UNIVERSITY OF THE FRASER VALLEY

ORIGINAL COURSE IMPLEMENTATION DATE: September 2008
REVISED COURSE IMPLEMENTATION DATE: January 2027
COURSE TO BE REVIEWED (six years after UEC approval)**:** October 2032
Course outline form version: 29/08/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: BIO 407	**Number of Credits:** 3 Course credit policy (105)
Course Full Title: Applied Biotechnology **Course Short Title:** Applied Biotechnology	
Faculty: Faculty of Science	**Department/School:** Biology

Calendar Description:

Examines the principles, applications, and impacts of biotechnology incorporating concepts from genetics, biochemistry, microbiology, and molecular biology. Students evaluate biotechnological approaches in medicine, industry, food, the environment, and agriculture, critically analyzing their applications, limitations, benefits, ethical implications, and diverse perspectives, including Indigenous knowledge.

Prerequisites (or NONE):	BIO 201 and BIO 220. BIO 320 is recommended.
Corequisites (if applicable, or NONE):	None.
Pre/corequisites (if applicable, or NONE):	None.

Antirequisite Courses *(Cannot be taken for additional credit.)*

Former course code/number: **BIO 405**

Cross-listed with: **N/A**

Equivalent course(s):

(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar	45
Total hours	**45**

Scheduled Laboratory Hours

Labs to be scheduled independent of lecture hours: **No**

Course Details

Special Topics course: **No**
(If yes, the course will be offered under different letter designations representing different topics.)

Directed Study course: **No**
(See policy 207 for more information.)

Grading System: **Letter grades**

Delivery Mode: **Face-to-face only**

Expected frequency: **Every other year**

Maximum enrolment (for information only)**: 36**

Prior Learning Assessment and Recognition (PLAR)

PLAR is available for this course.

Transfer Credit *(See **bctransferguide.ca**.)*

Transfer credit already exists: **No**

Submit outline for (re)articulation: **No**
(If yes, fill in transfer credit form.)

Department approval	**Date of meeting:**	Feb 13, 2026
Faculty Council approval	**Date of meeting:**	April 2026
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	October 2, 2026

Learning Outcomes *(These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)*

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

1. Explain the theoretical principles, components, and mechanisms underlying the technologies studied.
2. Assess the applicability and limitations of biotechnologies in addressing real-world challenges, and develop strategies to mitigate their limitations.
3. Analyze the benefits of biotechnology and the potential problems associated with the application of each of these techniques in areas such as medicine, consumer goods, the food industry, environmental protection, and agriculture.
4. Engage with Indigenous Knowledge Givers to explore Indigenous perspectives on biotechnology and reflect on how these perspectives inform ethical and culturally respectful scientific practice.
5. Understand how biotechnology professionals across local sectors apply biotechnology in scientific, ethical, and community contexts.
6. Critically review the most recent scientific literature on this topic.

Recommended Evaluation Methods and Weighting *(Evaluation should align to learning outcomes.)*

Final exam:	40%	Assignments:	25%	Quizzes/tests/midterm:	35%
	%		%		%

Details:

Assignments (25% total): literature review and analysis (10%); reflective writing, scientific writing, and communications (5%); and collaborative learning and peer presentations (10%). Quizzes/tests/midterm (35% total): quizzes (10%) and midterm (25%).

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.)*

Lectures, guest lecturers, in-class discussions, and student presentations.

Texts and Resource Materials *(Include online resources and Indigenous knowledge sources. Open Educational Resources (OER) should be included whenever possible. If more space is required, use the Supplemental Texts and Resource Materials form.)*

	Type	Author or description	Title and publication/access details	Year
1.	Textbook	Michael T. Madigan, Kelly S. Bender, Daniel H. Buckley, W Matthew Sattley, David A. Stahl	Brock Biology of Microorganisms, 16th edition	Current
2.	Textbook	Martin R Adams, Maurice O Moss	Food Microbiology	Current
3.	Journal	Up-to-date, peer-reviewed journal articles.		Current
4.				

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

Material will be drawn from a number of sources, including texts, journal articles, and government publications.

Course Content and Topics

Introduction to biotechnology and industrial microbiology
Food microbiology
Food spoilage and food preservation
Principles of fermentation
Fermented foods and lactic acid bacteria
Yeast and fermentation products
Introduction to the fundamentals of the wine industry
Water and wastewater treatment
Biomining
Bioremediation
Biotechnology and synthetic biology
Tools for genetic engineering
Applications of synthetic biology
Medical biotechnology
Engineered vaccines and therapeutic agents
Protein and lipid biotechnology
Petroleum biotechnology
Microbial renewable energy
Plant biotechnology
Biotechnology in agriculture
Biotechnology of built environments