ORIGINAL COURSE IMPLEMENTATION DATE:	November 1994
REVISED COURSE IMPLEMENTATION DATE:	September 2016
COURSE TO BE REVIEWED: (six years after UEC approval)	February 2022

Course outline form version: 09/15/14

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

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

Course Code and Number: BIO 408	**Number of Credits:** 3 Course credit policy (105)
Course Full Title: Directed Studies in Biology I **Course Short Title (if title exceeds 30 characters):**	
Faculty: Faculty of Science	**Department (or program if no department):** Biology

Calendar Description:

The course is designed for students in a Biology major or minor. They will have an opportunity to apply scientific principles in a creative hands-on research experience outside the usual course format. Students will develop their own projects in biology under the supervision of a faculty member with expertise in the field. The projects will be equivalent in weight and difficulty to a single upper-level course.

Note: Students with credit for BIO 409 or BIO 499 cannot take this course for further credit.

Prerequisites (or NONE):	B+ average in BIO 202, 210, and 220, and instructor's permission. Note: As of January 2017, prerequisites will change to the following: B+ or better in BIO 202, 210, and 220, and instructor's permission.
Corequisites (if applicable, or NONE):	
Pre/corequisites (if applicable, or NONE):	

Equivalent Courses (cannot be taken for additional credit)

Former course code/number:

Cross-listed with:

Equivalent course(s): **BIO 409, BIO 499**

Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.

Transfer Credit

Transfer credit already exists: ☐ Yes ☒ No

Transfer credit requested (OReg to submit to BCCAT):
☐ Yes ☒ No (if yes, fill in transfer credit form)

Resubmit revised outline for articulation: ☐ Yes ☒ No

To find out how this course transfers, see **bctransferguide.ca**.

Total Hours: 45

Typical structure of instructional hours:

Lecture hours	
Seminars/tutorials/workshops	
Laboratory hours	
Field experience hours	
Experiential (practicum, internship, etc.)	
Online learning activities	
Other contact hours: Student Directed	45
Total	**45**

Special Topics

Will the course be offered with different topics?
☐ Yes ☒ No

If yes, different lettered courses may be taken for credit:
☐ No ☐ Yes, repeat(s) ☐ Yes, no limit

Note: The specific topic will be recorded when offered.

Maximum enrolment (for information only): 6

Expected frequency of course offerings (every semester, annually, every other year, etc.): every semester

Department / Program Head or Director: Allan Arndt	**Date approved:**	November 13, 2015
Faculty Council approval	**Date approved:**	January 2016
Campus-Wide Consultation (CWC)	**Date of posting:**	February 12, 2016
Dean/Associate VP: Lucy Lee	**Date approved:**	January 2016
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	February 26, 2016

Learning Outcomes

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

1. exercise creativity in science
2. explore a specific area in depth
3. practice the clear formulation of answerable questions
4. express themselves clearly and professionally, both orally and in writing
5. develop industry contacts
6. maintain a scientific journal

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods (guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion)

Students will work closely with college supervisors and, where appropriate, with industrial sponsors.

Lectures, demonstrations, small group practice, discussion, audio-visual presentations, use of models and charts.

Grading system: Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☐ No ☐

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

Typical Text(s) and Resource Materials (if more space is required, download Supplemental Texts and Resource Materials form)

	Author (surname, initials) Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.		☐		
2.		☐		
3.		☐		
4.		☐		
5.		☐		

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

Typical Evaluation Methods and Weighting

Final paper or project & seminar presentation: 55%	Assignments: %	Midterm exam: %	Practicum: %
Quizzes/tests: %	Lab work: %	Field experience: %	Shop work: %
Seminar/written project proposal: 15%	Technical ability, organization & time management: 20%	Research poster: 10%	Total: 100%

Details (if necessary): All students will be required to deliver an interim report or presentation to the supervising instructor. The final report will be delivered to a committee consisting of the supervisor a minimum of one other instructor, and the industrial partner if one exists. This committee will be responsible for assigning the final grade.

Final seminar presentation: Marked by members of the Biology Department (see Final Presentation Mark Sheet)

Research poster: Students registered in BIO 408 are required to present a poster at the UFV undergraduate research day.

Final paper or project: Students must hand in an acceptable final paper or project in order to pass the course. This paper will be marked by at least TWO members of the student's supervisory committee.

Typical Course Content and Topics

A student will be expected to spend no fewer hours on this project than on any other upper level 3 credit biology course (45 hours). The student experience may be considered to consist of several stages:

Selection of a Suitable Area

The student may already have a specific area of research in mind or a specific instructor with whom he or she would like to interact. In this case, the student and instructor will strike an agreement depending on:

(i) available equipment and space

(ii) budget for consumables

(iii) availability of appropriate faculty and staff

Otherwise, an instructor may suggest a project to a suitable student. In all cases, it will be the instructor's responsibility to ensure that the proposed project is appropriate for an upper level student to accomplish in the proposed time. It is also the responsibility of the instructor to ensure that equipment, funding, and space are available for the project. In some cases, students may benefit from expert advice and input in addition to that of the supervising instructor (for example, see Industrial Partners, below). However, it is always the responsibility of the instructor to ensure that the project conforms to UFV academic standards.

Design of Research Project

The student will survey the literature in a particular field under the guidance of the appropriate instructor. The student will be assisted to build on the literature to formulate a testable hypothesis and design an appropriate experimental approach. The student will address questions such as: novelty of the approach, statistical analysis to be carried out, use of controls, use of replicates. Because of the nature of biological science, not all projects will fit neatly into one semester. Student and instructor will have the option of extending the course into a second semester, although the credit value of the course will remain 3 credits.

Carry out Research

The instructor will aid the student in mastery of the techniques necessary to carry out the research. The student will be responsible for scheduling time for the various stages of the project, making sure equipment is available, reporting to the instructor and industrial sponsor where appropriate. Regular meetings of student and instructor are required for all projects.

Production of Research Paper

The student will be expected to produce a research paper that is clear and scholarly and written in the style of a major journal. The instructor will aid the student in producing a quality piece of science communication.

Industrial Partners

An industrial partner may, if desired, be built into this project in one of several ways. In these cases, expenses and/or a salary may be underwritten by an industrial sponsor. The instructor remains the judge of the academic quality of the work.

1. The Biology 408 project may be accomplished through a part-time job. A student who expects to gain relevant science experience through a part-time job may wish to use the project as the basis for a Biology 408 report. A guidance/evaluation committee will be struck, consisting of the principal instructor and the industrial sponsor, plus at least one additional instructor. The student must have prior approval before registering in BIO 408.

2. The Biology 408 project may arise out of summer work or work undertaken in a semester that the student is away from the college. Such an arrangement must be set up in advance of the time away from UFV. The student must obtain approval from a supervising instructor before a project undertaken in a semester away from campus can be considered for BIO 408. In this case, the student, instructor and employer must remain in contact for the duration of the project.

3. The expenses incurred in a Biology 408 project may be supported by an industrial sponsor. Such an arrangement may be fostered by the proposed Science Council of British Columbia Skills Partnership program. In all cases, the report produced by the student remains the property of the University of the Fraser Valley.

LABORATORY EXPERIMENTS

Appropriate experiments will be determined by the supervising instructor and student. Cost and space considerations will be considered on an ad hoc basis.