湖北工業大學
HUBEI UNIVERSITY OF TECHNOLOGY

Course Title	Cell Biology
Course Code	BIOL 3213
Semester	Summer 2025
Course Length	10 Weeks, 60 Contact Hours
Credits	4
Instructor	TBA
Office	TBA
Email	TBA
Prerequisite	BIOL 2413 Principles of Genetics and Molecular Biology
Antirequisite	BIOL 3211 Cell Biology (5 Weeks)

Course Description:

The focus of Cell Biology is the study of the structure and function of the cell. In this course we will cover topics such as membrane structure and composition, transport, and trafficking; the cytoskeleton and cell movement; the breakdown of macromolecules and generation of energy; and the integration of cells into tissues. We will also cover important cellular processes such as cell cycle regulation, signal transduction, apoptosis (programmed cell death), and cancer cell biology. Throughout the semester we will attempt to relate defects in these various cellular processes to human diseases to help gain a better understanding of what happens when cells don't work as they should.

Course Goals:

Students who successfully complete this course will demonstrate competency in the following general education core goals:

- **Critical Thinking Skills** – Students will engage in analytical thinking, demonstrating the ability to critically evaluate, synthesize, and apply knowledge to complex problems, and construct well-reasoned solutions and arguments.
- **Independent Research and Inquiry** – Students will conduct independent research, utilizing academic resources to explore relevant topics, formulating research questions, analyzing data, and presenting findings in a coherent, scholarly manner.
- **Problem-Solving and Application** – Students will apply theoretical concepts and methodologies learned in the course to real-world problems, demonstrating the ability to develop practical solutions informed by academic inquiry.
- **Global and Cultural Awareness** – Students will gain awareness of the global and cultural contexts relevant to the course, appreciating diverse perspectives and considering the implications of their studies in a broader, international context.

Student Learning Outcomes:

Upon completion of this course, students will be able to:

- analyze experimental data to reach conclusions about mechanisms of cellular function;
- describe the organization of the cell and the functions of organelles;
- delineate and apply the principles of protein sorting to different cellular compartments;
- outline the mechanisms of vesicle trafficking inside cells;
- understand the organization and function of the cytoskeleton;
- describe the structure and function of the extracellular matrix;
- compare the different interactions of cells to form tissues;
- contrast the different principles & mechanisms of cellular signaling;
- explain the mechanisms of cell cycle control, cancer, and apoptosis.

Textbooks/Supplies/Materials/Equipment/ Technology or Technical Requirements:
Lodish et. al. *Molecular Cell Biology*. Fifth Edition. Freeman Press.

Course Requirements:

Quizzes (15%)
Short quizzes will be given periodically throughout the course to reinforce key concepts and ensure students stay up to date with the lecture and lab material. These quizzes may include multiple-choice questions, fill-in-the-blank exercises, and short-answer questions.

Laboratory Sessions (20%)
The lab component is integral to the course and is designed to provide hands-on experience in key cell biology techniques.
Lab assessments will consist of two parts:

- Lab performance and participation (5%):
  Assessed based on attendance, adherence to safety protocols, teamwork, and engagement during lab sessions.
- Lab reports (15%):
  Students will submit detailed lab reports for selected experiments, including methods, results, and discussion.

Midterm Exam (20%)
The midterm exam will cover the material from the first half of the semester. This exam will assess students' comprehension of key cell biology techniques, such as microscopy and protein structure determination. The midterm will consist of multiple-choice questions, short-answer questions, and data-based problem-solving exercises, allowing students to demonstrate both factual knowledge and analytical thinking.

Final Exam (30%)
The final exam will be cumulative. It will include questions on cell cycle regulation, apoptosis, protein sorting, vesicular trafficking, membrane structure, and cell communication. The format will be similar to the midterm and will include multiple-choice questions, short-answer questions, data interpretation tasks, and one or more

essay-style questions that require students to synthesize and apply their knowledge to broader biological questions.

Research Paper (15%)
Students will select a recent peer-reviewed research article in cell biology and write a research paper critically analyzing its findings. This paper will have two main sections. The first section, a 500-word summary, will describe the research questions, methods, and key findings of the selected article. The second section, a critical analysis of 1000 to 1500 words, will evaluate the strengths and limitations of the study, discuss how the findings relate to concepts covered in the course, and reflect on the broader implications of the research. Proper citation of all sources will be required, and the paper will be graded on clarity, depth of analysis, and engagement with the scientific literature.

Assessments: Activity	**Percent Contribution**
Quizzes	15%
Laboratory Sessions	20%
Midterm Exam	20%
Final Exam	30%
Research Paper	15%

Grading:

Final grades will be based on the sum of all possible course points as noted above.

Grade	**Percentage of available points**
A	94-100
A-	90-93
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73
D	64-69
D-	60-63
F	0-59

Course Schedule:
The schedule of activities is subject to change at the reasonable discretion of the instructor. Minor changes will be announced in class, major ones provided in writing.

BIOL 3213 Schedule		
Lecture	Topic	Readings
L1	Introduction to Cell Biology	Ch. 1-2
L2	Protein Structure and Function	Ch. 3-4
L3	Protein Structure and Function	Ch. 3-4
L4	Cell Biology Lab Techniques Lab 1	Notes
L5	Biomembranes and Cell Architecture	Ch. 5

L6	Biomembranes and Cell Architecture	Ch. 5
L7	Integrating Cells into Tissues	Ch. 6
	Lab 2	
L8	Transport of Ions and Small Molecules across Cell Membranes	Ch. 7, 11
	Membrane Transport	
L9	Cellular Energetics	Ch. 8
L10	Protein Sorting	Ch. 17
L11	Membrane Trafficking	Ch. 17
	Lab 3	
L12	Vesicular Traffic, Secretion, and Endocytosis	Ch. 17
/	**Midterm Exam**	/
L13	Metabolism and Movement of Lipids	Ch. 18
L14	Cytoskeleton I: Microfilaments and Intermediate Filaments	Ch. 19
	Lab 4	
L15	Cytoskeleton I: Microfilaments and Intermediate Filaments	Ch. 19-20
	Cytoskeleton II: Microtubules	
L16	Cytoskeleton II: Microtubules	Ch. 19-20
	Lab 5	
L17	Cell Signaling	Ch. 13
L19	Cell Signaling	Ch. 13
L20	Signaling Pathways that Control Gene Activation	Ch. 14
L21	Cell Birth, Lineage, and Death	Ch. 22
	Lab 6	
L22	Cell Cycle and Cell Growth Control	Ch. 21
L23	Cell Cycle and Cell Growth Control	Ch. 21
L24	Cancer Cell Biology	Ch. 23
L25	Cancer Cell Biology	Ch. 23
	Research Paper Submission	
/	**Final Exam**	/

Accommodation Statement:

Academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow.

Academic Integrity Statement

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged to have engaged in academic dishonesty in coursework may receive a reduced or failing grade for the work in question and/or for the course.

Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

Other Items:

Lab Policies

- **Attendance:** Attendance at all lab sessions is mandatory. Missing a lab without a valid excuse will result in a grade penalty.
- **Late Reports:** Late lab reports will incur a 10% penalty per day.
- **Safety:** Proper lab attire (lab coat, gloves, safety goggles) is required at all times. Failure to follow safety protocols may result in dismissal from the lab.
- **Academic Integrity:** Plagiarism and fabrication of data will not be tolerated and will result in disciplinary action.

Lab Materials

- Lab manual (provided during class).
- Lab notebook for recording data and observations.
- Personal protective equipment (lab coat, gloves, safety goggles).

Attendance and Expectations

All students are required to attend every class, except in cases of illness, serious family concerns, or other major problems. We expect that students will arrive on time, be prepared to listen and participate as appropriate, and stay for the duration of a meeting rather than drift in or out casually. In short, we anticipate that students will show professors and fellow students maximum consideration by minimizing the disturbances that cause interruptions in the learning process. This means that punctuality is a must, that cellular phones be turned off, and that courtesy is the guiding principle in all exchanges among students and faculty. You will be responsible for the materials and ideas presented in the lecture.

Assignment Due Dates

All written assignments must be turned in at the time specified. Late assignments will not be accepted unless prior information has been obtained from the instructor. If you believe you have extenuating circumstances, please contact the instructor as soon as possible.

Make-Up Work

The instructor will not provide students with class information or make-up assignments/quizzes/exams missed due to an unexcused absence. Absences will be excused and assignments/quizzes/exams may be made up only with written documentation of an authorized absence. Every effort should be made to avoid scheduling appointments during class. An excused student is responsible for requesting any missed information from the instructor and setting up any necessary appointments outside of class.

Access, Special Needs, and Disabilities

Please notify the instructor at the start of the semester if you have any documented disabilities, a medical issue, or any special circumstances that require attention, and the school will be happy to assist.