PLNT4610/PLNT7690 Bioinformatics

2023 COURSE INFORMATION

INSTRUCTOR

Dr. Brian Fristensky Office: 330 Agriculture Tel: 474-6085
Email: brian.fristensky@umanitoba.ca
OFFICE HOURS: 2:30 - 4:00 Tuesday, Thursday

COURSE DESCRIPTION

An introduction to the theory, strategies, and practice of data management and analysis in molecular biology. Topics include DNA and protein sequence analysis, biological databases, genomic mapping, and analysis of gene expression data. Prerequisites: PLNT 2530 (039.253) or the former 039.450 or PLNT 3140 (039.314) or MBIO 3410 (060.341) or PLNT 4310 or the former PLNT 4540 or consent of instructor.

By the end of the course, students should

- have a basic skill set that would allow them to work in large scale, collaborative projects that demand network-based data-sharing
- be familiar with the major types of analytical methods available for working with sequences, databases, phylogenomic data, genomic, and gene expression data.
- understand how to use the computer to do *in-silico* experiments, that is, to test hypotheses using their own data and data from databases

LECTURES AND LABS

Lectures and Lab: 8:30 - 9:45 Tuesday, Thursday, Agriculture 137

All required readings are on the course web site unless announced otherwise.

WWW SITE

Most course materials are available online at either of two URLs:
http://home.cc.umanitoba.ca/~frist/PLNT4610
http://home.cc.umanitoba.ca/~frist/PLNT7690

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 CRITERIA

This course is dual-numbered as both a graduate and undergraduate course. Assignments, exams, and presentations are apportioned somewhat differently, between the two.

Assignments: 3 @ 20% each Assignments will be designed to test both understanding of theory and the ability to apply theory to a specific problem. Up to four assignments may be handed in, but only the top three grades will count. Students will post completed assignments to their web sites for viewing by the instructor. Examples of possible topics include: • comparative genomics • genome organization • phylogeny of a multigene family • creation a database relating to an area of your own interest • data pipelines	60%
Mid-term examination	20%
Final examination	20%
TOTAL	100 %

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

4.0 (80 - 89%)	A	Excellent	course, original and creative thinking
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 does it tell you? Given an equation, can you use it correctly?
3.0 (60 - 69%)	B	Good	
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 4 points per day late, for a maximum of 20 points (ie. the total value of the assignment).

MISSED EXAMS OR COURSEWORK DUE TO ILLNESS

Students who are unable to meet a course requirement due to medical circumstances are currently not required to submit medical notes. However, students are required to contact their instructor or academic advisor by email to inform of the missed work and to make arrangements for extensions, deferrals, or make-up assignments. Please follow these guidelines if you are unable to meet an academic requirement for your courses.

- Contact your instructor for term work such as a class, quiz, midterm/test, assignment, lab
- Contact an advisor in your faculty/college/school of registration for a missed final exam (scheduled in the final examination period);

- Inform your instructor/advisor as soon as possible do not delay. Note for final exams, students must contact within 48 hours of the date of the final exam; and
- Email your instructor/advisor from a U of M email address, and include your full name, student number, course number, and academic work that was missed.

Be advised that only the Dean's Office – not individual instructors or Departments – is in a position to grant deferred examinations. No student may write a final examination at a time other than that prescribed by the Registrar's Office without the knowledge of the Dean's Office. This is to protect instructors and ensure fairness among all students.

Grade Appeals

If you have questions about your grades, talk to your instructor. There is a process for term work and final grade appeals. Note that you have the right to access your final examination scripts. See the Registrar's Office (https://umanitoba.ca/registrar/grades/appeal-grade) for more information including appeal deadline dates and the appeal form.

Voluntary Withdrawal - VW Date: Nov. 21, 2023

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-supports/accessibility/
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 Counselling Centre and University Health Services. A summary of this information can be found at

Schedule "A": Policies and Resources

Contingency Plan in the Event of Instructor Illness

The Department of Plant Science in consultation with the Faculty of Agricultural and Food Sciences has devised a plan so that there is minimal impact on the delivery and content of the course, should the instructor fall sick and is unable to contnue lectures in-person. Please be assured that the alternative plan outlining any deviation from the normal mode of instruction will be communicated to you as quickly as possible if/when the need arises.

Respectful Work and Learning Environment

The University is committed to a respectful work and learning environment. You have the right to be treated with respect and you are expected to conduct yourself in an appropriate and respectful manner. Policies governing UM community behaviour include:

- Respectful Work and Learning Environment (https://umanitoba.ca/about-um/respectful-work-and-learning-environment-policy)
- Student Discipline (https://umanitoba.ca/governance/governing-documents-students#student-discipline)
- Violent or Threatening Behaviour (https://umanitoba.ca/governance/governing-documents-students#violent-or-threatening-behaviour)

The UM website, Engaging in Respectful Conduct (https://umanitoba.ca/student-supports/respectful-conduct), includes more details about expectations for behaviours related to university activities.

Sexual Violence Policies

The UM has several policies and procedures that deal with the rights and responsibilities of the University community with regards to all forms of sexual violence. For a comprehensive list of policies and associated resources, visit the Sexual Violence Resource Centre's information page (https://umanitoba.ca/student-supports/sexual-violence-support-and-education/sexual-violence-get-informed). Please note that there are many supports available in addition to these policy documents (see UM Learner Supports).

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.

Copyright

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)

PLNT4610/PLNT7690 BIOINFORMATICS

COURSE SCHEDULE - 2023

Unit	Date(s)	Topic
		I. The computer as the ultimate general-purpose tool
1	Sept. 7 Sept. 12	Information-driven science Cloud-based computing with Linux
2	Sept. 14 Sept. 19	Creating a web site with HTML
		II. DNA and protein sequence analysis
3	Sept. 21, 26	Working with DNA and protein sequence data
4	Sept. 28, Oct. 3	Pairwise sequence similarity searches
5	Oct. 5 Oct. 10	Database Similarity Searches
6	Oct. 12 Oct. 17	Multiple sequence alignment
	Oct. 19	Mid-term exam (Units 1 - 6)
7	Oct. 24 Nov. 26	Phylogenetic analysis
		III. Biological Databases and the Cloud
8	Oct. 31, Nov. 2	Flatfile, relational, and object-oriented databases
	Nov. 7	Flatfile, relational, and object-oriented databases (cond.)
9	Nov. 9	The Object-Oriented Web, High Performance Computing

	Nov. 13 - 17	Fall break
		IV. Genomics and Transcriptomics
10	Nov. 21, 23	Genome assembly
11	Nov. 28	Genome annotation
12	Nov. 30 Dec. 5	Transcriptomics
		Final exam TBA
The dates and content of lectures listed above may change as the course progresses.		

This schedule is subject to change at the discretion of the instructor and/or based on the learning needs of the students but such changes are subject to Section 2.8 of the – ROASS- Procedure.

Send questions or comments on this web site to *frist@cc.umanitoba.ca*