

ANSC*4050 - Biotechnology in Animal Science

Fall 2024 Course Outline

Section: 01

Credits: 0.50

Land Acknowledgement: Guelph

The University of Guelph resides on the ancestral lands of the Attawandaron people and the treaty lands and territory of the Mississaugas of the Credit. We recognize the significance of the Dish with One Spoon Covenant to this land and offer respect to our Anishinaabe, Haudenosaunee and Métis neighbours. Today, this gathering place is home to many First Nations, Inuit, and Métis peoples and acknowledging them reminds us of our important connection to this land where we work and learn.

Calendar Description

The course will provide an overview of how biotechnology has impacted biomedical science and animal production. Important principles of recombinant DNA, DNA marker identification, stem cell biology, and generation of transgenic animals will be emphasized. The current challenges and potential opportunities in biotechnology will also be discussed.

Prerequisite(s): MBG*2040 or MBG*2400

Department(s): Department of Animal Biosciences

Course Description

Topics to be covered will include the fundamental concepts and principles underlying gene expression regulation, recombinant DNA biotechnology, the production of recombinant proteins and their applications, gene targeting, gene therapy, animal cloning, transgenic animals, concepts and current research in stem cell biology and relevant applications.

Lecture Schedule

TuTh 11:30am-12:50pm in MCKN*115 (9/5 to 12/13)

Lab Sections

Day	Time	Location	Sections
Wednesday	8:30am - 10:15am	ANNU 110	01
Wednesday	10:30am - 12:15pm	ANNU 110	02

Instructor Information

Christine Bone

Instructor

Email: cbone@uoguelph.ca

Office: ANNU 021

Office Hours:

By appointment only

Melissa Parent

Teaching Assistant

Email: mparen02@uoguelph.ca

Office Hours:

Online Communications

Textbooks

Group	Title	Author	ISBN
Suggested	Molecular Biotechnology: Principles and Application of Recombinant DNA	Bernard R. Glick, Jack J. Pasternak, & Cheryl L. Patten	
Suggested	Bionanotechnology: Principles and Applications	Anil Anal	

Learning Resources

Lab Manual

A PDF copy of the lab manual will be posted on CourseLink.

Other Resources

Course slides will be posted online on CourseLink.

Student presentation slides will be posted on CourseLink. Reference information on relevant research publications that will be discussed in class will be posted on slides/CourseLink.

Course Learning Outcomes

1. Understand the concepts and principles of recombinant DNA and biotechnology, including gene expression regulation, plasmid and virus expression vectors, site-directed mutagenesis, gene editing, microbes as host for recombinant protein production, and animal transgenesis.
2. Critically analyze recent key research papers in the field of biotechnology.
3. Effectively communicate concepts and research examples of applications of biotechnology in animal and biomedical science.
4. Critically evaluate applications of molecular biotechnology in animal and biomedical science.
5. Acquire applicable laboratory experience by performing experiments involving plasmid isolation and gel electrophoresis.

Schedule of Topics and Assignments

Week of	Topic	Activities	Due
9/5	Introduction History of Biotechnology	First day of class	Sept. 5
9/10	Principles underlying gene expression regulation		
9/17	Fundamental concepts and principle of recombinant DNA and biotechnology		
9/24	DNA library Virus vectors Plasmid vectors Applications		
10/1	Microorganisms as hosts for recombinant protein expression and detection Feed and nutrient improvements using a biotechnology approach		
10/8	Recombinant yeast Animal cloning Principles of transgenesis		
10/15		Fall Study Break	

10/17	Gene editing Applications of transgenic animals, in animal and biomedical science	
10/22	Continuation of Week 7	Midterm
10/29	Principal concepts and current research in stem cell biology and relevant applications Gene/cell therapy	
11/5	Continuation of Week 9	
11/12	Molecular agriculture Intellectual property regulation and policy	Student Poster Presentations Student Slideshow Presentations
11/19	Continuation of Week 11	Student poster presentations Student Slideshow Presentations
11/26	Introduction of nanotechnology and its application Summary	Last day of class Nov 30

Lab / Seminar Schedule

The lab sessions will be held in ANNU 110

Lab 1: October 2: Transformation of E. Coli

Lab 2: October 9: Plasmid Isolation

Lab 3: October 16: Gel Electrophoresis

Lab 4: November 13: Student slideshow presentations

Lab 5: November 20: Student slideshow presentations

Assessment Breakdown

Description	Weighting (%)	Due Date
Lab Quizzes	6%	Oct 2, 9, 16
Midterm	15%	Oct 24
Group Project (Slideshow and Poster Presentations)	35%	Nov 13, 14, 19 & 20
Evaluation of Group Projects	4%	Nov 13, 14, 19 & 20
Final Exam	40%	Dec 5

Assessment Details

Quizzes

There will be 3 lab quizzes, which accompany the 3 labs in this course.

Each quiz makes up 2% of the final grade, for a total of 6%.

Lab quizzes are to be completed during the scheduled lab time.

Course Learning Outcomes Assessed: 5

Midterm

The midterm is completed during class time and will assess the content taught during the first 8 weeks

Course Learning Outcomes Assessed: 1

Group Presentation

35

Marks for the group presentation are a combination of individual work (70%) and overall group work (30%). Additional information regarding the group presentations can be found below in the "Group Project Marking Scheme" and on CourseLink under "Group Presentation Guidelines".

Course Learning Outcomes Assessed: 2, 3, 4

Peer Evaluation

4

Peer evaluation marks are earned by attending poster and slideshow presentations and providing feedback on others' presentations. A maximum of 1 mark can be earned per presentation, for a total of 4%.

Course Learning Outcomes Assessed: 2, 3, 4

Exam

40

The final exam will assess all content covered over the semester.

Course Learning Outcomes Assessed: 1

Final Exam

Date: Dec 5

Time: Th 8:30am-10:30am

Location: TBA *Please see Web Advisor closer to the date of scheduled final for location.*

To understand rules and regulations regarding Examinations students are encouraged to read Student's Responsibilities (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/examinations/>)

If the student is unable to meet the final exam requirements due to medical, psychological or compassionate circumstances they are encouraged to review Student's Responsibilities in the Academic Consideration, Appeals and Petitions (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/>) section of the Academic Calendar.

Group Project Marking Scheme

Student Presentations (35 % of the final grade)

See "Group Project Guidelines" on CourseLink for more details.

Student presentations will be carried out in groups of four or five and will involve the presentation of a scientific article provided by the instructor. The significant features of the article must be reviewed, with appropriate background information. Questions such as: *Why was this work done? How was it done? What were the main results and conclusions? Has there been any follow-up to this work?* should be answered.

Each student will be responsible for one of the 5 aspects of the project:

1. Creating the slides for the slideshow presentation, and two multiple choice questions (with expected answers NOT shown) directly related to the content of the presentation for the class on the last slide. (Note: everyone in the group should help create these two questions)
2. Giving the slideshow presentation.
3. Answering questions from the audience following the slideshow presentation.
4. Creating a poster on the paper your group presented.
5. Presenting the poster.

It is expected that all five students will work as a team in preparing the whole project. As a group, you will decide which student is most suited to each aspect of the final project. The presentation is expected to be of high quality and should be well-practised. The answers to questions should be confident, accurate, and informative. The slideshow presentation will be 15 minutes long with an additional 5-minute discussion/question period.

Each group is expected to come up with two multiple-choice questions, relevant to the content presented for the class. The questions are to be posted on the last slide of the presentation.

During each slideshow presentation, all other students in the class will answer the two questions from each presentation and submit written critical comments on their peer's presentations to help the instructor and TAs arrive at a mark for each group.

All students are expected to be present at these presentations, perform evaluations, and provide answers to the two questions stated at the end of each group's presentation, this response contributes to 4% of the final mark.

The group component of this project contributes to 30% of the overall grade for this project. Out of the 35 possible marks, every member in the group will receive the same grade for 30% of their overall mark. The remaining 70% will be assessed individually for each student according to his/her individual performance for the section they are responsible for. For example: in group A, John was responsible for making the slides for his group presentation, he received 85% on his group's overall presentation package ($35 \times 85\% \times 30\% = 8.92$ marks), and in the specific section he was responsible for (slides), he received 83% thus ($35 \times 83\% \times 70\% = 20.33$ marks). So, John's mark is $8.92 + 20.34 = 29.26/35$ (84%) before group peer evaluation. If John receives no complaints from his group mates regarding lack of effort in the group work, his final mark will remain $29.26/35$ (84%). If the group members indicated that John didn't try hard enough to participate in the group work, and only spent 90% of his effort, then John's final presentation mark will be $90\% \times 84 = 76\%$.

Mark breakdown for the presentation assignment:

Individual Grade	24.5 marks
Group Grade (Presentation)	6.3 marks
Group Grade (Poster)	4.2 marks
Evaluation of Group members	(only applicable if all group members do not contribute equally)
Total	35 marks

In summary, overall mark (/35) = Overall Group Mark (x0.3) + Individual Mark (x0.7) x Group Evaluation.

Meetings between student presentation groups and instructor. Will be scheduled according to the specific available time of the participants.

Last Day to Drop Course

The final day to drop Fall 2024 courses without academic penalty is the last day of classes: November 29

After this date, a mark will be recorded, whether course work is completed or not (a zero is assigned for missed tests/assignments). This mark will show on the student's transcript and will be calculated into their average.

Course Grading Policies

Submission of Assignments

Lab quizzes are to be submitted at the end of the lab session.

Student presentation materials are due **48 hours before** the date of the presentation.

Late Assignment

Lab quizzes will not be accepted after the lab session ends.

If you choose to submit assignments to the **Dropbox** tool late, the full allocated mark will be reduced by 5% per day after the deadline for the submission of the assignment to a limit of six days at which time access to the **Dropbox** folder will be closed.

Extensions will be considered for medical reasons or other extenuating circumstances. If you require an extension, discuss this with the instructor as soon as possible and well before the due date. Barring exceptional circumstances, extensions will not be granted once the due date has passed. These rules are not designed to be arbitrary, nor are they inflexible. They are designed to keep you organized, to ensure that all students have the same amount of time to work on assignments, and to help return marked materials to you in the shortest possible time.

Please note that these policies are binding unless academic consideration is given to an individual student.

Course Standard Statements

During the course, your instructor will interact with you on various course matters on the course website using the following ways of communication:

Announcements

The instructor will use **Announcements** on the Course Home page to provide you with course reminders and updates. Please check this section frequently for course updates from your instructor.

Email

If you have a conflict that prevents you from completing course requirements, or have a question concerning a personal matter, you can send your instructor a private message by email. The instructor will attempt to respond to your email within 24 hours.

Meetings

If you have a complex question you would like to discuss with your instructor, you may attend designated office hours, or book an in-person meeting or video meeting on Teams (or alternate platform being used by your instructor). Video meetings depend on availability and are booked on a first come first served basis.

Statement on the use of AI

Students' work must reflect their unique intellectual capacity and demonstrate the application of critical thinking and problem solving. Therefore, the use of AI (e.g., Chat GPT) to complete any form of assessment is not permitted in this course. Submission of materials completed by AI constitutes an offence under the University's academic misconduct policies, either as a form of plagiarism or the use of unauthorized aids.

Statement on Inclusive Verbiage

This class is founded on an environment of mutual respect. All students are encouraged to share, engage in discussion, and learn from one another. Respect will be a requirement for participation in this course. In line with respecting others, we will use the names and pronouns that members of this class ask for us to use in reference to them. Please share with the instructors and/or the class (as you feel comfortable) the name(s) and pronouns you would like for us to use for you, if they ever differ from information available to us on CourseLink.

Standard Statements for Undergraduate Courses

Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-misconduct/>) is outlined in the Undergraduate Calendar.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to make a booking at least 10 days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website. (<https://www.uoguelph.ca/sas/>)

Accommodation of Religious Obligations

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements.

See the Academic calendar for information on regulations and procedures for Academic Accommodations of Religious Obligations (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-accommodation-religious-obligations/>).

Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all undergraduate students except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in the Undergraduate Calendar - Dropping Courses (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/dropping-courses/>).

Email Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly. e-mail is the official route of communication between the University and its students.

Health and Wellbeing

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (<https://wellness.uoguelph.ca/>). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator (<https://wellness.uoguelph.ca/navigators/>) who can help develop a plan to manage and support your mental health or check out our mental wellbeing resources (<https://wellness.uoguelph.ca/shine-this-year/>). The Student Wellness team are here to help and welcome the opportunity to connect with you.

Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

Recording of Materials

Presentations that are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The Academic Calendars (<http://www.uoguelph.ca/registrar/calendars/?index>) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the Undergraduate Calendar for information on regulations and procedures for Academic Consideration. (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/>)