

The course content is divided into 7 Modules. Each module has its own folder on the Canvas website. Each module contains several chapters from the textbook **Molecular Biology: Principles of Genome Function, 2nd Edition, Craig et al., Oxford:**

Module 1 Introduction (Ch 1, 2)

Module 2 Basic Methods in Molecular Biology (Ch 19)

Module 3 Chromosome structure and function (Ch 4)

Module 4 Transcription (Ch 4, 8, 9, 10)

Module 5 Translation (Ch 11, 12, 13)

Module 6 Genomics (Ch 18, Ch 19)

Module 7 Replication and DNA repair (Ch 6, 15, 16)

Please see **Course Overview** on Canvas for additional details

Tentative schedule (topics are subject to change – exam dates will NOT change)

DATE	TOPIC	READING	PROF
M 8/23	Class objectives and overview Module 1 Introduction	Ch 1	Yao
W 8/25	Module 1 Introduction	Ch 2, Ch 19 (1, 2)	Yao
M 8/30	Module 2 Basic Methods in Molecular Biology	Ch 19 (3, 4, 6, 7)	Yao
W 9/1	Module 2 Basic Methods in Molecular Biology	Ch 19 (3, 4, 6, 7)	Yao
M 9/6	Labor Day		
W 9/8	Module 3 Chromosome structure and function	Ch 4	Yao
M 9/13	Module 3 Chromosome structure and function		Yao
W 9/15	Module 3 Chromosome structure and function		Yao
M 9/20	FIRST EXAM: Exam material includes content covered till 9/15: Modules 1-3		
W 9/22	Module 4 Transcription	Ch 8	Yao
M 9/27	Module 4 Transcription		Yao
W 9/29	Module 4 Regulation of transcription	Ch 9	Yao
M 10/4	Module 4 Regulation of transcription		Yao
W 10/6	Module 4 RNA processing	Ch 10	Yao
M 10/11	Module 4 RNA processing		Yao
W 10/13	SECOND EXAM: Exam material includes content covered till 10/11: Modules 1-4		
M 10/18	Module 5 Translation I	Ch 11.1 – 11.6	Stargell
	****Monday October 18 "W", Repeat/delete deadline ****		
W 10/20	Module 5 Translation II	Ch11.7 – 11.11 Ch11.14	Stargell
M 10/25	Module 5 Regulation of Translation	Ch 12	Stargell
W 10/27	Module 5 Regulatory small RNAs	Ch 13.1 – 13.7	Stargell

M 11/1	Module 5: Methods of studying translation	p839 Ch12.1EA; Ch12.3;Ch13.2 EA; p808 –10	Stargell
W 11/3	Module 6 Genomics I	18.1 – 18.5	Stargell
M 11/8	Module 6: Methods of studying genomics	Ch 19.15	Stargell
W 11/10	THIRD EXAM: Exam material includes content covered till 11/3: Modules 1-5 + Genomics I		
M 11/15	Module 6 Genomics II	18.6 – 18.11	Stargell
W 11/17	Module 7 Replication I	Ch 6.1 – 6.7	Stargell
11/22-26	FALL BREAK		
M 11/29	Module 7 Replication II	Ch 6.8 – 6.11	Stargell
W 12/1	Module 7 DNA damage	Ch 15.1 – 15.7	Stargell
M 12/6	Module 7 DNA repair; CRISPR/Cas-9	Ch16.1 – 16.3 Ch16.8	Stargell
W 12/8	Methods Overview		Stargell
M 12/13	FINAL EXAM: 4:10 – 6:10 pm		

WELCOME TO MOLECULAR GENETICS!

Professor: Dr. Tingting Yao

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Office: MRB 283

Office hours: 4:15-5:30 PM Monday; and by appointment

Professor: Dr. Laurie Stargell

email: Laurie.Stargell@colostate.edu

Office: MRB 111

Office hours: TBA (Dr. Stargell begins teaching in October)

Teaching Assistant: Ms. Leah Dixon

email: Leah.Dixon@colostate.edu

Office: TBA

Group Study hours: TBA and by appointment

Class Schedule (all in Physiology 103):

Monday 3:00 – 4:15 PM

Wednesday 3:00 – 4:15 PM

Instructional Format:

1. All lectures are in person, face-to-face. Everyone is required to wear a mask. To allocate enough time for active learning in class, some lecture contents will be assigned as watching pre-recorded videos. ***These videos are part of course content delivery, not as a replacement of in-class learning.***
2. All classes will be automatically recorded via Echo360 and available on Canvas. Be aware that the quality of these recordings is limited. These are provided for students that cannot come to class due to extenuating circumstances. ***We strongly encourage you to come to class unless you are not feeling well.*** However, we do not take attendance.
3. Office hours will be conducted in person in offices as listed above. Additional appointments can be set up through email communications.
4. Ms. Dixon will lead **Group Study** on Fridays (Time and Room to be announced). Anyone is welcome to attend whether you have questions or not.

Important information for students: All students are expected and required to report any COVID-19 symptoms to the university immediately, as well as exposures or positive tests from a non-CSU testing location. If you suspect you have symptoms, or if you know you have been exposed to a positive person or have tested positive for COVID, you are required to fill out the COVID Reporter (<https://covid.colostate.edu/reporter/>). If you know or believe you have been exposed, including living with someone known to be COVID positive, or are symptomatic, it is important for the health of yourself and others that you complete the online COVID Reporter. Do not ask your instructor to report for you. If you do not have internet access to fill out the online COVID-19 Reporter, please call (970) 491-4600. You may also report concerns in your academic or living spaces regarding COVID exposures through the COVID Reporter. You will not be penalized in any way for reporting. When you complete the COVID Reporter for any reason, the CSU Public Health office is notified. Once notified, that office will contact you and, depending upon each situation, will conduct contact tracing, initiate any necessary public health requirements and notify you if you need to take any steps. For the latest information about the University's COVID resources and information, please visit the **CSU COVID-19 site**: <https://covid.colostate.edu/>.

Prerequisites: BC351 with a C or better or BC401 with a C or better or concurrent registration; BZ350 with a C or better or LIFE 201B with a C or better.

Textbook: Molecular Biology: Principles of Genome Function, 2nd Edition, Craig et al., Oxford.

Topics to be covered include:

- organization of genes
- methods for isolation and molecular analysis of proteins and nucleic acids
- the mechanisms and regulation of transcription, RNA processing and translation
- the packaging of DNA as chromatin and its impact on gene expression
- genomics and proteomics
- DNA replication, recombination and repair

Student Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- compare and contrast the regulatory mechanisms of gene expression in bacterial and eukaryotic cells.
- describe the packaging of DNA into chromatin, its modifications and roles in regulation
- explain the fundamental mechanisms of RNA processing
- discuss the organization and expression of the genome
- compare and contrast the fundamental mechanisms of transcription, translation and replication.
- critically analyze and present the methods and results of experiments involving Molecular Genetics

Objectives: Although learning the basic facts of molecular genetics is important, a particular emphasis will be placed on understanding how this knowledge was obtained and comparing the mechanisms involved in the various processes. An important goal of this course is to prepare motivated students for graduate studies in molecular genetics or related fields, for an entry level position in the biotech industry, or for training of future molecular biology teachers. As such, we will become familiar with the language and basic concepts in modern molecular biology and genetics, and develop important skills including analyzing data and predicting outcomes. This will enhance your ability to think critically and independently.

Prerequisites: In order to cover the vast field of Molecular Genetics in any depth, we must assume the student has the proper background in the fundamentals of the cell's structure and function, organic chemistry, general genetics, and rudimentary molecular genetics. The latter includes the fundamental structures of proteins and nucleic acids, their general functions, and an overview of the basic mechanisms of replication, transcription, translation, and RNA processing. These topics were covered in LIFE201B. Quiz 1 is designed to test whether you have the knowledge background required for this class. Those not meeting a threshold of knowledge are advised to consider alternate courses or to plan to spend extra time in coverage of background material.

Lectures and reading: Lecture recordings along with powerpoint slides from the lectures will be available on the class Canvas site. Additionally, there will be slides and videos posted on the site that are **self-study**. The assigned material in the textbook expands on the material that we discuss in class and often provides the scientific method that was used to obtain these facts. Each examination may include questions from self-study that were not covered in class.

Vocabulary: These lists will be provided for each module and they indicate the most important concepts. Please use them to focus your thoughts on the material.

iClicker: If you don't have an iClicker account that matches your CSU email, you should have received an invitation to join. We will use iClicker to conduct polls in class and you will receive extra credit for participation, no matter the responses. We do not use it for taking attendance. Please follow instructions here: <https://canvas.colostate.edu/iclicker/student-information/>

Extra credit 10 pts will be given if you participate in 75% of the iclicker questions in class, no matter your responses. A total of 15 pts will be given for exam reflections for the first 3 exams.

Assessment:

Exam 1	50 pts
Exam 2	50 pts
Exam 3	50 pts
Exam 4	50 pts
Quizzes	20 pt each, total 240 pts
Assignments/Discussion	10 pt each, total 120 pts

Grades will be assigned on the basis of total number of points. As a reference, based on past records,

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

We will use +/- to adjust the range.

EXAMS (200 points total; 4 at 50 points each): Four exams are scheduled (see syllabus for dates). These exams will be conducted close-book in person. All exams will have a component of memorization, and other questions will require more than simple regurgitation of facts. Exams will contain a mixture of multiple choice, T/F, and short answer, problem solving, with an emphasis on experimental approaches. In addition to master the **Vocabulary** we provided, answering the problems in the back of each chapter will help you in your studies.

Only under unusual circumstances will alternate exams be given, at the discretion of the instructor. Requests for such should be submitted to the instructor at least one week before the scheduled exam, preferably sooner. If an examination is missed **with a valid excuse**, the remaining exams will each be scaled to the total point schedule.

Online Quizzes (240 points total; 12 at 20 points each) There will be a quiz **every week**, except the week of a scheduled exam. Quizzes will be available Tuesday at 5 pm until Saturday at 11:59 pm. The questions will be multiple-choice format and/or problem solving questions, and will cover material from the lectures and from the assigned readings. You will have **one hour** to complete the quiz once you start.

We will drop your lowest quiz score at the end of the semester. **If you miss a quiz, it is automatically counted as your lowest score.** There is no makeup quiz.

Assignments (120 points total; 12 at 10 points each) There will be an assignment **every week**, except the week of a scheduled exam. We will devote some of the class time to discuss the assignments, which are designed to enhance your critical thinking skills and/or include in-depth discussion of topics that are covered in the lecture. Attending class is optional. However, everyone needs to turn in the assignment by Saturday at 11:59 pm.

We will drop your lowest assignment score at the end of the semester. **If you miss an assignment, it is automatically counted as your lowest score.** There is no makeup assignment.

There are no quiz or assignment in the week of an exam.

Grading and re-grading: Correct answers to the exams, quizzes, assignments and homework will be posted on Canvas. If you have a problem with the way in which a particular question was graded, please write a cover page explaining why you felt a particular question was incorrectly graded, and turn it in with your answer sheet within one week of the return of the assignment. We will not regrade questions where you simply ask

us to re-grade it without an explanation of why (unless I announce there was a systematic problem with wording of the question). We will look at your concern and determine whether additional credit should be given. Only after this process will we discuss the grading of the assignment with you personally.

Classroom policies: The classroom environment is meant to promote learning and growth. Respect the rights of others seeking to learn, the professionalism of the instructor, and the general goals of academic freedom. Differences of viewpoint or concerns should be expressed respectfully in terms that are supportive of the learning process. Conduct that disrupts the learning process will not be tolerated and may lead to removal from the class and/or disciplinary action. Cell phone and pager sounds are disruptive to the class. While you are in class, please silence your cell phone and/or pager. If you must answer your phone, please leave the lecture room before doing so.

Respect for Diversity: It is our intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is our intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let us know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let us know so that we can make arrangements for you.

Academic Integrity: This course will adhere to the [CSU Academic Integrity/Misconduct](#) policy as found in the General Catalog and [the Student Conduct Code](#). Academic integrity lies at the core of our common goal: to create an intellectually honest and rigorous community. Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, I will ask that you affirm the CSU Honor Pledge as part of completing your work in this course.