Department of Computer Science

176 Thorvaldson Building
110 Science Place, Saskatoon, SK, S7N 5C9, Canada
Telephine: (306) 966-4886, Facimile: (306) 966-4884

CMPT 830-01
Fall 2019–2020

UNIVERSITY OF SASKATCHEWAN

Course Syllabus
CMPT 830: Bioinformatics and Computational Biology

Catalogue Description

Provides an in-depth algorithms-based introduction to major concepts and techniques in bioinformatics. Topics include algorithms for structure prediction and similarity, sequence similarity and alignment, phylogenetics, comparative genomics, expression analysis, database searching, artificial life, and biological computation.

Prerequisite(s):	Either a previous bioinformatics course, or at least 6 credit units of previous course work in each of computer science, statistics, and the life sciences. Should you not have these, please talk to the instructor.
Class Time and Location:	Tuesday, Thursday, 10:00-11:20, GEOL 269
Website:	https://moodle.cs.usask.ca/course/view.php?id=779

Instructor Information

Instructor	Ian McQuillan
Contact:	Email: mcquillan@cs.usask.ca,
	Phone: 966-2900
	Location: Thorv S423 (in the Spinks Addition),

The course objectives include:

- gaining comfort with interdisciplinary studies, computer science and mathematics applied to the life sciences;

- learning to use online tools and databases and various bioinformatics programs, while interpreting results and generating conclusions;

- understanding how to adjust parameters for programs and their effect on results, and recognizing better parameters based on context;

- understanding and manipulating sequence information in different file formats using computers;

- solving small programming tasks as applied to bioinformatics;

- understanding bioinformatics algorithms.

The following topics indicate the tentative areas to be covered:

- introduction to bioinformatics,

- algorithms,

- Python (a programming language),

- sequence alignment,

- phylogenetic trees,

- protein structure,

- RNA secondary structure,

- microarrays,

- mass spectrometry,

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- hidden Markov models,

- Lindenmayer systems,

- Information theory in natural computing.

Student Evaluation

Grading Scheme

There will be 2 assignments, to be completed on an individual basis. There will be a final (take-home) exam whose date has yet to be scheduled. There will be a project to be done individually. The topic must be relevant to bioinformatics, chosen by the student and approved by the instructor. The project will consist of both an oral presentation and a written paper.

Assignments	25%
Class Project	40%
Final Exam	35%
Total	100%

Criteria That Must Be Met To Pass

The class project and the final exam are required elements of the class.

Textbook Information

There is no required textbook for the class. Certain books that are good suggested reading would be:

- *Bioinformatics and Functional Genomics*, third edition, by Jonathan Pevsner, 2015, published by Wiley-Blackwell.

- *Understanding Bioinformatics* by Zvelebil and Baum, 2007, published by Garland Science.

- *Concepts in Bioinformatics and Genomics* by Momand and McCurdy, 2017, published by Oxford University Press.

- *Practical Computing for Biologists* by Haddock and Dunn, 2011, published by Sinauer Associates

- *Introduction to Computational Molecular Biology* by Setubal and Meidanis, PWS Publishing, 1997. Library Call No. QH506 .S4893 1997.

- *Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology* by Gusfield, Cambridge University Press, 1997. Library Call No. QA76.9 .A43G87.

- *Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins* by Baxevanis and Ouellette, Wiley-Interscience, 2005. Library Call No. QP620.B575 2005.

- *Fundamental Concepts of Bioinformatics* by D. E. Krane and M. L. Rayner, 2003, Benjamin Cummings. Library Call No. QH324.2 .K72 2003.

Policies

Late Assignments

Late assignments will be accepted, though they will be docked a penalty. The penalty will grow exponentially with the number of days late. Individual requests for extensions based on medical grounds will require suitable documentation. As a general rule, extensions on compassionate grounds will only be considered if made prior to the due date of the assignment.

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Missed Examinations

Students who miss an exam should contact the instructor as soon as possible. If it is known in advance that an exam will be missed, the instructor should be contacted before the exam.

Incomplete Course Work and Final Grades

"When a student has not completed the required course work, which includes any assignment or examination including the final examination, by the time of submission of the final grades, they may be granted an extension to permit completion of an assignment, or granted a deferred examination in the case of absence from a final examination.

Extensions past the final examination date for the completion of assignments must be approved by the Department Head, or Dean in non-departmentalized Colleges, and may exceed thirty days only in unusual circumstances. The student must apply to the instructor for such an extension and furnish satisfactory reasons for the deficiency. Deferred final examinations are granted as per College policy.

In the interim, the instructor will submit a computed percentile grade for the class which factors in the incomplete coursework as a zero, along with a grade comment of INF (Incomplete Failure) if a failing grade.

In the case where the student has a passing percentile grade but the instructor has indicated in the course outline that failure to complete the required coursework will result in failure in the course, a final grade of 49% will be submitted along with a grade comment of INF (Incomplete Failure).

If an extension is granted and the required assignment is submitted within the allotted time, or if a deferred examination is granted and written in the case of absence from the final examination, the instructor will submit a revised assigned final percentage grade. The grade change will replace the previous grade and any grade comment of INF (Incomplete Failure) will be removed.

A student can pass a course on the basis of work completed in the course provided that any incomplete course work has not been deemed mandatory by the instructor in the course outline and/or by College regulations for achieving a passing grade." (http://policies.usask.ca/policies/academic-affairs/academic-courses.php)

For policies governing examinations and grading, students are referred to the Assessment of Students section of the University policy "Academic courses: class delivery, examinations, and assessment of student learning" (http://policies.usask.ca/policies/academic-affairs/academic-courses.php)

Academic Honesty

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals subsection of the University Secretary Website and avoid any behaviour that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct,
http://www.usask.ca/university_secretary/honesty/StudentAcademicMisconduct.pdf,
as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals,
http://www.usask.ca/university_secretary/honesty/StudentNon-AcademicMisconduct2012.pdf.

Academic honesty is also defined and described in the Department of Computer Science statement on Academic Honesty:
http://www.cs.usask.ca/students/academic-honesty/index.php.

For more information on what academic integrity means for students see the Student Conduct & Appeals subsection of the University Secretary Website at:
http://www.usask.ca/university_secretary/pdf/dishonesty_info_sheet.pdf

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Examinations with Access and Equity Services (AES)

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Access and Equity Services (AES) if they have not already done so. Students who suspect they may have disabilities should contact AES for advice and referrals. In order to access AES programs and supports, students must follow AES policy and procedures. For more information, contact AES at (306) 966-7273 or aes@usask.ca, or visit the AES website at https://students.usask.ca/aes.

Students registered with DSS may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through DSS by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by DSS.

Student Supports

The Student and Enrolment Services Division (SESD) focuses on providing developmental and support services and programs to students and the university community. For more information, see the SESD web site http://www.usask.ca/sesd/.

Student Learning Services (SLS) offers assistance to U of S undergrad and graduate students. For information on specific services, please see the SLS website at http://library.usask.ca/studentlearning/.

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