



湖北工業大學  
HUBEI UNIVERSITY OF TECHNOLOGY

<b>Course Title</b>	Principles of Neurobiology
<b>Course Code</b>	BIOL 3243
<b>Semester</b>	Summer 2026
<b>Course Length</b>	8 Weeks, 60 Contact Hours
<b>Credits</b>	4
<b>Instructor</b>	TBA
<b>Office</b>	TBA
<b>Email</b>	TBA
<b>Prerequisite</b>	BIOL 1101 Principles of Biology
<b>Antirequisite</b>	BIOL 3241 Principles of Neurobiology (4 Weeks)

### Course Description:

This course offers a high-level investigation into the biological principles governing human physiological systems, focusing on the sophisticated mechanisms of homeostasis. The course provides an integrated understanding of how cells, tissues, and organ systems function in concert, with a particular emphasis on the biophysical properties of excitable tissues. Students will explore the intricate regulatory pathways of the nervous, muscular, endocrine, and reproductive systems at the molecular and systemic levels. Beyond conceptual understanding, the course emphasizes scientific reasoning and the application of physiological concepts to solve complex biological problems.

### 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:

- Describe the electrochemical mechanisms of the action potential and synaptic integration;
- Map the anatomical and functional pathways of major sensory and motor systems;
- Explain the molecular and cellular processes underlying neural development and circuit formation;
- Analyze the mechanisms of synaptic plasticity and their roles in learning and memory;
- Evaluate current research regarding neural regeneration and functional recovery.

**Textbooks/Supplies/Materials/Equipment/ Technology or Technical Requirements:**

**Primary Textbook:** *Neuroscience: Exploring the Brain, Enhanced Edition, 4th Edition*, by Mark Bear; Barry Connors; Michael A. Paradiso. Published by Jones & Bartlett Learning (2016).

**Supplementary Reference:** *Principles of Neural Science, 6th Edition*, by Eric R. Kandel, John D. Koester, Sarah H. Mack and Steven A. Siegelbaum. McGraw Hill (2021).

**Course Requirements:**

**Continuous Assessment (15%):** Short in-class quizzes will be administered throughout the semester to reinforce key concepts and encourage engagement with lecture material.

**Research Review Paper (15%):** Students must submit a 1000-word critical review of a recent peer-reviewed paper in the field of neuroplasticity or development. This encourages the transition from textbook learning to active scientific inquiry.

**Midterm Examination 1 (20%):** This exam (multiple-choice and short-answer format) covers foundational cellular and signaling mechanisms. It allows students to demonstrate mastery of the basic building blocks of neural function before progressing to more integrative topics.

**Midterm Examination 2 (20%):** This exam (multiple-choice and short-answer format) focuses on sensory and motor systems as well as initial aspects of neural development. It builds on the first midterm and evaluates students' ability to integrate cellular mechanisms with systems-level function.

**Final Examination (30%):** A comprehensive final exam (multiple-choice, short-answer, and integrative essay questions) emphasizes material from the second half of the course while retaining selected foundational concepts.

<b>Assessments: Activity</b>	<b>Percent Contribution</b>
Continuous Assessment	15%
Research Review Paper	15%
Midterm Examination 1	20%

Midterm Examination 2	20%
Final Examination	30%

**Grading:**

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

<b>Grade</b>	<b>Percentage of available points</b>
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.*

<b>BIOL 3243 Schedule</b>		
Lecture	Topic	Chapters
L1	Introduction to nervous-system organization and history	1
L2	Neurons and glial cells	2
L3	Membrane excitability and resting potential	3
L4	Generation and propagation of action potentials	4
L5	Synaptic transmission	5
L6	Neurotransmitter systems and receptors	6
L7	Neuroanatomy and overall structure of the nervous system	7
L8	Chemical senses (taste and smell)	8
L9	Visual system I: The eye and phototransduction	9
L10	Visual system II: Central visual processing	10
L11	Auditory and vestibular systems	11
L12	Somatic sensory system (touch, pain, temperature)	12
L13	Spinal control of movement	13
L14	Brain control of movement (cortex, basal ganglia, cerebellum)	14
L15	<b>Midterm Exam 1 (Lectures 1-7)</b>	--
L16	Chemical control of the brain and behavior	15
L17	Motivation, feeding, and homeostasis	16
L18	Embryonic development and wiring of the brain	23
L19	Neurogenesis, cell migration, and differentiation	23
L20	Axon guidance, synapse formation, and cell death	23
L21	<b>Midterm Exam 2 (Lectures 8-17)</b>	--
L22	Regeneration and neural plasticity	23
L23	Memory systems (declarative, procedural, amnesia)	24
L24	Synaptic plasticity: LTP, LTD, and molecular mechanisms	25
	<b>Research Review Paper Due</b>	
L25	Integration: plasticity across development, learning, and clinical	23 + 25

correlations

/ **Final Exam (Covers all prior lectures)**

### **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 outside the University; and nondisclosure or misrepresentation in filling out applications or other University records.

### **Other Items:**

#### **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.