

Master Course Syllabus

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

Semester: Spring

Course Prefix: BIOL

Course Title: Molecular Evolution and Bioinformatics

Year: 2025

Course and Section #: 4550-001

Credits: 3

Course Description

Focuses on the concepts of diversity and evolution as a fundamental principle of biology with emphasis on change at the molecular level. Teaches how natural selection shapes the evolution of genes, gene systems, macromolecules, and organisms. Explores the roles of mutation, natural selection, population size and subdivision, and genetic recombination. Introduces different approaches for testing hypotheses about how molecules evolve by using phylogenetic analysis.

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: Dr. Heath Ogden

Student Learning Outcomes

- Integrate all of the sub-disciplines of Molecular Biology into the unifying theme of Molecular Evolution
- Retell the major scientists and ideas that contributed to the history of evolutionary thought.
- Comprehend the mechanisms of evolution: natural selection, migration, genetic drift, mutation, and nonrandom mating.
- Understand the basic terminology and principles of the bioinformatic “omics” - such as genomics, transcriptomics, proteomics, etc.
- Contrast the different methodologies of DNA sequencing.
- Effectively use databases, websites, and computational methods for studying biological data in relation to the evolution of genes, proteins, and whole genomes.
- Construct and interpret evolutionary trees derived from sequence data.
- Students will be able to compose a variety of disciplinarily-appropriate texts within multiple situations and for multiple audiences.
- Apply the broader impacts of molecular evolutionary change as they relate to topics such as the tree of life, coevolution, biodiversity, evolutionary development, cultural issues, social issues, etc.

Course Materials and Texts

Laptop
Internet Access

Course Requirements

Course Assignments, Assessments, and Grading Policy

Exams (20% of overall grade)
Quizzes and assignments (40% of overall grade)
Project (40% of overall grade)

Required or Recommended Reading Assignments

Peer reviewed literature will periodically be assigned to read

General Description of the Subject Matter of Each Lecture or Discussion

Introduction to course
Nature of science
The revolution in biological information
Sequencing Methods
Nucleic acids, proteins, and amino acids
Evolution, molecular evolution and population genetics continued
Models of sequence evolution
Sequence alignment algorithms
Searching sequence databases, Information resources for genes and proteins
Phylogenetic methods
Human Evolution
Work on Projects
Present Projects
Final Exam

Required Course Syllabus Statements

Generative AI

This course requires you to complete assignments that assess your understanding, application, and problem-solving ability applied to chemistry. You are expected to do your own work. Problem solving and scientific thinking are tools that are necessary for students to learn in this course. The use of artificial intelligence (AI) tools, such as chatbots, text generators, paraphrasers, summarizers, or solvers, is strictly prohibited for any part of your assignments, unless indicated in the assignment that AI tools are permitted and in what fashion. Using these tools, without permission, will be considered academic dishonesty and will be handled according to the university's academic honesty policy. If you have questions about acceptable use of AI tools, please consult the instructor before submitting your work.

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.