

# BIOL 4501/5502: Bacterial Diversity and Physiology

Fall 2026 TR 12:45 – 2:05 pm • Env 115

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

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**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. 18                                                            | Phylogeny and the Three Domains of Life       |                        |
| 25                                                                 | Generation of Biosynthetic Precursors         | P1                     |
| Sept. 1                                                            | Bioenergetics and the Proton Motive Force     | P2                     |
| 8                                                                  | Respiration and Fermentation                  | P3                     |
| 15                                                                 | Autotrophy                                    | P4                     |
| 22                                                                 | Phototrophy                                   | P5                     |
| 29                                                                 | Chemotrophy in the Carbon and Sulfur Cycles   | P6                     |
| Oct. 6                                                             | Microbial contributions to the Nitrogen Cycle | P7                     |
| Oct. 13: Midterm Review and Oct. 16: Midterm                       |                                               |                        |
| 20                                                                 | Cell Envelope and Transport                   | P8                     |
| 27                                                                 | Bacterial Transcription                       | P9                     |
| Nov. 3                                                             | Two-component Regulatory Systems              | P10                    |
| 10                                                                 | Chemotaxis                                    | P11                    |
| 17                                                                 | Quorum Sensing                                | P12                    |
| 24                                                                 | Thanksgiving                                  |                        |
| Dec. 1                                                             | Stress Responses                              | P13                    |
| Final Review: Dec. 3 Final Exam: Dec. 8 (1-3pm; online via Canvas) |                                               |                        |

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. **A quiz related to the paper to be discussed that day will be administered within the first 10min of each Thursday class via iClicker. Tardy or absent students will not be able to take the quiz.** *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. 8 pts will be deducted from your participation 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. 5pts will be deducted for the absence if you complete the optional synopsis.*

**Exams:** There will be 2 exams administered via Canvas with lockdown browser. *Graduate students will have an alternative format exam that includes data interpretation and experimental design.* 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 10/13 and 12/3. 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 your *top 10* literature quizzes (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>)

**Academic Integrity:** 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.

*In this course, I want you to engage with the materials and develop your own critical thinking and writing skills. For this reason, the use of Generative AI (GenAI) tools like ChatGPT is not permitted. While these tools can be helpful in some contexts, they do not align with our goal of fostering the development of your independent thinking. Using GenAI to complete any part of an assignment, exam, or coursework will be considered a violation of academic integrity, as it prevents the development of your own skills, and will be addressed according to the [Student Academic Integrity policy](https://policy.unt.edu/policy/06-003) (<https://policy.unt.edu/policy/06-003>).*

**ADA accommodation statement:** The University of North Texas makes reasonable accommodations for students with disabilities. To request accommodations, you must first register with the Office of

Disability Access (ODA) by completing an application for services and providing documentation to verify your eligibility each semester. Once your eligibility is confirmed, you may request your letter of accommodation. ODA will then email your faculty a letter of reasonable accommodation, initiating a private discussion about your specific needs in the course. You can request accommodations at any time, but it's important to provide ODA notice to your faculty as early as possible in the semester to avoid delays in implementation. Keep in mind that you must obtain a new letter of accommodation for each semester and meet with each faculty member before accommodations can be implemented in each class. You are strongly encouraged to meet with faculty regarding your accommodations during office hours or by appointment. Faculty have the authority to ask you to discuss your letter during their designated office hours to protect your privacy. For more information and to access resources that can support your needs, refer to the [Office of Disability Access](https://studentaffairs.unt.edu/office-disability-access) website (<https://studentaffairs.unt.edu/office-disability-access>).

#### 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). [Campus Closures Policy](https://policy.unt.edu/policy/15-006) (<https://policy.unt.edu/policy/15-006>). 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.