Master Course Syllabus

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: https://catalog.uvu.edu/

Semester: Spring
Year: 2025
Course Prefix: BIOL
Course and Section #: 3550 001
Course Title: Molecular Biology
Credits: 3

Course Description

Examines structure, organization, replication, and expression of genomes. Explores the methods used for study of genome structure and function, including nucleotide and protein extractions, separations, and characterizations. Compares sequence data of genomes, transcriptomes, and proteomes. Examines primary literature in the field.

Course Attributes

This course has the following attributes:
☐ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements
☐ Discipline Core Requirements in Program
☒ Elective Core Requirements in Program
☐ Open Elective
Other: *Click here to enter text.*

Instructor Information

Instructor Name: Alma Laney

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- Identify the hallmarks of different genomes and genome elements.
- Identify the underlying mechanisms of genome expression (i.e. transcription and translation).
- Explain how genomes are replicated and maintained in the cell.
- Investigate the structure-function relationships of macromolecules.
- Explain the methods of extraction, separation, characterization and manipulations of nucleic acids and proteins.
- Interpret the sequence data of genomes, transcriptomes and proteomes.
- Interpret published research reports on genomes, transcriptomes, proteomes, and regulation of genome expression.

Course Materials and Texts

You will need access to a computer with internet access to utilize Canvas and to complete the course project. Options are available on campus for this if not available elsewhere.

Course Requirements

Course Assignments, Assessments, and Grading Policy
Assignments:

1. **Exams:** There will be two exams total for this course. Two Mid-term exams **Oct 3rd and Nov 13th** will be given through Canvas using Proctorio. A study guide for the exam has been included in the module for the week the exam is due, but it is recommended to fill out the study guide as you watch the lectures. The tests will consist of 80% multiple choice questions and 20% short answer questions. No notes or outside resources are allowed for either exam.
2. **Reflections**: There are 10 Reflection assignments that will be available on Canvas. These assignments will require the reading of a scientific paper or similar article and answering a series of questions about the article and reflecting on what those findings mean. Participation by answering each of the questions with at least two full sentences per question and participating in the class discussion per the reflection instructions is required to receive full credit and partial credit will not be given. One Reflection assignment will be dropped from the final grade.
3. **Attendance:** Attendance in class is essential for success and will be taken using CanSurvey (available through Canvas). To receive credit for the lectures, watch the lecture to obtain the access code and then fill out the corresponding CanSurvey by the due date listed on Canvas.
4. **Course project:** A course project consisting of the identification of the features of an unknown cDNA sequence will be due beginning **Feb 14th**. Briefly, a cDNA sequence will be assigned to pairs of students to work in teams. The student will identify what the closest ortholog to that sequence is, what the protein sequence is, what motifs are found in the sequence, etc. This will be accomplished using the bioinformatics programs discussed in the class. A short 5 min presentation will be given to the class either **April 14th or April 30th** and a written lab report on the sequence assigned will be uploaded to Canvas by **April 30th**.

Reflections:
The reflection assignments will be opportunities to explore topics together. Posts to the discussion board should add significantly to the conversation and support your point of view. *Comments that do not add significantly to a discussion will receive* ***no credit****.* It is okay to disagree in a discussion. In fact, learning does happen when we disagree. However, we need to be respectful and keep our online classroom a safe place to learn.
Reflections conclude on Wednesdays immediately prior to class. **After this, late posts will not be accepted.**
Grading Scale:
The following grading standards will be used in this class:

Grade	Percent
A	94-100
A-	90-93

B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
E	0-59

Standard rounding rules will be followed for grade determination

Assignment Categories

Activity	**Percent**
Exams	30%
Reflections	20%
CanSurvey	15%
Project	35%

Late Work Statement:

Any work submitted LATE on canvas (up to five days late) after the due date will receive 75% of the available points and assignments up to 10 days late will receive 50% of the available points as a maximum. Any missed assignments turned in after 10 days will result in a grade of a zero unless prior arrangements have been made or for extenuating circumstances. **The Attendance quizzes, Reflection Assignments, and the Exams are the exceptions to this policy as these will not be accepted late without extenuating circumstances.**

Required or Recommended Reading Assignments
N/A

General Description of the Subject Matter of Each Lecture or Discussion

Week	*Monday (Online)*	*Wednesday (In Person)*	*Friday (Online)*
Week 1 Jan 6th	No Class activities	**Introduction**	Lecture 2: DNA
Week 2 Jan 13th	Lecture 3: RNA	**Reflection 1** **What is the class project?**	Lecture 4: Proteins
Week 3 Jan 20th	Martin Luther King Jr Day, No Class	**Reflection 2**	Lecture 5: Gene expression
Week 4 Jan 27th	Lecture 6: Molecular Biology of the Cell Cycle	**Reflection 3**	Lecture 7: Genetics of Sexual Reproduction
Week 5 Feb 3rd	Lecture 8: Mutations and Cancer	**Reflection 4**	Lecture 9: Genomes
Week 6 Feb 10th	Lecture 10: “Junk” DNA	**Reflection 5** **Exam 1 (Review Session) open**	**BLASTN**
Week 7 Feb 17th	President's Day, No Class	**Exam 1 Closes (10 pm)** **Reflection 6**	Lecture 11: Nucleic acid extractions Lecture 12: Reverse transcription and PCR **BLASTX**

Week 8 Feb 24th	Lecture 13: Plasmids	**Reflection 7**	Lecture 14: Cloning **ORF Finder/Translation**
Week 9 March 3rd	Lecture 15: Protein extractions	**Reflection 8**	Lecture 16: Motifs **BLAST-P/CDD**
Week 10 March 10th	Lecture 17: Sanger sequencing	**Reflection 9**	Lecture 18: Next generation sequencing **Signal-P/TMHMM**
Week 11 March 17th	Spring Break, No Class	Spring Break, No Class	Spring Break, No Class
Week 12 March 24th	Lecture 19: Bioinformatics	**Reflection 10**	**Lecture 20: Phylogenetic analysis** **PHYRE**
Week 13 March 31st	Lecture 21: Omics	**Exam 2 review session** **Exam 2 open**	**Cladogram**
Week 14 April 7th	Project work	**Exam 2 Closes (10 pm)** **Project Help**	**Gene Identification**
Week 15 April 14th	Project Work	**Presentations**	
Week 16 April 21st	Project Work	No Class, Reading Day	

Finals Week April 28th	Finals Begin	**Final Exam Time 9-10:50 am Final Report and Presentations Due**

Required Course Syllabus Statements

Generative AI

AI is a tool with potential usefulness for writers. However, AI is also fraught with serious issues. It possesses accuracy problems while simultaneously sounding very confident about its incorrectness. It also frequently generates fake citations and quotations. It cannot understand the complexities and contexts of human communication. Finally, the way AI is trained on other texts poses several ethical questions about copyright and intellectual theft of property (along with uncritically inheriting the biases of the texts it's trained on).

To be clear, copying the exact wording of an AI chatbot is considered plagiarism and means that a student will be held accountable for violating academic integrity. Although many citation guides are already presenting ways to properly use and cite AI, citing AI in your work is not in line with the standards of scientific writing.

Using Remote Testing Software

☐ This course does not use remote testing software.

☒ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities

Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU Accessibility Services at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity
At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX
Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation
UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.
To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.