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 #: 1010-001
Course Title: Fundamentals of Biotechnology I Career Survey BB
Credits: 3

Course Description

The course explores careers in biotechnology with emphasis on central dogma of biology, DNA techniques, applications in biotech, and bioethics. Lab work is included. The goal of the course is to provide awareness of biotechnology-related careers, increase general scientific literacy, provide objective, critical thinking opportunities, and link biotechnology to real world scenarios.

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: Biotech Professor

Student Learning Outcomes

1) Comprehension of basic biology concepts such as DNA replication, transcription, translation, and protein folding, gene expression, mutations and evolution, DNA and protein diagnostics, CRISPR gene editing, and plasmid manipulation in *E. coli*
2) Introduction to a myriad of biotechnological applications and associated bioethics involved
3) Providing hands-on laboratory and critical thinking experiences
4) Understanding laws and regulations for creating, testing, and manufacturing biotech products
5) Encouraging entrepreneurial creativity by providing an opportunity to “develop and market” a potential biotechnology product

Course Learning Outcomes as per catalog

1. Describe, in general terms, the field of Biotechnology.
2. Discuss, in general terms, the risks and benefits of Biotechnology to society.
3. Apply some of the basic methods of Biotechnology in a laboratory setting.
4. Describe some of the applications of Biotechnology for human welfare.

Course Materials and Texts

No textbook. Handouts, videos on Canvas

Course Requirements

Course Assignments, Assessments, and Grading Policy

Assignments – discussions and homework: 60 points total

1. Science identity and the scientific method in your everyday life
2. Cracking the Code of Life video worksheet
3. Science in the News article presentation
4. Hackathon brainstorming – ideas for a biotech solution to a local problem
5. Cracking Your Genetic Code discussion on personal genomics
6. GMO discussion
7. FDA case studies
8. Research vs Innovative Treatment case studies
9. Opioid dependency and the opioid crisis

Assignments – Lab worksheets: 100 points

1. Chromosomal (cheek cell) DNA extraction
2. Bacterial Transformation with pGLO
3. CRISPR gene editing
4. GMO diagnostics
5. Food contamination diagnostics
6. ELISA diagnostic

Quizzes and Exams: 100 points

1. Syllabus quiz
2. Midterm
3. Final

Final Project – Hackathon: 25 points - A hackathon is an event where people come together to detect and solve a problem or to identify innovative opportunities. Your group will determine the issue to be addressed and come up with possible solutions using Biotech.

GRADING:

A = ≥ 93%	B = 83-86%	C = 73-76 %	D = 63-66%
A- = 90-92%	B- = 80-82%	C- = 70-72%	D- = 60-62%
B+ = 87-89%	C+ = 77-79%	D+ = 67-69%	E = Below 60

Required or Recommended Reading Assignments

Lab worksheets

Discussion questions/worksheets/case studies – described above

Videos – Cracking the Code of Life, Cracking Your Genetic Code, Black Death, Principles of Curiosity

General Description of the Subject Matter of Each Lecture or Discussion

Topic
Syllabus; Principles of Curiosity video; What is a scientist /scientific method worksheet done in class in groups
Career Review – What biotechies really do
Central Dogma 1; DNA replication (replication activity)

Central Dogma 2: Transcription – DNA to RNA -transcription activity and *cheek cell DNA extraction lab*
Central Dogma 3; Translation – RNA to protein (codons and translation activity)
Central Dogma 1, 2, 3; DNA to RNA to Protein - putting it all together with Insulin
In the News in-class assignment
Pipetman practice; safety; lab layout
Bacterial transformation with pGlo plasmid
Analyze transformations Hackathon presentation discussion
CRISPR gene editing lab – intro and digestion
CRISPR gene editing lab – run DNA on agarose gels and analysis of results
Black Death Video; midterm review
Midterm!
Single Nucleotide Polymorphisms and evolution
Cracking Your Genetic Code; **hackathon prep**
Transgenics presentation – **transgenics/personal genomics discussion questions**
GMO Discussion
GMO lab intro; start GMO lab (DNA extraction/PCR);
GMO lab (Run pre-poured gels)/ Analyze
Food safety lab – diagnose Santa and Mrs. Claus' vacation food poisoning
Food safety gel analysis. **Start case study: UC Davis neurosurgeon treats glioblastoma in an unorthodox way**
Human Experimentation – CFR 45 vol 46 – **FDA empowerment: the cases of the tainted cough syrup and the thalidomide disaster**
Biomanufacturing and CFR 21 - quality, variation, cGMP, and SOPs
ELISA diagnostics
Opioid crisis dependency
Finish Opioid Discussion/questions/research
Entrepreneurship hackathon
Entrepreneurship hackathon
FINAL'S WEEK SCHEDULE: Written final exam

Required Course Syllabus Statements

Generative AI

A WORD ABOUT AI IN CLASS:

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 ideas;
- Fine tuning your research questions (not answers);
- Finding references for 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, unless it is mutually agreed upon that you may utilize the tool.
- Writing a draft of a writing assignment.
- Writing entire sentences, paragraphs or papers to complete class assignments.

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). Your use of AI tools must be properly documented and cited in order to stay within university policies on academic honesty.
Any student work submitted using AI tools should clearly indicate what work is the student's work and what part is generated by the AI. In such cases, no more than 25% of the student work should be generated by AI. 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.