

COURSE # BTEC 1010

Fundamentals of Biotechnology / Career Survey

*2018-2019*

**Instructor**

**Instructor:**

**Phone:**

**Email:**

**Office Hours:**

**Course**

## Course Description

***This is a Concurrent Enrollment Course, offering both high school credit through \_\_\_\_\_\_\_\_\_\_\_\_\_\_ High School and college credit through Utah Valley University. Credit from this course is transferable to all colleges and universities. Contact the receiving institution for how the credits will be applied.***

**Catalog Description**

Explores careers in biotechnology with emphasis on central dogma of biology, DNA techniques, applications in biotech, and bioethics. Examines forensics and human cloning.

**Course Prerequisites**

This class is available to all high school students in good academic standing. High school prerequisites apply.

## Course Objectives or Learning Outcomes

The overall goal of the course is to provide career exploration in biotechnology fields. Objectives include:

1. Introduce a myriad of biotechnological applications and associated bioethics
2. Provide hands-on laboratory and critical thinking experience

Encourage entrepreneurial creativity by providing an opportunity to develop and market a potential biotechnology product.

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**Required Text and Materials**

Class handouts to be provided

**Department Policies**

**Assessment**

* The delivery method of this class is primarily lecture-based.
* Environment of the Classroom. All student activity and behavior must contribute to creating a classroom environment which does NOT 1) interfere with the teacher’s ability to teach, or 2) interfere with any other students’ ability to learn (whether you think they want to or not). Tardies/Absences will affect your grade.
* Homework: Homework is the life blood of this class. You will simply have to put forth significant effort outside of class time. This will mainly consist of READING the required handouts and completing the designated assignments.

**Grading Scale**

A = 100-93 B - = 82-80 D+ = 69-67

A - = 92-90 C+ = 79-77 D = 66-63

B+ = 89-87 C = 76-73 D - = 62-60

B = 86-83 C - = 72-70 F = 59-0

**Grades and Credit**

Your grade for this class will become part of your permanent college transcript and will affect your GPA. A low grade in this course can affect college acceptance and scholarship eligibility.

Grades are determined by instructors, based upon measures determined by the instructor and department and may include: evaluation of responses, written exercises and examinations, performance exercises and examinations, classroom/laboratory contributions, mastery of pertinent skills, etc. The letter grade “A” is an exceptional grade indicating superior achievement; “B” is a grade indicating commendable mastery; “C” indicates satisfactory mastery and is considered an average grade; “D” indicates substandard progress and insufficient evidence of ability to succeed in sequential courses; “E” (failing) indicates inadequate mastery of pertinent skills or repeated absences from class; “UW” indicates unofficial withdrawal from class.

**University Policies**

**Academic Integrity**

Utah Valley University expects all students to maintain integrity and high standards of individual honesty in academic work, to obey the law, and to show respect for others. Students of this class are expected to support an environment of academic integrity, have the right to such an environment, and should avoid all aspects of academic dishonesty. Examples of academic dishonesty include plagiarizing, faking of data, sharing information during an exam, discussing an exam with another student who has not taken the exam, consulting reference material during an exam, submitting a written assignment which was authored by someone other than you, and/or cheating in any form.

In keeping with UVU policy, evidence of academic dishonesty may result in a failing grade in the course and disciplinary review by the college.  Any student caught cheating will receive, at minimum, zero points on that particular assignment for the first offense.  A second offense can result in failing the course and will entail being reported to Student Advising.  Academic dishonesty includes, in part, using materials obtained from another student, published literature, and the Internet without proper acknowledgment of the source.   Additional information on this topic is published in the student handbook and is available on the UVU website.

### **Student Code of Conduct**

All UVU students are expected to conduct themselves in an appropriate manner acceptable at an institution of higher learning. All students are expected to **obey the law**, to **perform contracted obligations**, to **maintain absolute integrity and high standards** of individual honesty in academic work, and to observe a **high standard of conduct for the academic environment**.

The Student Rights and Responsibilities Code, or Code of Conduct, outlines for students what they can expect from the University and what the University expects of them.

Students should review their Rights and Responsibilities. The Code of Conduct also outlines the process for academic appeals, and appeals related to misconduct and sanctions. It can be found at <http://www.uvu.edu/studentconduct/students/>

**Student Responsibilities**

You are expected to take an active role in the learning process by meeting course requirements as specified in written syllabi. Faculty members have the right to establish classroom standards of behavior and attendance requirements. You are expected to meet these requirements and make contact with faculty members when unable to do so.

**Withdrawal Policy**

If you do not wish to take this course or find that you are unable to continue, you should officially withdraw by the deadline stated in the current semester UVU Student Timetable.

You can officially withdraw from a course by dropping it through the online registration system or the campus One Stop desk (BA 106) by the listed date. If you officially withdraw from a course by the "Last Day to Drop and Not Show on Transcript," the course will not appear on your academic transcripts. If you officially withdraw from a course by the "Last Day to Withdraw," a "W" will appear on your transcripts. Although your GPA will not be affected — a "W" will indicate that you chose to withdraw. If you fail to complete the course and do not drop it before the "Last Day to Withdraw," a "UW" or "E" (a failing grade) will appear on your transcripts.

Withdrawing from a course may impact your financial aid status. For more information, see: UVU Financial Aid.

**Cheating and Plagiarism Policy Procedures**

This document was taken from the Utah Valley University Policy 541, The Student Rights and Responsibilities Code

5.4.4 Each student is expected to maintain academic ethics and honesty in all its forms, including, but not limited to, cheating and plagiarism as defined hereafter:

1) Cheating is the act of using or attempting to use or providing others with unauthorized information, materials, or study aids in academic work. Cheating includes, but is not limited to, passing examination answers to or taking examinations for someone else, or preparing or copying another's academic work.

2) Plagiarism is the act of appropriating another person's or group's ideas or work (written, computerized, artistic, etc.) or portions thereof and passing them off as the product of one's own work in any academic exercise or activity.

3) Fabrication is the use of invented information or the falsification of research or other findings. Examples include but are not limited to:

a) Citation of information not taken from the source indicated. This may include the incorrect documentation of secondary source materials.

b) Listing sources in a bibliography not used in the academic exercise.

c) Submission in a paper, thesis, lab report, or other academic exercise of falsified, invented, or fictitious data or evidence, or deliberate and knowing concealment or distortion of the true nature, origin, or function of such data or evidence.

d) Submitting as your own any academic exercise (written work, printing, sculpture, etc.) prepared totally or in part by another.

### **Students with Disabilities**

**Students who need accommodations because of a disability** may contact the UVU Office of Accessibility Services (OAS), located on the Orem Campus in LC 312. To schedule an appointment or to speak with a counselor, call the OAS office at 801-863-8747. Deaf/Hard of Hearing individuals, email [nicole.hemmingsen@uvu.edu](https://owa.uvu.edu/owa/redir.aspx?C=r3xUa4y2bkalWljgIj1VXM3KzYlusNIIESMqIpkF5USfG-H3cUMstYl8DNScKc_quB49PvOQ-l0.&URL=mailto%3anicole.hemmingsen%40uvu.edu) or text 385-208-2677.

**Religious Accommodations**

At the beginning of each semester, you shall promptly review the course syllabus and class schedule and notify faculty to request an accommodation for sincerely held religious beliefs and practices using the *Religious Accommodation Request Form*.

**Dangerous Behavior**

The faculty member has the right to demand and secure the immediate removal of any person from the classroom whenever the faculty member determines, to the best of his or her knowledge or belief, that the person's actions are threatening or dangerous to students or themselves. If the faculty member cannot resolve a disruptive situation, the faculty member may request that the disruptive person(s) leave the classroom. If the disruptive person(s) will not leave voluntarily, the faculty member may call University Police for assistance. The incident shall be reported to the Dean of Students and to the Director of Judicial Affairs in accordance with Policy 541 *Student Rights and Responsibilities Code*.

**Discriminatory, Exclusionary, or Disruptive Behavior**

Faculty members observing discriminatory, exclusionary, or disruptive behavior follow procedures described in UVU Policy 541 *Student Rights and Responsibilities Code.* 5.6

**Attendance**

Attendance in this class is not mandatory due to the different learning preferences with each student. However, class will be held according to the schedule on the top of this syllabus. Chapters will be covered in class as listed in the semester schedule below. Class will consist of chapter reviews, discussion and group activities.

**Policies/References**

1. Policy 541: Student Rights and Responsibilities Code <https://www.uvu.edu/catalog/current/policies-requirements/student-rights-and-responsibilities.html>
2. Policy 601: Classroom Instruction and Management. <https://policy.uvu.edu/getDisplayFile/5750ed2697e4c89872d95664>
3. Policy 635: Faculty Rights and Professional Responsibilities. <https://policy.uvu.edu/getDisplayFile/563a40bc65db23201153c27d>

**Definitions**

* 1. Syllabus: An agreement between faculty and students that communicates course structure, schedule, student expectations, expected course outcomes, and methods of assessment to students.

### **Dropping the Class**

### \_\_\_\_\_\_\_\_\_ is the last day to drop the course without it showing on your transcript.

\_\_\_\_\_\_\_\_\_ is the last day to withdraw from the class.   
If you drop the high school class, you must also withdraw from the UVU class to avoid receiving a failing grade.

Due dates and this syllabus may change at the instructor’s discretion due to the needs of the class members.

**Topics and Class Activities**

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| History of Biotech |
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| Cracking the Code of Life |
| Central Dogma 1; Genomic DNA extraction |
| Central Dogma 2; codons and protein models |
| In the News |
| Lab basics |
| Pipetman practice; Intro to GFP |
| Plasmid mini-prep |
| Restriction digests |
| Pour/run agarose gels; Intro transformations |
| Analyze digests; Bacterial transformation |
| Analyze transformations; Review |
| Reading Day |
| Notebook check |
| Black Death Video |
| Single Nucleotide Polymorphisms; Cookie-ase |
| Career Review |
| Midterm |
| Bioethics (GMO) |
| Ethics discussion; transgenics |
| Review |
| GMO intro/ start lab (DNA extraction/PCR) |
| GMO lab (Run pre-poured gels)/ Analyze |
| Human Experimentation/ Case Studies |
| Human Experimentation/ Case Studies |
| Teamwork, quality, & variation |
| BioManufacturing/ Let’s cook! |
| ELISA diagnostics |
| Artel Olympics; Review |
| Entrepreneurship Presentations |
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| |  |  |  | | --- | --- | --- | | **Activity** | **Description** |  | | **Class Participation** | This is a student-centered classroom. This type of class requires student participation in activities and discussions. This means that everyone attends all classes and participates in discussion. This style of teaching helps you become more engaged and responsible for your own learning. Participation in discussion helps you to think critically, express ideas/thoughts, and allows you to learn how to give and receive feedback. |  | | **Biotech in the News** | This is a great way to become aware of the biotech around you. Identifying relevant news articles about biotech will keep you informed about cutting edge science and how it is changing our world today. (1-2 page summary of something related to biotech you read or heard in the news; please reference article or report) |  | | **Local Company Survey** | A 2-page report that describes 2 local biotech/bioscience companies in Utah. Include information that you think is important to know about the companies. Compare and contrast the companies, commenting on the characteristics that you like and do not like about them. Would you work for these companies? This is a chance to start looking at an internship possibility. |  | | **Career Survey** | A 2-page report that details a career path in any field that is biotech related. Custom fit it to the area you are interested in such as medicine, forensics, agriculture, nutrition, environmental science, wildlife or marine biology, medical device, pharmaceuticals, or informatics. Do you have an area that you might want to overlap with the above such as IT, law, HR, journalism, chemistry, or education? This is an opportunity for you to explore your passions and interests as related to job possibilities. Also, remember that in any of the above interest areas there are many job descriptions such as R&D, QA/QC, regulatory affairs, human resources, computer and technical support, sales representative, and legal/intellectual property issues. In the report, include the following information: 1) job description; 2) opportunities (local and national); 3) benefits; 4) entry points; 5) promotion opportunities; 6) educational opportunities;  7) education required. Describe what the working environment would be like and anything that would be relevant to making a decision to pursue this career.  Finally, make a few comments as to whether or not this career is appealing to you now that you have researched it! |  | | **SNP Paper** | You will receive an explanation of what should go into the laboratory report. This will include a description of the purpose of the lab, a representation of your results, and a discussion of what the results indicate. |  | | **Quizzes** | You will be quizzed on the different sections we cover. Quiz topics include: 1) History, central dogma, & basic lab techniques, 2) Careers, applications, & pGLO/GFP labs, 3) personalized medicine, forensics, & SNP lab, 4) GMOs, ELISAs, & BioMan |  | | **Manufacturing Process** | A hands-on activity will be offered to learn the importance of proper documentation and good manufacturing practices (GMP) in the production of a quality product.  Each group of students will follow a recipe (a standard operating procedure, SOP) to make a batch of cookies, determine whether the cookies were successfully made (quality control), and if not, determine what went wrong and how to prevent it in the future (non-conformance reporting; corrective action / preventative action processes). |  | | **Video Report** | A 1-page summary of the video. What was helpful, interesting, or confusing about the video? |  | | **Final Project – 10-Minute Talk** | For the final project you will create a biotechnology idea of your very own, or review a topic of interest such as cloning (topic must be cleared by instructor). Each student is responsible for developing a 10-minute talk to present his/her idea to the class. HAVE FUN. This project should take you about 10-15 hours total over the course of the semester. You will be asked to provide a very short progress report on this midway through the semester. As you progress, please be sure to discuss any concerns or issues you may have with the instructor.  GMOs: Understanding the impact of genetically modified organisms (GMOs) on our society and personal lives is becoming more important every day. This project is designed to engage you in thinking about what is important when designing and trying to market a genetically modified product. Take time to look around you and see what organism or products have already been genetically modified. Ask yourself what was reason or purpose for the modification. Consider what issues or difficulties the companies might have encountered in convincing the public to buy their organism or product.  These are the things you should be considering when coming up with your idea for a modified organism or product. The scientific background does not have to be based entirely upon reality but should be thoughtful and include some rationale. You should include to whom you will market this product and why.  Other Biotechnology Topics: We will not have time to cover all the interesting areas of biotechnology research. Example topics include personalized medicine, informatics, DNA fingerprinting, cloning, genetic testing, knock-out technology, transgenic animals, forensic methods, bioremediation, stem cell research etc… |  | |  | |  | |