



MCB 4304 - Genetics of Microorganisms

MCB 6937 - Advanced Molecular Genetics

Spring, 2026

Online Asynchronous, 3 credits

Instructor: Dr. Luiz Passalacqua

Microbiology and Cell Science Department - room 1137

Email: lmoreirapassalac@ufl.edu (Please note that I do not reply outside business hours.)

Office hours: Thursday period 8 (3:00-3:50 pm) via Zoom or in my office. Zoom by request is also an option if you cannot make to period 8.

Teaching Assistant

TBD. Please refer to the Canvas website for contact guidance and additional information, including TA contact information.

Course Description

Organisms use genetic instructions encoded in DNA. In this course, we will explore the multifaceted roles of nucleic acids and proteins (including enzymes) in genetics of prokaryotes and eukaryotes. We will also discuss the similarities and differences between viruses, prokaryotes, and eukaryotes. We will discuss the molecular structure and biochemistry of DNA and RNA, how genes and genomes are arranged, how DNA is mutated and repaired, and the machinery that is used to transcribe and translate RNA across different major branches of the tree of life, including both eukaryotic and prokaryotic systems. We will also emphasize several key techniques used to manipulate and study these systems. Lastly, we will also approach special topics related to the course.

This class is asynchronous and can be taken 100% online via Canvas. It is designed to follow a Tuesday-Thursday type schedule throughout the semester. The lectures are pre-recorded and uploaded to Canvas. Dates of lectures in the syllabus correspond to the intended Tues/Thurs distribution; students are encouraged but not required to follow along at approximately this pace. The quizzes and exams are timed and will only be available during the windows indicated on each module.

Course Learning Objectives

The main goal of this course is to endow students with a foundational knowledge and understanding of the molecules involved with the transmission, utilization, and evolution of genetic information, particularly in the microorganism realm. Achieving this goal should empower students to think critically and create connections about how molecular genetic processes are connected to and interact with macro-scale processes in other areas of research and everyday life. By the end of this course, students should be able to:

- Define and explain both nucleic acid and protein biochemistry involved in genetics
- Apply the knowledge on nucleic acid and protein biochemistry involved in genetics to predict and evaluate hypothetical experimental outcomes
- Analyze and evaluate genetic mutations and manipulation on the cell cycle, replication, and gene expression, predicting functional outcomes

- Interpret case studies involving gene expression
- Plan and design hypothetical experiments and their outcome on the gene regulation of organisms
- Generate a scientific report based on the course content

Course Structure

MCB 4304 (undergraduate version): The course consists of weekly modules (see below). Two exams (weeks 7 and 15) will be given. Each will account for 20% of the grade. 20% of your grades will be accounted for by quizzes (4 in total – around 20 questions each). Homework assignments (4 in total) will account for 20% of the grades. Two meaningful assignments (read below) will account for the remaining 20% of your grade.

MCB 6937 (graduate version): The course consists of weekly modules (see below). Two exams (weeks 7 and 15) will be given. Each will account for 20% of the grade. 15% of your grades will be accounted for by quizzes (4 in total – around 20 questions each). Homework assignments (4 in total) will account for 15 % of the grades. Two meaningful assignments (read below) will account for the remaining 15% of your grade. One scientific reports assignment (read below) will account for the remaining 15% of your grade.

Meaningful assignments: 1) Science Poster. Prepare a scientific poster on a topic related to the class. This assignment shall be done in group (5 people per group). Please refer to the class Canvas page for full instructions. 2) Discovery of new RNA thermometers. This computer-based multi-step assignment (a detailed guide will be provided) will allow students to discover new RNA thermometer candidates in bacteria. This assignment shall be in group (5 people per group). Please refer to the class Canvas page for full instructions.

Scientific reports assignment (MCB 6937 only): Prepare a scientific report review (minireview) on a topic related to the class. Minireviews are summaries of developments in the field of microbiology/molecular biology. This minireview can be done alone or in a group (up to 8 people per group). This assignment should be done throughout the semester, and Dr. Luiz Passalacqua will be available to discuss and provide feedback at any time. Dr. Luiz Passalacqua can also help with the choice of topic if needed. Please refer to the class Canvas page for full instructions. In the event of an outstanding minireview, the person/group will be invited to publish it in a scientific journal with Dr. Luiz Passalacqua.

Penalty for late submission: 25% of the assignment grade per day.

Important note: You may not plagiarize or use an AI text generator to complete your homework, quizzes, assignments, or exams. Each student is expected to turn in their own unique work, which will be subject to plagiarism and AI checks.

Material not covered here: Reproduction and cell division, Mendelian and non-Mendelian inheritance, Population Genetics, and Evolutionary Genetics.

Course Prerequisites

(MCB 3020 or MCB 3023) and (MCB 3020L or MCB 3023L) with minimum grades of C.

Textbooks, Learning Materials, and Supply Fees

Genetics: Analysis and Principles (Author: Robert Brooker).

ISBN: 1266823654 / 9781266823657

Recommended but not required.

Required Technology & How to Obtain the Technology

For the exams, you must use the Chrome browser with the Honorlock extension. You are also required to procure and use an external camera with at least a 110° viewing window ([I recommend this camera](#)). Your screen and immediate surroundings will be monitored for suspicious activity and reported if anything is detected.

Communication Guidelines

Please use Canvas email to contact me or the TAs.

Technical Support

UF Computing Help Desk & Ticket Number: All technical issues require a UF Helpdesk Ticket Number. The UF Helpdesk is available 24 hours a day, 7 days a week. <https://helpdesk.ufl.edu/> | 352-392-4357

Weekly Course Schedule

Week	Topic	Assignment / Due Date
1 (Jan 10)	<u>Module 1</u> Overview & Background Molecular structure of DNA and RNA Method of the week: Intro + Restriction Enzyme + PCR and RT-PCR <u>Homework 1</u> : Article - Molecular Structure of DNA, Watson and Crick <u>MCB 6937</u> : minireview assignment due to Apr 17 at 11:59 pm.	None
2 (Jan 20)	<u>Module 2</u> Molecular structure of chromosomes and transposable elements Method of the week: Gene cloning	<u>Quiz 1</u> (Modules 1 and 2) due date: Jan 26 at 11:59 pm.
3 (Jan 26)	<u>Module 3</u> DNA replication Method of the week: DNA Sequencing Homework 2: Video - "The Most Beautiful Experiment: Meselson and Stahl"	<u>Homework 2</u> due date: Feb 02 at 11:59 pm.
4 (Feb 02)	<u>Module 4</u> Gene Transcription and RNA Modification Method of the week: Nucleic acid detection and DNA separation Meaningful Assignment 1: Science poster (due Mar 13 at 11:59 pm)	<u>MCB 6937</u> : choice of topic for scientific minireview due to Feb 09 at 11:59 pm.
5 (Feb 09)	<u>Module 5</u> Translation Method of the week: Blotting methods and methods for analyzing DNA- and RNA- binding proteins	<u>Quiz 2</u> (Modules 3, 4 and 5) due date: Feb 16 at 11:59 pm.
6 (Feb 16)	<u>Module 6</u> Gene Regulation in Bacteria Method of the week: Gene knockouts and transgenics	None
7 (Feb 23)	<u>Review and Exam 1</u> Exam review session Exam 1	Exam 1: Wed (Feb 25, 8am) until Friday (Feb 27, 11:59pm).
8 (Mar 02)	<u>Module 7</u> Gene Regulation in Eukaryotes Method of the week: Chromatin immunoprecipitation Homework 3: Video - "The Genome Project Documentary" <u>MCB 6937</u> reminder: minireview due Apr 13 at 11:59 pm	<u>Homework 3</u> due date: Mar 09 at 11:59 pm.

Week	Topic	Assignment / Due Date
9 (Mar 09)	<u>Module 8</u> Epigenetics Method of the week: Microscopy and Macromolecular structural biology	<u>Assignment 1</u> (Science poster) due by Mar 13 at 11:59 pm) <u>Quiz 3</u> (Modules 7 and 8) due date: Mar 13 at 11:59 pm.
10 (Mar 16)	Spring break	
11 (Mar 23)	<u>Module 9</u> Non-Coding RNAs Method of the week: CRISPR and gene editing Meaningful Assignment 2: Discovery of new RNA thermometers (<i>due by end of Week 13</i>)	None
12 (Mar 30)	<u>Module 10</u> Genetics of Viruses Special topic of the week: Biotechnology	<u>Quiz 4</u> (Modules 9 and 10) due date: Apr 06 at 11:59 pm.
13 (Apr 06)	<u>Module 11</u> Gene Mutation, DNA Repair, and Recombination Special topic of the week: Genomics Homework 4: Article - Evolution of the mutation rate – Michael Lynch	<u>Assignment 2</u> (RNA thermometers) due Apr 11 at 11:59 pm) <u>Homework 4</u> due date: Apr 13 at 11:59 pm.
14 (Apr 13)	<u>Module 12</u> Genetic Transfer and Mapping in Bacteria Genetic Linkage and Mapping in Eukaryotes Special topic of the week: Genetic Basis of Cancer	<u>MCB 6937</u> : final minireview due to Apr 17 at 11:59 pm.
15 (Apr 20)	<u>Review and Exam 2</u> Exam review session Exam 2	Exam 2: Wed (Apr 22, 8am) until Friday (Apr 24, 11:59pm).
16 (Apr 27)	Finals week	None

Grading Policy

Course grading is consistent with [UF grading policies](#).

Course Grading Structure

Grades in this class will be determined by two exams, four quizzes, four homework, and two meaningful assignments (MCB 6937 will also have a scientific assignment). No items in this class are dropped, and there is no extra credit. Grades are determined as follows (% of grade):

MCB 4304

Exam I	20
Exam II	20
Quizzes (4x)	20 (4 in total)
Homework	20 (4 in total)
Meaningful assignment	20 (2 in total)

MCB 6937

Exam I	20
Exam II	20
Quizzes (4x)	15 (4 in total)
Homework	15 (4 in total)
Meaningful assignment	15 (2 in total)
Scientific assignment	15

Exam and Proctoring Information: For the exams, you must use the Chrome browser with the Honorlock extension. You are also required to procure and use an external camera with at least a 110° viewing window ([I recommend this camera](#)). Your screen and immediate surroundings will be monitored for suspicious activity and reported if anything is detected. A human proctor will review flagged incidents and send a report to the instructor. The instructor always has access to the full recordings of the test taker and the screen recording. Canvas also records a log of test taker activity during the exam.

For each exam, there is a 2 days window in which you can complete it. The exam windows will open at 8:00 AM EST and close at 11:59 PM EST 2 days later. You have 4 hours to complete the exam once you start it (the exam should take 1 hour; thus, you are provided with 4 times the amount of time needed to complete it), assuming you begin the exam prior to 8 PM on the last day. If you live in a different time zone, please take this into account: Canvas will lock your exam responses at 11:59 PM EST.

You can complete your exam with Honorlock proctoring at any time during the exam window. You do not need to schedule an appointment to use Honorlock. The exams are closed book with a lockdown browser. To learn more about Honorlock, go to the student page of Honorlock and watch their quick video at: <https://honorlock.com/students/>

Note: If you have privacy concerns regarding Honorlock's access to your computer activity outside of the times it is required for class, the Honorlock extension can be easily removed from your browser immediately after each exam or the test quiz (you'll need to add it again for the next exam). To remove it, go to Chrome -> preferences -> settings -> extensions and select remove Honorlock.

For each homework or quiz, you will have one week to complete it. You will also have at least 3 times the time needed to complete them.

Grading Scale

Grade	Percentage
A	≥ 90%
A-	≥ 87%
B+	≥ 83%
B	≥ 80%
B-	≥ 77%
C+	≥ 73%
C	≥ 70%
C-	≥ 65%
D	≥ 55%
E	< 55%

Academic Policies and Resources

Academic policies for this course are consistent with university policies. See <https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/>

Campus Health and Wellness Resources

Visit <https://one.ufl.edu/whole-gator/topics> for resources that are designed to help you thrive physically, mentally, and emotionally at UF. Please contact [UMatterWeCare](#) for additional and immediate support.

Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Privacy and Accessibility Policies

- Instructure (Canvas)
 - [Instructure Privacy Policy](#)
 - [Instructure Accessibility](#)
- Zoom
 - [Zoom Privacy Policy](#)
 - [Zoom Accessibility](#)

Additional information

Attendance and Make-Up Work: Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>. Please contact the instructor if needed.

Online Course Evaluation Process: Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluer.com/ufl/>. Summaries of course evaluation results are available to students at: <https://gatorevals.aa.ufl.edu/public-results/>.

Academic Honesty: As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

Class content publication and sharing policy: publication of any course material without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide

access to a recording, regardless, of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Services for Students with Disabilities: The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation 0001 Reid Hall, 352-392-8565, <https://disability.ufl.edu/>