

# Texas A&M University-Texarkana

## BIOL 490 – Introduction to Biotechnology

Spring 2026 Course Syllabus  
RELLIS Campus

### Faculty Details

**Instructor:** Sebastian Schmidl, Ph.D.  
**Email:** [sschmidl@tamut.edu](mailto:sschmidl@tamut.edu)  
**Phone:** (979) 317-3431  
**Office Location:** RELLIS Academic Complex Building (ACB) 1, Suite 322  
1425 Bryan Road  
Bryan, TX 77807  
**Office Hours:** TR 3:00p-6:00p or by appointment  
(Note: When emailing or leaving a phone message, please indicate which course you are contacting me about.)

### Course Information

#### Course Name and Course Credit

BIOL 490 – Introduction to Biotechnology (4 SCH)

#### Course Meeting Times

Tuesday	9:10 AM – 11:50 AM	Lecture	RELLIS ACB1, Room 120
Tuesday	12:00 PM – 2:40 PM	Lab	RELLIS ACB1, Room 315A

#### Course Description

This upper-division course introduces the fundamental concepts and practical applications of biotechnology, with particular emphasis on microbial systems. Students examine the structure, function, expression, and evolution of microbial genes, along with the experimental approaches used to study and manipulate them. Core topics include molecular information flow, regulation of gene expression, microbial genomes and their evolution, gene discovery and mapping, and principles of genetic engineering. Students also explore a variety of molecular genetic techniques, including DNA cloning, polymerase chain reaction (PCR) and quantitative PCR, nucleic acid hybridization methods, functional omics approaches, mutagenesis strategies, reporter genes and gene fusions, and emerging technologies such as next-generation DNA sequencing. The laboratory component provides hands-on experience with modern microbial genetics techniques that reinforce and extend concepts covered in lecture. Prerequisites: Students should have a solid foundation in introductory college-level biology. It is also recommended that students have completed at least one upper-division biology course, such as Genetics (BIOL 310), General Microbiology (BIOL 311), or Cell and Molecular Biology (BIOL 402).

## Course Delivery Method

This course is delivered in a face-to-face format and includes lectures, in-class learning activities, and laboratory sessions. Supplemental materials, resources, and announcements will be provided through Canvas.

## Required Textbooks/Resources

Thieman, W. J., and Palladino, M. A. (2018) Introduction to Biotechnology, 4<sup>th</sup> Edition, Pearson, ISBN: 978-0134650197.

## Student Learning Outcomes

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

- Describe the scope of biotechnology and explain its practical applications in research and industry.
- Discuss the molecular basis of DNA replication, transcription, and translation.
- Explain the mechanisms that regulate gene expression and how they influence cellular processes.
- Apply foundational molecular genetic techniques to investigate biological questions.
- Identify genes, pathways, and cellular processes that can be used to design or modify biological systems.
- Analyze and address problems that arise at the interface of biology, engineering, and technology.
- Engage in collaborative case-study activities to connect molecular biology concepts to real problems in genetics and biotechnology.

## Methods of Evaluation

### Evaluation Criteria

Course grade will be determined as follows (100% total):

- |                            |           |
|----------------------------|-----------|
| • Exams (2)                | 20% each  |
| • Final Comprehensive Exam | 30%       |
| • Research Proposal        | 15%       |
| • Lab Reports (2)          | 7.5% each |

### Grading Policy

Letter Grade Scale:

- A (90% and above) – Excellent work that shows strong understanding and mastery of the material
- B (80% – 89%) – Good work with solid understanding and minor gaps
- C (70% – 79%) – Satisfactory performance meeting the basic course requirements
- D (60% – 69%) – Limited understanding; below expectations in some areas
- F (below 60%) – Does not meet the minimum requirements for the course

## Course Policies

### Attendance Policy

**Lecture:** Lecture notes will be posted in Canvas. However, regular attendance is strongly encouraged, since class meetings provide additional explanations, real-world examples, and supplemental materials that may not appear in the posted notes. Important announcements about exams and assignments will be made at the beginning of class and will not be repeated for students who arrive late. Reading assigned textbook chapters in advance is recommended to strengthen understanding and support active participation.

**Lab:** Attendance at all laboratory sessions is mandatory, because hands-on participation is crucial for developing practical skills in biotechnology. Students are expected to wear appropriate attire, including any required personal protective equipment, and must always follow safety procedures. Although laboratory activities may not always align directly with lecture topics, they are designed to reinforce core biotechnological techniques and problem-solving skills. Students will gain experience with sterile technique, DNA extraction, PCR, gel electrophoresis, cloning strategies, and analysis of experimental data, with particular emphasis on accuracy, troubleshooting, and careful documentation throughout the laboratory process.

### Late Work Policy

**Exams:** There will be two lecture exams and one comprehensive final exam. Students will be notified in advance about which lectures are covered on each exam. Exams will include multiple-choice and short-answer questions. Sample questions will be posted in Canvas to support exam preparation. All exams will be taken online using Respondus LockDown Browser with webcam monitoring. Each exam will be open for one week, from Monday through Sunday. Students may begin the exam at any time during this window. Once the exam is opened, it must be completed within 90 minutes. The timer runs continuously and cannot be paused, restarted, or extended. Beginning the exam late in the testing window does not extend the deadline. All exams automatically close when the exam window ends. Missed exams will be excused only for documented university-sanctioned events, serious illness, or other approved extenuating circumstances. Arrangements for university-sanctioned events must be made before the exam window opens. For all other approved circumstances, the instructor must be notified as soon as possible. Failure to communicate in a timely manner may result in a grade of zero.

**Research Proposal:** Students will work in groups of two to develop a written research proposal that explores a novel idea within the broad field of biotechnology and the biological sciences, with an emphasis on living systems or organisms used to develop or improve products. Students are encouraged to select a topic that genuinely interests them, since curiosity and engagement typically lead to deeper and more thoughtful work. Before finalizing a topic, each group must confirm that sufficient, reliable, peer-reviewed literature is available to support both the significance and feasibility of the proposed study. The proposal must follow APA format and be approximately 15-20 pages in length, 1.5-spaced, including figures. Proposals should be clearly organized and include the following

sections: Summary, Specific Aims, Innovation, Introduction, Materials and Methods, Rationale, Expected Results, Applications and Future Directions, and Literature Cited. Each group will submit an outline to the instructor prior to Spring Break. The completed proposal is due April 26, 2026. Late submissions will incur a grade penalty unless prior arrangements have been approved for documented, valid reasons. Technical issues are not considered an acceptable excuse for late submission unless reported to both the instructor and IT support before the deadline. Additional assignment details and expectations will be provided in class and on Canvas, and students are responsible for reviewing all posted guidance carefully.

Lab Reports: Two formal lab reports will be required, each describing the experiments conducted in the laboratory and including a properly formatted references section. Reports must follow the scientific paper format outlined in the lab guidelines provided in class. Each report is due by 11:59 PM on the assigned date. Late submissions will incur a grade penalty unless an extension has been arranged in advance for documented, valid reasons. Technical difficulties must be reported before the deadline to be considered for an extension.

### **Communication Policy**

Office Hours: Students who are unable to attend the scheduled office hours may email to request an appointment at an alternative time. Office hours may occasionally change during the semester, and any updates will be posted in Canvas.

Course Updates: Students should check Canvas regularly for announcements, changes to the syllabus or schedule, and other important course information. Canvas will serve as the primary platform for all course updates.

Grade Questions: Students should contact the instructor as soon as possible with any questions or concerns about grades so that issues can be addressed promptly. This may include clarification of grading criteria, review of feedback, or discussion of possible errors. All grade concerns must be raised and resolved before the last class day, April 29, 2026.

## **Semester Overview**

### **Important Dates (16-Week Full Term; January 12-May 6)**

January 12	First Class Day
January 16	Last Day for Add/Drop (16-Week Classes)
January 19	Martin Luther King, Jr. Day – University Closed
January 28	Spring Census
February 23-March 1	Exam 1 Period
March 9-13	Spring Break – No Classes
April 6-12	Exam 2 Period
April 10	Reading Day – No Classes
April 22	University Withdrawal/“Q” Drop Deadline (16-Week Classes)
April 26	Research Proposal Due

April 29  
 April 30-May 1  
 May 4-6

Last Class Day  
 Study Days – No Classes  
 Final Exam Period

**Course Outline (Tentative)**

<b>Date</b>	<b>Topic</b>	<b>Assigned Reading</b>
<b>Week 1</b> Jan. 12-16	<b>Class Introduction and Syllabus Review</b>	-
<b>Week 2</b> Jan. 19-23	The Biotechnology Century and Its Workforce	Chapter 1
<b>Week 3</b> Jan. 26-30	An Introduction to Genes and Genomes	Chapter 2
<b>Week 4</b> Feb. 2-6	Recombinant DNA Technology and Genomics	Chapter 3
<b>Week 5</b> Feb. 9-13	Proteins as Products	Chapter 4
<b>Week 6</b> Feb. 16-20	Microbial Biotechnology	Chapter 5
<b>Week 7*</b> Feb. 23-27	Plant Biotechnology	Chapter 6
<b>Week 8</b> Mar. 2-6	Animal Biotechnology	Chapter 7
<b>Week 9</b> Mar. 9-13	<b>Spring Break</b>	-
<b>Week 10</b> Mar. 16-20	Aquatic Biotechnology	Chapter 10
<b>Week 11</b> Mar. 23-27	Medical Biotechnology	Chapter 11
<b>Week 12</b> Mar. 30-Apr. 3	Lab Session 1	-
<b>Week 13*</b> Apr. 6-10	Lab Session 2	-
<b>Week 14</b> Apr. 13-17	Lab Session 3	-
<b>Week 15*</b> Apr. 20-24	Lab Session 4	-
<b>Week 16</b> April 27-29	Lab Session 5	-

\* Exam Weeks.

## University Policies, Support, and Student Resources

### University Policies

For University policies on Academic Integrity, A&M-Texarkana Email Address, and the Drop Policy, please refer to the [Syllabus Policies](#).

### Information Technology (IT) Support

For questions on password reset, login issues, and application installation, please refer to IT Helpdesk or Submit a [TeamDynamix](#) ticket.

### Learning Management System (Canvas) Support

This course utilizes Canvas, the university's Learning Management System (LMS), for all course materials, announcements, assignments, and communication. You can access Canvas through the university's website or by navigating to the [Canvas Portal](#) using your student credentials. For questions on *all web-enhanced and online courses*, please refer to [Technology Innovation and Digital Education \(TIDE\)](#).

### Disability Accommodations

The Americans with Disabilities Act (ADA) is a federal non-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this law requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodations, please contact the Office of Student Life in UC room 125, or call (903) 223-1351. For additional information visit [Disability Services](#).

### Student Conduct and Complaints

The university is committed to maintaining a respectful and safe environment. The [Student Code of Conduct](#) outlines behavioral expectations and disciplinary procedures. If you encounter a concern or issue, you may submit a formal report through the [Student Complaint Process](#). To report an issue related to academic misconduct, you can do so at the [Academic Misconduct](#) page.

### Student Resources and Programs

The university enhances student education beyond academics through diverse programs. Students can join clubs (like SGA, Honors, Greek Life), participate in service, experience study abroad, and learn about career services, internships and job opportunities. Visit [Student Resources and Programs](#) to learn about clubs, organizations and student resources.