

# BIOL 4501: Bacterial Diversity and Physiology

Fall 2025 TR 12:30 – 1:50 pm • Env 115

**Professor: Dr. Calvin A. Henard**

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**Office Hours:** email to schedule a meeting

**Course Description and Objectives:** Comparative survey of bacteria and archaea. Growth, metabolism, energy transformations, adaptive mechanisms, ecology, and role of bacteria and archaea in biogeochemical cycles.

The objectives of this course are to provide (i) a basic understanding of bacterial physiology, (ii) an in-depth survey of the structure and metabolic diversity of bacteria, (iii) a framework for thinking about microbial interactions in pathogenicity and ecology, and (iv) the benefits of bacterial diversity to ecology, biotechnology, and agriculture.

**Course Pre-requisites, Co-requisites, and/or Other Restrictions:** [BIOL 1710](#) or [BIOL 1711](#); [BIOL 1720](#) or [BIOL 1722](#); [BIOL 1760](#) or [BIOL 1761](#); [BIOL 2041](#)/[BIOL 2042](#); [CHEM 2370](#); or consent of department.

**Suggested Textbooks:** The following are excellent resources for this course, but are not required:  
[Brock Biology of Microorganisms](#), ISBN 978-0134874401  
[Principles of Microbial Diversity](#) by James W. Brown, ISBN 9781555814427  
[The Physiology and Biochemistry of Prokaryotes](#) by David White et al., ISBN 019539304X  
[Microbial Physiology](#) by Ann M. Stevens et al., ISBN 1683673670

## **Weekly Topic Schedule**

| Date                                                | Subject                                       | Literature Assignments |
|-----------------------------------------------------|-----------------------------------------------|------------------------|
| Aug. 19                                             | Phylogeny and the Three Domains of Life       | P1                     |
| 26                                                  | Generation of Biosynthetic Precursors         | P2                     |
| Sept. 2                                             | Bioenergetics and the Proton Motive Force     | P3                     |
| 9                                                   | Respiration and Fermentation                  | P4                     |
| 16                                                  | Autotrophy                                    | P5                     |
| 23                                                  | Phototrophy                                   | P6                     |
| 30                                                  | Chemotrophy in the Carbon and Sulfur Cycles   | P7                     |
| Oct. 7                                              | Microbial contributions to the Nitrogen Cycle | P8                     |
| <b>Oct. 14: Midterm Review and Oct. 16: Midterm</b> |                                               |                        |
| 21                                                  | Cell Envelope and Transport                   | P9                     |
| 28                                                  | Bacterial Transcription                       | P10                    |
| Nov. 4                                              | Two-component Regulatory Systems              | P11                    |
| 11                                                  | Chemotaxis                                    | P12                    |
| 18                                                  | Quorum Sensing                                | P13                    |
| 25                                                  | Thanksgiving                                  |                        |
| Dec. 2                                              | Stress Responses                              |                        |

**Dec. 4: Final Review and Dec. 11 (10:30-12:30pm) Final Exam**

Please note this schedule is tentative and subject to change by the instructor. Weekly topics may vary, but exam dates are set and will not change.

**Literature Assignments:** One of the primary goals of this course is to introduce you to or refine reading and evaluating primary scientific literature. To this end, I will be uploading review articles and/or primary literature associated with weekly topics to Canvas <https://unt.instructure.com/login/canvas>. There will be in-class discussions each Thursday class session related to these readings. Assignments will be YOU asking questions/annotating the papers via **Perusal prior to Thursday class meetings**. Graduate students will be expected to be discussion leaders during literature review sessions, so ensure that you have not only read the papers, but performed additional research/reading, as needed.

Paper discussions and participation will occur in class, which is worth 25% of your grade. **You must be present to receive credit. 2.5 pts will be deducted from your final grade for each absence on a Thursday paper discussion day.** If you have an excused absence, you have the option to write a 1pg, single-spaced, 11pt arial font synopsis of the paper turned in by 9am the Monday following the absence to receive partial credit. **The synopsis is not a substitution for full participation. 1pt will be deducted for the absence if you complete the optional synopsis.**

**Exams:** There will be 2 exams administered via Canvas. Exams will be available on the indicated dates within Canvas and must be completed during the indicated timeframe. **You DO NOT need to come to class the weeks of exams, but we will have an optional exam material review on 10/14 and 12/4. There will be no make-up exams.**

- Any student found cheating or guilty of plagiarism on any exam or assignment will receive a grade of zero (0) for that exam and may face other disciplinary action(s).
- **The exam dates are fixed and will not change;** however, the content included on each exam may be different than what is listed in the tentative course schedule. If there are changes to the topics covered on an exam, it will be announced in class and on Canvas.
- Students will have one week following the return of graded exams to raise concerns or dispute potential grading errors related to the exam. **After the one week period, the grade is set and can no longer be disputed.**

### **Grading:**

Your final course grade will include 2 exams (50%), literature assignment participation/presentation (25%), and *Perusal* annotations (25%):

Grading will follow a standard scale:

|            |   |
|------------|---|
| (90-100 %) | A |
| (80-89%)   | B |
| (70-79%)   | C |
| (60-69%)   | D |
| (< 60%)    | F |

Laptop and tablet-style computers are allowed during class as long as they are being used appropriately (i.e., taking notes). You will be asked to put your device away if you are using it for something other than class. **Please make sure that your phone is on silent when class is in session.** You are not allowed to text, play games, or surf the web on your phone during lecture.

**I value the many perspectives students bring to our campus. Please work with me to create a classroom culture of open communication, mutual respect, and inclusion. All discussions should be respectful and civil. Although disagreements and debates are encouraged, personal attacks are unacceptable. Together, we can ensure a safe and welcoming classroom for all. If you ever feel like this is not the case, please stop by my office and let me know. We are all learning together.**

### **Technical Assistance**

Here at UNT we have a Student Help Desk that you can contact for help with Canvas or other technology issues.

**UIT Help Desk:** [UIT Student Help Desk site](http://www.unt.edu/helpdesk/index.htm) (<http://www.unt.edu/helpdesk/index.htm>)

**Email:** [helpdesk@unt.edu](mailto:helpdesk@unt.edu)

**Phone:** 940-565-2324

**In Person:** Sage Hall, Room 130

**Walk-In Availability:** 8am-9pm

**Telephone Availability:**

- Sunday: noon-midnight
- Monday-Thursday: 8am-midnight
- Friday: 8am-8pm
- Saturday: 9am-5pm

**Laptop Checkout:** 8am-7pm

For additional support, visit [Canvas Technical Help](https://community.canvaslms.com/docs/DOC-10554-4212710328) (<https://community.canvaslms.com/docs/DOC-10554-4212710328>)

### **UNT Policies**

#### **Academic Integrity Policy**

Academic Integrity Standards and Consequences. According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University. **If I identify plagiarism on an Exam, you will get an automatic 50 unless the violation is particular egregious, then you will receive a 0.**

#### **ADA Policy**

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time; however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have

the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the Office of Disability Access website (<http://www.unt.edu/oda>). You may also contact ODA by phone at (940) 565-4323.

### Emergency Notification & Procedures

UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.

### Acceptable Student Behavior

Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT's [Code of Student Conduct](https://deanofstudents.unt.edu/conduct) (<https://deanofstudents.unt.edu/conduct>) to learn more.