C: 55 - 69%  
F: <55%
- Exams: All exams must be taken when scheduled! If you are ill the day of the exam, you must email me before the exam, and be prepared to bring medical documentation.

**Possible topics for lab technique presentations:**

Atomic force microscopy	scanning electron microscopy	transmission electron microscopy
Light microscopy (including brightfield, phase, and DIC)		Quantification of cell number
Western blot	Northern blot	Flow cytometry
fluorescent microscopy	PCR	CRISPR
protein separation by chromatography		X-ray crystallography
protein separation by electrophoresis		mass spectrometry
in situ hybridization	RNAi	DNA cloning
Determining amino acid sequence		

**Tentative Course Outline (Ver. 9.18); subject to change by the instructor.**

		<b>Topics</b>	<b>Reading</b>	<b>Suggested Chp questions for study</b>	<b>Smart Works Due</b>
Aug. 29	T	Introduction to cell	Chp. 1	8,9	Sept 11
Aug. 31	R	Chemical components of cells	Chp. 2	8,9,10,14,15,19,20	Sept 11
Sept. 5	T	Energy, catalysis, and biosynthesis	Chp. 3	6,7,8,9,10,12,13,14,15,16,17	Sept 11
Sept 7	R	Protein structure and function	Chp. 4, except “Covalent modifications ...” to end of chapter; except all panels	1,2,3,10,11,14,18,22,23,25	Sept 13
Sept 12	T	DNA and chromosomes	Chp. 5, except “Interphase Chro...”, “Heterochromatin can ...”, X-inactivation...”	1,2,5,6,8	Sept 18
Sept 14	R	DNA replication, repair	Chp. 6, except “How we know”	3,5,6,7,8,10,11,12,15	Sept 20
Sept 19	T	From DNA to protein	Chp. 7, except “How we know”	2,6,9,10,11,14,15,16,17,18	Sept 25
Sept 21	R	“			
Sept. 26	T	Review; Control of gene expression	Chp. 8, except pp 286-295, 299-302	8,12,13	Oct 5
<b>Sept. 28</b>	<b>R</b>	<b>Exam I</b>			
Oct 3	T	Control of gene expression			
Oct 5	R	Genetic modifications; virus life cycle	Chp. 9		
Oct 10	T	<b>Indigenous People’s Day – no classes</b>			
Oct 12	R	Membrane structure	Chp. 11		
Oct. 17	T	<b>Lab technique presentations (PCR, CRISPR, EV Isolation)</b>			
Oct 19	R	Membrane transport	Chp 12		
Oct 24	T	Energy metabolism	Chp 13, 14, pp 473-495		
Oct 26	R	“	“		
Oct 31	T	<b>Lab technique presentations (Live cell imaging, protein separations, RNA separations)</b>			
Nov 2	R	<b>Exam II</b>			
Nov 7	T	Cell signaling	Chp. 16		
Nov 9	R	Cytoskeleton	Chp. 17 pp 595-624		
Nov 14	T	<b>Lab technique presentations (Mass spectrometry, SEM, fluorescent microscope)</b>			
Nov 16	R	<b>Lab technique presentations (;</b>			
Nov. 21	T	Cell cycle	Chp. 18		
Nov. 23	R	<b>Thanksgiving</b>			
Nov 28	T	Cell culture techniques	handouts		
Nov 30	R	Tissue structure and extracellular matrix	Chp. 20 and handouts		
Dec 5	T	Stem cells and differentiation			

Dec 7	R	Cancer			
Dec 14	R	<b>Final exam 12:30-2:30 pm Must be taken as scheduled!</b>			