

Syllabus

We reserve the right to make changes to any part of this syllabus, including the scheduled dates for exams or lesson topics and the addition of new assignments. Changes made after the first day of class will be announced on Canvas ASAP and **highlighted in green.**

Course Description

In this 3 credit course, we will learn about:

- bacteria and archaea form, growth, physiology, genetics, and diversity
- bacterial interactions including symbiosis and pathogenesis (animal and plant)
- use of bacteria in biotechnology
- viruses

Meeting Time and Place

Mon., Wed., and Fri. 9:05-10:10 AM., Coker 201

Textbook

Madigan et al, Biology of Microorganisms, 16th edition. The text is for help with the topics covered in lecture. Only a fraction of the topics covered in the text will be covered in this class as one semester is not enough time to cover the entire book.

Lecture Schedule:

Date	Lecture #	Topic	Chapter for background and help	Instructor
Aug 21	1	Introduction	1	SM
Aug 23 ^m	2	Cell structure	2	SM
Aug 25 ^{*m}	3	Metabolism I	3	SM
Aug 28	4	Metabolism II	3	SM
Aug 30 ^{#m}	5	CANCELLED – No Class	-	SM
Sep 1 [*]	6	Molecular Biology	6 & 7	SM

Sep 4		LABOR DAY - No Class		
Sep 6 ^{#m}	7	Metabolic Diversity	14	SM
Sep 8 ^{*m}	8	Bacterial Growth / Practicum: Growth, Transformation and Mutation	4 & 9	AM & SM
Sep 11	9	Nutrient Cycling and Nitrogen Fixation	15 & 21	SM
Sep 13 [#]	10	Functional Diversity	15	SM
Sep 15 [*]	11	Microbial Ecology and Methods	19	SM
Sep 18	12	Microbial Ecosystems	20	SM
Sep 20		MIDTERM I, covers lectures 1-12		
Sep 22	13	Bioremediation, Bacteria in Built Environments	22	SM
Sep 25		WELL-BEING DAY - No Class		
Sep 27 ^m	14	Gene regulation (quiz cancelled)	7	AM
Sep 29 ^{*m}	15	Gene regulation	7 & 8	AM
Oct 2^m	16	Intro to Viruses	5	CB
Oct 4^{m#}	17	Viral Replication	11.1 – 11.4	CB
Oct 6[*]	18	Viral Genomes I: DNA Viruses	11.4 – 11.7	CB
Oct 9^m	19	Viral Genomes II: RNA Viruses	11.8 – 11.11	CB
Oct 11[#]	20	Plant viruses and plant diseases Quiz 5, covers lectures 16-18	-	AM
Oct 13[*]	21	COVID	-	CB
Oct 16^m	22	Bacterial genetics	9	CB
Oct 18 [#]	23	Bacterial genetics Quiz 6, covers lectures 19-21	9	CB
Oct 20		FALL BREAK - No Class		
Oct 23^m	24	Omics & Genome Evolution	10	CB
Oct 25 ^{m#}	25	Genetic engineering Quiz 7, covers lectures 22&23	12	CB
Oct 27 ^{m*}	26	Microbial evolution and systematics	13	CB
Oct 30 ^m	27	Diversity of Bacteria & Archaea	16 & 17	CB
Nov 1		MIDTERM II, covers lectures 13-27		
Nov 3 ^m	28	Host-microbe interactions; symbiosis	23 & 24	AM

Nov 6 ^{*m}	29	Host-microbe interactions; animal & plant pathogens	25	AM
Nov 8	30	Evolution of antibiotic resistance (quiz cancelled)	Levy 1998; on Canvas	CB
Nov 10 ^{#m}	31	The innate immune system and host defense	26	AM
Nov 13	32	The adaptive immune systems	27	AM
Nov 15 ^{#m}	33	Epidemiology Quiz 8, covers lectures 28-31	30	CB
Nov 17 [*]	34	Infectious diseases	30-33	AM
Nov 20 [*]	35	Infectious diseases	30-33	AM
Nov 22-24		THANKSGIVING BREAK		
Nov 27 ^m	36	Major Microbial Diseases:	30-33	AM
Nov 29 ^{m#}	37	Major Microbial Diseases Quiz 9, covers lectures 32-35	30-33	AM
Dec 1 [*]	38	Major Microbial Diseases	30-33	AM
Dec 4	39	Major Microbial Diseases	30-33	AM
Dec 6	40	Major Microbial Diseases	30-33	AM

4pm Tuesday, Dec 12 FINAL EXAM, covers lectures 1-40

*There is a discussion session on this day.

There is a quiz on this day.

^m There is a Mastering Microbiology assignment due on this day.

Course Objectives:

At the end of this course, you should understand how bacteria grow both in association with eukaryotic hosts and in the environment. You should also understand how viruses grow. You should be able to work problems in bacterial and viral genetics and gene cloning. You should understand how to use genetics to answer questions about how bacteria and viruses act under certain conditions. You should understand the fundamentals of bacterial and viral disease and the host response to infection. You should understand the roles that bacteria play in the environment and how we can manipulate bacteria to alter these roles. You should understand the fundamental biology of the Archaea.

Prerequisites:

- BIOL 202, or
- BIOL 103 and BIOL 104 and BIOL 220

You should have a good understanding of the fundamentals of genetics and molecular biology.

Assignments & Grading Policies

Mastering Microbiology (2% of your grade)

In the lecture schedule, we assign background reading for every lecture, usually from the textbook. On every day for which the assigned reading is a new textbook chapter, we provide a Mastering Microbiology assignment to guide your reading and test your comprehension of the information you read. The Mastering assignments are required and should be completed by 11:59PM the day before class. They will be graded for completeness, not for correct answers. Each Mastering Microbiology assignment will count equally toward your grade, 1 point per assignment.

Late policy: Mastering assignments can be submitted multiple times before the deadline. If you miss the deadline, we will accept late submissions until 11:59PM on the day of class, without penalty. No credit will be given for Mastering submissions that occur after that. Missing a few assignments over the course of the semester will not have a large negative impact on your grade, but we ask that you work diligently to complete these assignments on time.

Group Discussions (19% of your grade)

Each Friday (and one Monday) we will spend 20-30 minutes engaging in a group discussion. Group discussions will aid your ability to design experiments and protocols and help you develop the ability to think critically. Group discussions will also provide an opportunity for you to hear new and diverse points of view.

You will be assigned to a discussion group of about 8 people, chosen to ensure that at least one member of each group is taking the laboratory associated with this course (Biol 422L).

Your group discussion grades will be based on your individual pre-discussion worksheets, your contribution to the group's collaborative report, and the final report submitted by your group. Worksheets and reports will be graded for clarity and scientific accuracy. Note that most of the questions will have many possible correct answers. Make sure to cite your sources correctly and to use quotation marks around copied material (even material from the web should be cited and placed in quotation marks). Failure to cite or use quotation marks constitutes plagiarism and violates the UNC honor code. For help and guidance, please visit:

<https://guides.lib.unc.edu/writing-citing/how-citing>

<https://guides.lib.unc.edu/citing-information/home>

Each group discussions will count equally toward your grade, 10 points per discussion, and you will be allowed to drop 1 group discussion from your final grade.

Permission to miss a group discussion must be obtained in advance and will be granted only in cases of extreme illness or travel for a University-excused purpose (e.g., to participate in a

UNC athletic event or to interview for a job, graduate or medical school). In the event that you obtain permission to miss a group discussion, you will need to submit your pre-discussion worksheet and to write out your answer to the discussion question, in complete form with references, and email it to the instructor (Dr. McCoy, Dr. Matthyse, or Dr. Burch) by 11pm Thursday, the night before the discussion.

Quizzes (20% of your grade)

We will administer quizzes at the start of class each Wednesday to provide opportunities to practice answering exam-style questions and to encourage you to review the course material consistently throughout the semester. Note that some quiz questions will require you to integrate material from two or more lectures to prepare you for the mid-term and final exams. Quizzes (and exams) will also cover material from the group discussions.

We will grade quizzes for correct answers and each quiz will count equally toward your grade, 15 points per quiz. Please do not email your instructors to tell them you missed a quiz. You will be allowed to drop 1 quiz from your final grade. We will not make accommodations for any other missed quizzes.

Exams (60% of your grade)

There will be 2 midterms (15% each) and a cumulative final exam (30%). The midterm exams are not cumulative, except that the advanced material at the end of the course builds on the basic material taught in the beginning. The final exam is cumulative, covering material from all 40 lectures. Exam questions will be taken from lectures, group discussions, and assigned readings. Exams will consist of a variety of question types including true-false, multiple choice, fill in the blanks, and short answer. Exam-style questions will be given for practice during many lectures and on the weekly quizzes. Your final exam will consist of 50% material from the last third of the class, and 50% material from the first two thirds.

Exams will be administered in-person. They will be timed paper exams offered during the regular class period (50 mins). You will be allowed a calculator but no other aids during exams. Students with ARS accommodations will receive alternative arrangements as necessary.

Old exams are available on the course Canvas site.

Permission to miss a midterm examination will be granted only in extreme circumstances (e.g. severe illness), must be certified as University excused by the UNC Dean of Students' office, and permission to miss an exam must be obtained in advance (at least an hour before the exam starts, but the sooner you let us know, the better!). In the event that you obtain permission to miss one midterm examination, you will need to take a makeup exam on the Wednesday following the exam you miss. Midterm exams that are missed without advance permission will be given a score of zero points. Students who miss two exams or fail to take the final exam, will fail the course.

Taking a makeup final exam requires permission from the dean's office. Makeup exams for the final will be given at some time after Dec. 15. No one may take the final exam early.

Grade Calculation

Your letter grade will be based on the sum of your performances on quizzes, in-class participation, exams, and recitation according to the following scale:

A:	93-100%	C+:	76-79.9%
A-:	90-92.9%	C:	73-75.9%
B+:	86-89.9%	C-:	70-72.9%
B:	83-85.9%	D:	65-69.9%
B-:	80-82.9%	F:	<65%

In order to achieve a fair grade distribution, at the end of the semester, the instructors may adjust grade thresholds class-wide to improve your letter grades; the thresholds will under no circumstances be adjusted to lower your grades. There will be absolutely NO appeals regarding the final grading scale (e.g., We will not round a score of 89.9 to a 90.0).

Grading Disputes

Scores and final course grades will be changed ONLY in the event that an exam question was mis-graded or if exam points were totaled incorrectly. Requests for exam re-grading must be in the form of a WRITTEN appeal to the professor teaching that material justifying why your answer should be accepted. This appeal should be submitted via Gradescope (the online exam grading platform we use). For every regrade request, we reserve the right to re-grade your entire exam, therefore a regrade request could lead to an increase, decrease, or no change in your exam score. All appeals for changes must be made within 3 calendar days after the exam is returned. We will not re-grade any question or exam after the 3 days have elapsed, but will still work to correct exam point totals if you find an error.

Instructional Team & Office Hours

Instructors:

Dr. Christina Burch

cburch@bio.unc.edu

Mon. 11-11:45 and 2-2:45

Genome Sciences 3163

Dr. Ann Matthyse

ann_matthyse@unc.edu

Mon. 11-11:45 and 2-2:45

Coker 304

Zoom Mon. 7:30-8:00 PM

by appointment only

Dr. Sophie McCoy

sophie.mccoy@unc.edu

Tues. 10-11:30

Wilson 334

*uncertain availability in person after Oct. 16

Teaching Assistants

Dr. Vinod Kumar

Cynthia Thomas

vinodk@unc.edu

Tues. 12:30-1:15

Wilson 138

cynthia_thomas@med.unc.edu

Wed. 12:30-1:15

Wilson 138

Laboratory Preparation Staff-

Isabelle Dalton

Wilson 138

Caroline Chandler

Wilson 138

Isabella Hancock

Wilson 138

Communicating with your Instructors

**** If you have a question, please re-read the Syllabus and old posts on the Canvas Discussion Board first to see if your question has already been addressed ****

Non-emergency, non-confidential communications should occur in class and on our online Canvas Discussion Board

(https://uncch.instructure.com/courses/36066/discussion_topics). The quicker you begin asking questions on the Canvas Discussion Board, the quicker you will benefit from the collective knowledge of your classmates and instructors.

We encourage you to ask questions on Canvas whenever you struggle to understand a concept. We, your instructors, view the Canvas Discussion Board largely as a forum where students help each other. The teaching staff will weigh in occasionally, but only after we see solid effort to tackle a question. Rather than ask “What is the answer to question 2?”, please tell us what you think the answer is, and why you think it’s correct (or not), or tell your peers where you are stuck! This approach sparks conversation, which leads to learning.

Do not hesitate to contact us by email if you need to, but please reserve email for emergency and confidential communications. If you ask us a general question via email, we will redirect you to Piazza and answer publicly in the online venue

Diversity in our classroom

Statement from your instructors: We value the perspectives of individuals from all backgrounds, reflecting the full diversity of our students. We broadly define diversity to include race, gender identity, national origin, ethnicity, religion, social class, age, sexual orientation, political background, and physical and learning ability. We strive to make our classroom an inclusive space for all students. Please let us know if there is anything we can do to improve. We appreciate your suggestions.

UNC Policy on Non-Discrimination: The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals’ abilities and qualifications. Consistent with this principle and applicable laws, the University’s Policy Statement on Non-Discrimination offers access to its educational programs and activities as well as employment terms and

conditions without respect to race, color, gender, national origin, age, religion, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered, and that equitable and consistent standards of conduct and performance are applied.

If you are experiencing harassment or discrimination, you can seek assistance and file a report through the Report and Response Coordinators (see contact info at <https://safe.unc.edu>) or the Equal Opportunity and Compliance Office, or online to the EOC at <https://eoc.unc.edu/report-an-incident/>.

Academic Honesty

Academic honesty means that we respect each other and the work that we do; this means we behave with integrity in and out of the classroom, and do not lie, cheat or steal (e.g. plagiarism is a form of stealing). This means that when you take assessments you submit work that is your own, not conducted in collaboration or with assistance from another person, unless you are instructed to do so. Make good choices, even when you think no one is looking. If you are unsure about which actions violate that honor code, consult <https://honor.unc.edu>.

The University of North Carolina at Chapel Hill has had a student-led honor system for over 100 years. It is our responsibility to report any instances of academic dishonesty and violations of the Honor Code. The student-led Honor System is responsible for adjudicating any suspected violations of the Honor Code. All suspected instances of academic dishonesty will be reported to the Honor System and students will receive a zero on the assignment or exam in question. Your full participation and observance of the Honor Code is expected. Please report any violations that you observe. Information, including your responsibilities as a student is outlined in the Instrument of Student Judicial Governance at <https://studentconduct.unc.edu/sites/studentconduct.unc.edu/files/documents/Instrument.pdf>.

Generative AI

In this course, we will follow the recommendations of UNC's AI Committee for the responsible and ethical use of generative AI tools such as ChatGPT. The committee recommendations are described in full under the Syllabus Guidelines for Generative AI section at this link: <https://provost.unc.edu/student-generative-ai-usage-guidance/>

Here we provide only excerpts that are most relevant to this course:

Generative AI is extremely useful; however, it has the following limitations:

- How output is arrived at is not clear as the internal processes used to produce a particular output within the generative AI cannot be determined.
- The output is based on existing data (often scraped from online sources) and may reflect biases that should be acknowledged; it may also be inaccurate or entirely fabricated, even if it appears reliable or factual.

- AI evokes a range of intellectual property concerns; sourcing and ownership of information is unclear, and the status of AI output raises numerous questions—e.g., is output equivalent to a published resource? What citational responsibilities are in place for various AI interactions?

Usage Philosophy

Use of generative AI in your coursework is based on the following principles:

1. **AI should help you think.** Not think for you. Use these tools to give you ideas, perform research (in compliance with point 2 below), and analyze problems. Do not use them to do your work for you, e.g., do not enter an assignment question into ChatGPT and copy & paste the response as your answer.
2. **Engage with AI Responsibly and Ethically:** Engage with AI technologies responsibly, critically evaluating AI-generated outputs and considering potential biases, limitations, and ethical implications in your analysis and discussions. Utilize AI technologies ethically, respecting privacy, confidentiality, and intellectual property rights. Ensure that the data used for AI applications is obtained and shared responsibly and in compliance with relevant regulations.
3. **You are 100% responsible for your final product.** You are the user. If the AI makes a mistake, and you use it, it's your mistake. If you don't know whether a statement about any item in the output is true, then your responsibility is to research it. If you cannot verify it as factual, you should delete it. You hold full responsibility for AI-generated content as if you had produced the materials yourself. This means ideas must be attributed, facts are true, and sources must be verified.
4. **The use of AI must be open and documented.** The use of any AI in the creation of your work must be declared in your submission and explained. Details on how to source your AI usage are explained below.

Specific Guidelines

Not following these guidelines may be a reportable violation to the UNC Honor Court.

We anticipate that many of you will use generative AI as you work toward answering Group Discussion Problems.

- **Research:** If you use AI to support your research, you must account for and document your use. Possibilities include topic brainstorming, search assistance, source evaluation, and summaries and source documentation. Track your use of AI throughout these stages, and then document this assistance as you submit the project. Any material generated through AI in your projects should also be documented in your citations.
- **Writing & Presentation:** In principle, you may submit material that contains AI-generated content, or is based on or derived from it, if this use is properly documented.

This may include drafting an outline, preparing individual sections, combining elements, removing redundant parts, and compiling and annotating references. Your documentation must make the process transparent – the submission itself must meet the relevant standards of attribution and validation.

- **Group Work:** Group work guidelines are based on the type of assignment above (e.g., a group written assignment will use the guidelines for written assignments).

Sourcing Use of AI

- **Accuracy:** Generative AI may invent both facts and sources for those facts. Verification is your responsibility, whether the source of the error is you or the AI makes no difference. You need to check the facts, the quotes, the arguments, and the logic, and document what you did to validate your material.
- **Attribution:** All ideas that are not originally your own have a source and that source must be attributed. Please be aware that generative AI tends to invent sources. You have a two-fold obligation with respect to attribution:

(1) If a source is identified, find and attribute the original source of the idea, identify the location of the text within the source, and provide a working link to the location (if the source is available online). If you are not able to locate the source, delete that content.

(2) Document the process by explaining how you used generative AI in a work statement that will accompany your submission of major projects in the class. As you submit a project, develop, and include an appropriate version of the below statements:

- “I attest that this project did not use AI at any stage in its development or in the creation of any of its components.”
- “I attest that this project made use of AI in the following ways:”
You must then use the following form to document your usage. *

*Note that such attribution is not a valid source for facts, only for the output itself.

[1] ChatGPT was used in the development of these guidelines – more specifically, it was employed to generate suggestions for student use policies and to rephrase and consolidate certain sections of the text. Also, [Sentient Syllabus](#) was a resource for a number of the ideas within this document.

Campus Resources

College can be challenging in unexpected ways. It is possible that at some point this semester your multiple competing personal responsibilities and interests may get in the way of your academic success. It is also possible that you may get sick or have other personal emergencies. The bottom line is this: asking for help is a sign of strength and self-care! Please ask for help early and often! Small problems are easier to cope with than escalated issues that have waited until the end of the semester. While we sincerely hope that you will let us know when things are not going well, here are other campus resources you can turn to, as well:

Dean of Students: If at any time during the semester you experience a personal or family illness, loss, financial stress, academic access, living issues, interpersonal violence response, alcohol or similar substance related issues, and other forces that may interfere with your well-being and success and/or academic retention please contact the Dean of Students immediately (or contact your professor and we will do so for you). Website: deanofstudents.unc.edu

Academic Advising: Your academic advisers are familiar with all of the campus policies, procedures and requirements. Website: advising.unc.edu

Counseling and Psychological Services (CAPS): If you are experiencing any distress please speak with a medical professional in a confidential setting. The CAPS office has daily drop-in hours or you may call them for an appointment (919-966-2281) or schedule online (healthyheels.unc.edu). CAPS is strongly committed to addressing the mental health needs of a diverse student body through timely access to consultation and connection to clinically appropriate services, whether for short or long-term needs. Go to their website: <https://caps.unc.edu/> or visit their facilities on the third floor of the Campus Health Services building for a walk-in evaluation to learn more.

LGBT Center: Provides educational services, resources and advocacy. Website: lgbtq.unc.edu

Carolina Women's Center: Aims to provide an equitable working and educational environment regardless of gender. Provides assistance to all individuals regardless of gender orientation. Website: womenscenter.unc.edu

International Student and Scholar Services: offers services to help international students adjust to life in North Carolina and UNC. Website: iss.unc.edu

Accessibility Resources and Service (ARS): The University of North Carolina at Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with disabilities, chronic medical conditions, a temporary disability, or pregnancy complications resulting in barriers to fully accessing University courses, programs and activities. Accommodations are determined through the Office of Accessibility Resources and Service (ARS) for individuals with documented qualifying disabilities in accordance with applicable state and federal laws. See the ARS Website for contact information: <https://ars.unc.edu> or email ars@unc.edu.

Title IX Resources: Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Please contact the Director of Title IX Compliance (Adrienne Allison – Adrienne.allison@unc.edu), Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (gvs@unc.edu; confidential) to discuss your specific needs. Additional resources are available at safe.unc.edu.

Undergraduate Testing Center: The College of Arts and Sciences provides a secure, proctored environment in which exams can be taken. The center works with instructors to proctor exams for their undergraduate students who are not registered with ARS and who do not need testing accommodations as provided by ARS. In other words, the Center provides a proctored testing environment for students who are unable to take an exam at the normally scheduled time (with pre-arrangement by your instructor). For more information, visit <http://testingcenter.web.unc.edu/>.

Learning Center: Want to get the most out of your courses this semester? Visit UNC's Learning Center at <http://learningcenter.unc.edu> to make an appointment or register for an event. Their free, popular programs will help you optimize your academic performance. Try academic coaching, peer tutoring, STEM support, ADHD/LD services, workshops and study camps, or review tips and tools available on the website.

Writing Center: For free feedback on any course writing projects, check out UNC's Writing Center. Writing Center coaches can assist with any writing project, including multimedia projects and application essays, at any stage of the writing process. You don't even need a draft to come visit. To schedule a 45-minute appointment, review quick tips, or request written feedback online, visit <http://writingcenter.unc.edu>.