PLNT2530 Plant Biotechnology

2024 COURSE INFORMATION

INSTRUCTORS

Dr. Brian Fristensky
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OFFICE HOURS: 12:30 - 3:00 p.m. Mon., Wed.

Teaching Assistants:

Tarin Farhana

COURSE OBJECTIVE

An introduction to current biotechnological techniques, including recombinant DNA, plant tissue culture, plant transformation and regeneration and bioinformatics. A background to the techniques as well as a discussion of their applications in current biology and crop production will be examined. A laboratory will provide first hand experience with many of the techniques. Not to be held with the former 039.450. Prerequisites: CHEM 2360 or MBIO2360 or CHEM 2770 (or 002.277) or MBIO 2770 (or 060.277) and PLNT 2520 (or 039.252) or BIOL 2500 or the former BOTN 2460 (or 001.246).

Lectures

MWF, 11:30 - 12:20 Location: Animal Science 107

TEXTBOOKS AND LECTURE NOTES

There is no required textbook. All lecture notes will be available on the course web site.

WWW SITE

Most course materials can be obtained at our Web site:
http://home.cc.umanitoba.ca/~frist/PLNT2530

ACADEMIC INTEGRITY

All work is to be completed independently by the student unless otherwise specified. Students are

reminded that academic dishonesty including plagiarism, cheating and examination impersonation is subject to severe academic penalties as described the University Policies on Academic Integrity. All work submitted for assignments, lab reports or exams is presumed to be the work of the student. Use of Artificial Intelligence for composing written submissions or as a source of information, unless explicitly requested by the instructor, is considered a violation of academic integrity.

EVALUATION PROCEDURE

Assignments (4 @ 5% each)	20 %	Due dates for assignments will given for each assignment. Grades on assignments handed in late will be decremented by one point per day late, for a maximum of 5 points. No assignments will be accepted after answers are discussed in class.
Midterm	20 %	In class
Laboratory	20 %	Lab reports due as outlined in lab manual. Lab data can be shared and discussed but all reports must be written independently. Late reports will lose 20% per day late. (Reports submitted 5 days late will receive no marks.) The lab portion of the course must be passed to pass the course.
Final Examination	40 %	The final exam will cover the second half of the course, ie. material covered after the midterm. However, it is worth reviewing material from the first half, because the later material depends upon these technologies. Final examination date, time and location will be scheduled by the instructor.

Grading is according to the Letter Grade System (Undergraduate Calendar section 2) ranging from 0 to 4.5 or F to A+. Roughly speaking, a C corresponds to understanding of a large portion of the material, the B range encompasses mastery of most of the material, and the A range indicates original thinking and creativity. Put another way:

Grade Point	Letter Grade	Meaning	comments
4.5 (90 - 100%)	A+	Exceptional	synthesis, ability to put things together from different parts of the course, original and creative thinking
4.0 (80 - 89%)	A	Excellent	
3.5 (70 - 79%)	B+	Very good	learning concepts or inferring them from the context; working with data eg. Given the results of an experiment, what
3.0 (60 - 69%)	B	Good	

			does it tell you? Given an equation, can you use it correctly?
2.5 (50 - 59%)	C+	Satisfactory	memorization of facts
2.0 (40 - 49%)	C	Adequate	
1.5 (30 - 39%)	D+	Marginal	
1.0 (20 - 29%)	D	Marginal	

This grading rubric should only be taken as a rough guide for how I construct assignment and exam questions. Not all questions and assignments can be precisely broken down in this fashion. How you answer the question is also important. Answers that use complete sentences with precise terminology and organized into coherent paragraphs, will be awarded more points than answers that do not have an obvious organization or do not express ideas in a clear, precise way. Communication is an important part of the scientific method.

LATE SUBMISSION POLICY

Due dates for assignments will given for each assignment. Grades on assignments handed in late will be decremented by one point per day late, for a maximum of 5 points. No assignments will be accepted after answers are handed out or discussed in class.

FINAL EXAMINATION TIME AND LOCATION SCHEDULED BY THE UNIVERSITY

Voluntary Withdrawal

Students will have their grades for at least two assignments and the midterm exam before the University VW date. When considering a VW, students should be aware that if you withdraw from a course, you may be given a lower priority in registering for that course in subsequent academic terms.

Student Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services

http://umanitoba.ca/student/accessibility/index.html
520 University Centre
204 474 7423
Student_accessibility@umanitoba.ca

Policy and Resource Document (Schedule A)

Students should familiarize themselves with University policies regarding academic integrity, student discipline, and respectful learning environment, for example, and on academic and student supports that are available, including a statement regarding mental health with referral information to the Student Counseling Centre and University Health Services. A summary of this information can be found at http://umanitoba.ca/centre-advancement-teaching-learning/sites/centre-advancement-teaching-learning/files/2021-05/Text-for-Schedule-A-ROASS-July-27-2020.pdf.

Recording Class Lectures

No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission of the Instructor. Course materials (both paper and digital) are for the participant's private study and research.

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Course Technology

It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. The student can use all technology in classroom setting only for educational purposes approved by instructor and/or the University of Manitoba Student Accessibility Services. Student should not participate in personal direct electronic messaging / posting activities (e-mail, texting, video or voice chat, wikis, blogs, social networking (e.g. Facebook) online and offline "gaming" during scheduled class time. If student is on call (emergency) the student should switch his/her cell phone on vibrate mode and leave the classroom before using it. (©S Kondrashov. Used with permission)

PLNT2530 PLANT BIOTECHNOLOGY

2024 COURSE OUTLINE

Jan. 8, 10	2	**Overview of Course, Introduction** **1. Plant regeneration through tissue culture**
Jan. 12	3	**2. Review of nucleic acids**
Jan. 15 (Web)		Bioinformatics I - Introduction to Linux
Jan. 17, 19		**2. Review of nucleic acids** (cond.)
Jan. 22, 24, 26	3	**3. Methods of DNA manipulation**
Jan. 29, 31	2	**4. Nuclear Gene Structure and Expression**
Feb. 2, 5	2	**5. Genomes: Organization and Comparisons**
Feb. 7, 9, 12	3	**6. Gene Cloning, Mapping and Sequencing** A. Vectors B. Libraries (cDNA, Genomic) C. Gene isolation based on a known gene product
Feb. 14	1	**6. Gene Cloning, Mapping and Sequencing** D. Gene isolation when the gene product is unknown
Feb. 16 (Web)		Bioinformatics II: Searching for and retrieving sequences from NCBI
Feb. 19 -23		**Winter Term Break**
Feb. 26	1	D. Gene isolation when the gene product is unknown (cond.)
Feb. 28		Mid Term Exam
Mar. 1		**6. Gene Cloning, Mapping and Sequencing (cond.)** E. DNA Sequencing
Mar. 4, 6	2	**7. Genomics, Transcriptomics, Proteomics, Metabolomics**
March 8, 11, 13	3	**8. Genetic Engineering - Plant Transformation** A. *Agrobacterium* B. Direct gene transfer (biolistic, electroporation) C. Factors influencing expression of transgenes

March 15 (Web)	1	Bioinformatics III - Simulated Cloning
Mar. 18	1	9. Genome Editing
Mar. 20, 22, 25	3	**10. Applications of Genetic Engineering in Plants** A.Herbicide tolerance genes in weed control B. Insecticidal proteins
Mar. 27		**10. Applications of Genetic Engineering in Plants (cond.)** C. Novel proteins
Mar. 29		**Good Friday (University closed)**
Apr. 1 (Web)	1	Bioinformatics IV - In-silico cloning of genes by PCR
Apr. 3, 5	2	**10. Applications of Genetic Engineering in Plants (cond.)** D. Novel traits
April 8, 10	2	**11. Substantial Equivalence**
		FINAL EXAM - TBA

Hints for printing lectures: When printing the PDF, print in portrait orientation, 2 pages per sheet.