



ANSC*4050 - Biotechnology in Animal Science

Fall 2026 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

Lecture Schedule

TuTh 11:30am-12:50pm in MCKN*121 (9/10 to 12/22)

Lab / Seminar Schedule

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

Instructor Information

Julang Li

Instructor

Email: jli@uoguelph.ca

Thomas Hicks

TA

Email: hickst@uoguelph.ca

Sean Sousa-Kirpaul

TA

Email: ssousaki@uoguelph.ca

Learning Resources

Required Resources

Course 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.

Campus Resources

If you are concerned about any aspect of your academic program: Make an appointment with a Program Counsellor (<https://www.uoguelph.ca/uaic/programcounsellors>) in your degree program. If you are struggling to succeed academically: There are numerous academic resources offered by the Learning Commons (<https://www.lib.uoguelph.ca/using-library/spaces/learning-commons>) including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills.

Cost of Textbooks and Learning Resources

Textbook / Learning Resource	Required / Recommended	Cost
N/A		N/A

Students are advised that prices are often determined by the publisher or bookstore and may be subject to change.

Field Trip Fees

For those courses in the Department of Animal Biosciences that have a field trip component - an associated fee for each field trip in the amount of \$20 will apply. Further details on how these fees will be collected will be provided in class/on CourseLink; along with a waiver form that will need to be completed prior to the trip(s).

Library Course Reserve (Ares)

For this course, you will be required to access course reserve materials through the University of Guelph McLaughlin Library. To access these items, select **Ares** on the navbar in CourseLink. Note that you will need your Central Login ID and password in order to access items on reserve. For further instructions on accessing reserve resources, visit [How to Get Course Reserve Materials \(https://www.lib.uoguelph.ca/find/course-reserves-ares/\)](https://www.lib.uoguelph.ca/find/course-reserves-ares/).

If at any point during the course you have difficulty accessing reserve materials, please contact the e-Learning Operations and Reserve Services staff at:

Tel: 519-824-4120 ext. 53621 | Email: libres2@uoguelph.ca | Location: McLaughlin Library, First Floor, University of Guelph

Course Level Learning Outcomes

By the end of this course, successful students will be able to:

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, microbial hosts for recombinant protein production and animal transgenesis.
2. Acquire applicable laboratory experience by performing some basic biotechnology-related experiments
3. Evaluate the scientific, ethical, and societal aspects of emerging biotechnology applications through evidence-based discussion and critical engagement with current issues in the field.
4. Design and justify experimental approaches to investigate applications of biotechnology in animal science, using appropriate scientific reasoning and evidence

Lab / Seminar Schedule

The lab sessions will be at Room 110, ANNU building

Lab 1: October 14: experiment

Lab 2: October 21: experiment

Lab 3: October 28: experiment



Teaching and Learning Activities

Weekly Activities

Tentative schedule:

Week 1: Introduction, and history of biotechnology

Week 2: Principles underlying gene expression regulation

Week 3: Fundamental concepts and principle of recombinant DNA and biotechnology

Week 4: DNA library, virus vector, plasmid vector and applications

Week 5: Microorganisms as hosts for recombinant protein expression and detection, feed and nutrient improvements using a biotechnology approach

Week 6: Recombinant yeast, animal cloning, principles of transgenesis

Week 7-8: Gene editing and applications of transgenic animals, in animal and biomedical science

Week 9-10: Principal concepts and current research in stem cell biology and relevant applications, gene/cell therapy

Week 11-12: Molecular agriculture, Intellectual property regulation and policy, student poster presentations

Week 13: Introduction of nanotechnology and its application, dog cloning, summary

Assessment Breakdown

Description	Weighting (%)	Due Date
Midterm (in person)	20%	October 29 (LockDown Browser – Respondus) and in person
Class participation and discussion	22%	during classes, see details in course link
Lab quizzes	12%	October 14, 21, 28
Final exam	46%	TBD (LockDown Browser – Respondus) and in person

Grading Schemes

Quizzes 12%

There will be 3 lab quizzes, which accompany the 3 labs in this course. Each quiz makes up 4% of the final grade, for a total of 12%. Lab quizzes are to be completed during the scheduled lab time.

Course Learning Outcomes Assessed: 2

Midterm 20%

The midterm is completed during class time and will assess the content taught before midterm.

Course Learning Outcomes Assessed: 1

Class Participation and Discussion 22%

Students are expected to be present, share their perspectives, and actively engage in class and discussions on topics drawn from the weekly lecture content. Questions are designed to connect core biotechnology concepts to real-world scientific, ethical, and policy contexts, and all contributions are valued. Participation is recorded throughout the semester, with grades reflecting both frequency and quality of engagement. Below are the breakdowns:

For class participation (14%):

1. Multiple-choice questions will be posted during lectures. Using our class App to respond to the questions will indicate your **attendance**; you are awarded if you respond every time during the semester. (9%)

Students who are unable to attend a particular class with a valid reason can email our TA, Sean (ssousaki@uoguelph.ca), to explain their absence. Students will receive a 50% mark for that attendance if they communicate their absence, compared to those who do not, who will receive a 0 mark.



1. If your answers to these questions are correct. (5%)

For class discussion (8%):

Questions designed to connect core biotechnology concepts to real-world scientific, ethical, and policy contexts will be posted ahead of time and discussed during class. Students are encouraged and expected to share their perspectives and actively engage in class discussions. Discussion will be held in two formats:

1. During class: questions will be asked and discussed during lecture time.
2. Smaller group discussion: These discussions will be held during specific dedicated classes in small groups, so everyone has opportunities to speak in a group size they prefer.

Students will form groups of 6-10 students and think about the posted question. Students will then have 10 minutes to confer/debate/ideate amongst themselves before being asked to each individually share their opinion with a circulating TA and the groupmates. Students must provide a comprehensive/thoughtful answer to receive full marks. This will repeat twice more for a total of 3 questions pondered per class. Each successfully answered question will award a student 1 mark, for a total of 3 marks per class. There will be two of these sessions in total, making up 6% of the final grade.

Students who consistently raise their hands in class to respond or ask questions are rewarded for their participation at the end of the semester. (2%).

Course Learning Outcomes Assessed: 1,3

Final Exam 46%

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

Course Learning Outcomes Assessed: 1,4

Last Day to Drop Course

The final day to drop Fall 2026 courses without academic penalty is the last day of classes: December 04

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.

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.

Course Standard Statements

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

Courselink

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. More details regarding the specific requirement and date will be posted in the courselink contents, and class slides.

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 /TAs 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.

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 business days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). 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/>)