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: BTEC
Course and Section #: 2010-001
Course Title: DNA Manipulation and Analysis
Credits: 3

Course Description

This course teaches the theoretical and practical application of molecular biology tools used in creating recombinant DNA molecules. Students successfully completing this course will be able to understand the use of plasmid vectors and their features. The course will utilize a mixed format in which classroom instruction is linked to laboratory experiences.

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: Eric Domyan

Student Learning Outcomes

1	Work safely in a laboratory environment.
2	Successfully prepare laboratory solutions.
3	Maintain a laboratory notebook.
4	Apply laboratory methods for DNA manipulation and analysis.
5	Describe the methods used in genetic engineering.
6	Describe the principles behind the methods used in genetic engineering.

Course Materials and Texts

Provided on Canvas

Course Requirements

Course Assignments, Assessments, and Grading Policy

GRADING: Grades will be assigned based on the the following categories.

Assessment Item	Percentage of Total
Lab Notebook	**25%**
Homework:	**25%**
Quizzes/Exams:	**25%**
Project Summaries	**25%**
TOTAL	**100%**

Grading Standards: The table below indicates the percentage required for each grade.

A = 93% & above	A- = 90-92.95	B+ = 87-89.95
B = 83-86.95	B- = 80-82.95	C+ = 77-79.95
C = 73-76.95	C- = 70-72.95	D+ = 67-69.95
D = 63-66.95	D- = 60-62.95	E (failing) = Below 60

Lab notebook: To encourage continual maintenance of notebooks, you must have the Title, Purpose, and Methods written out before beginning a given lab. You need to have the Results and Conclusion recorded before leaving the room each class period. In addition, lab notebooks will be graded multiple times throughout the semester, with no advance notice given. Employers require that lab notebooks be kept up-to-date at all times, and this course will uphold that standard as well. Notebooks will be scored using a defined rubric.

Attendance: Class attendance is mandatory. Unavoidable absences due to illness or other extenuating circumstances must be discussed with me in advance, and any missing lab work must be made up as my schedule permits. Each unexcused absence will result in a full letter grade penalty.

Homework: Homework assignments will emphasize important skills and concepts.

Exams: The midterm exam will test student understanding of concepts covered in class up to the midterm, and will be online, pending instructor's discretion. The final exam will be cumulative, and will also be online, pending instructor's discretion. The exams will extensively cover the protocols that we complete in class. You will be allowed to use your Lab Notebook and a calculator on the exams.

Project Summaries: These are short writing assignments summarizing work accomplished, describing how the work relates to the project outline and outlining the next steps. There will be 5 project summaries worth 30 points each.

Extra credit: There may be one or two small extra credit assignments available over the course of the semester, but nothing replaces adequate planning and preparation for the class.

Required or Recommended Reading Assignments

Lab protocols and articles on genetic engineering provided on Canvas webpage.

General Description of the Subject Matter of Each Lecture or Discussion

Date	Topic
Mon, 1/6	Course overview, Biofuels lecture
Wed, 1/8	History of Molecular Biology, Basic Lab techniques, pipetting practice
	Due Jan 12: Literature Review, Safety Contract, Syllabus Quiz
Mon, 1/13	Basics of Molecular Biology, prepare LB plates
Wed, 1/15	Lab math lecture, make solutions, streak plates of *B. halodurans*
	Due Jan 19: Lab math pretest
Mon, 1/20	No class: MLK Day
Wed, 1/22	Genomic DNA extraction lecture, inoculate liquid culture of *B. halodurans*
	Due Jan 26: Homework 1: Lab Math
Mon, 1/27	Spectrophotometry lecture, Genomic DNA Extraction
Wed, 1/29	PCR Lecture, Spectrophotometry
	Due Feb 2: Project Summary 1
Mon, 2/3	Gel electrophoresis lecture, PCR Optimization
Wed, 2/5	Gel electrophoresis
	Due Feb 9: Homework 2: PCR
Mon, 2/10	PCR for LIC, Bacterial transformation lecture
Wed, 2/12	Gel electrophoresis of PCR for LIC, PCR purification
	Due Feb. 16: Project Summary 2
Mon, 2/17	No school: President's Day
Wed, 2/19	LIC Lecture, LB+amp plate preparation, Vector anatomy and clone verification lab
	Due Feb. 23: Homework 3: Genomic document
Mon, 2/24	LIC and transformation, Midterm exam review
Wed, 2/26	View transformation results, PCR verification of transformed colonies, Midterm exam review
	Due March 2: Midterm Exam
Mon, 3/3	Plasmid miniprep lecture, view PCR results, inoculate culture for miniprep
Wed, 3/5	Restriction enzymes lecture, Plasmid miniprep, prepare samples for sequencing
	Due March 9: Project summary 3
Mon, 3/10	No class: Spring Break
Wed, 3/12	No class: Spring Break
Mon, 3/17	Clone verification using restriction enzymes and sequencing
Wed, 3/19	Induction lecture, clone verification results, transform into BL21(DE3) cells
	Due March 23: Homework 4:Alternate primer design
Mon, 3/24	Transformation results
Wed, 3/26	Induction and sample collection
	Due March 30: Project Summary 4
Mon, 3/31	Protein extraction and affinity chromatography lectures
Wed, 4/2	SDS-PAGE lecture, soluble protein extraction and affinity chromatography
	Due April 6: Homework 5: Topic and References
Mon, 4/7	SDS-PAGE, Cellulase assay lecture
Wed, 4/9	Cellulase assay
Mon, 4/14	Work on Presentations
Wed, 4/16	Homework 5 Presentations
	Due April 20: Project Summary 5
Mon, 4/21	Homework 5 Presentations, Review for final
	Final Exam Due 11:59pm Wednesday, April 30

Required Course Syllabus Statements

Generative AI

AI programs are not a replacement for your human creativity, originality, and critical thinking. Writing, thinking, and researching are crafts that you must develop over time to develop your own individual voice. At the same time, you should learn how to use AI and in what instances AI can be helpful to you.

The use of generative AI tools (e.g. ChatGPT, Google Bard, etc.) is permitted in this course for the following activities:

- Brainstorming and refining your ideas;
- Fine tuning your research questions;
- Finding information on your topic;
- Drafting an outline to organize your thoughts; and
- Checking grammar and style.

The use of generative AI tools is not permitted in this course for the following activities:

- Impersonating you in classroom contexts, such as by using the tool to compose discussion board prompts/responses assigned to you or content that you put into a Teams/Canvas chat.
- Completing group work that your group has assigned to you.
- Writing and submitting a rough draft of a writing assignment.
- Writing entire sentences, paragraphs, or papers to complete class assignments.

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. Also, you are responsible for the information you submit based on an AI query (for instance, that it does not violate intellectual property laws, or contain misinformation or unethical content). If any part of this is confusing or uncertain, please reach out to me for a conversation 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.