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THE UNIVERSITY OF WESTERN ONTARIO

DEPARTMENT OF COMPUTER SCIENCE
LONDON   CANADA

Computer Science 9832a
Topics in Bioinformatics
(CS4463a Computational Biology)
Course Outline – September 2022

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Course Information

Course Information

Course Name:	CS9832a 2022 and CS4463a 2022
Class Meetings:	Wednesday 3:30-5:30pm
Location:	MC320

Prerequisites

Computer Science 3331, 3340.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Instructor Information

Instructor

Dr. KaiZhong Zhang, 372 Middlesex College, Tel: 519 661-3826, Email: kzhang<at>uwo.ca.

Students must use their Western (@uwo.ca) email addresses when contacting the instructors.

Office hours: TBA in Zoom.

Course Description

Bioinformatics studies biological problems using biological, computational, and mathematical methods. Computational biology studies computational techniques that can solve biological problems efficiently. This course covers some selected topics from Bioinformatics research.

Topics

The topics are drawn from the following lists:

- Pairwise sequence alignment with affine gap penalty.

- Multiple sequence alignment with affine gap penalty.

- Phylogeny

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- Neighbour-joining algorithm for phylogenetic tree construction.

- Tree comparison algorithms.

- RNA structure alignment algorithms.

- Sequence assembly

- Hidden Markov models

- RNA secondary structure prediction by minimum energy folding.

- Protein peptide de novo sequencing.

- Normalized similarity and distance

Delivery Mode

Lectures will be delivered in person.

Key Sessional Dates

Class Begin:	Thursday, September 8, 2022
Thanks Giving:	Monday, October 10, 2022
Fall Reading Week:	October 31 – November 6, 2022
Class End:	Thursday, December 8, 2022
Exam Period:	December 10 – 22, 2022

Contingency Plan for an In-Person Class Pivoting to 100% Online Learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, affected course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will not change. Any remaining assessments will also be conducted online as determined by the course instructor.

Course Materials

Recommended Textbook

M. S. Waterman, *Introduction to computational biology*, Chapman & Hall, 1995.

R. Durbin, S.R. Eddy, A. Krogh, and G. Mitchison, *Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids*, Cambridge University Press, 1998.

P.A. Pevzner, *Computational Molecular Biology: An Algorithmic Approach*, MIT Press, 2000

Course Website

The CS9832a and CS4463a website is at **http://owl.uwo.ca/portal**.

Lecture notes, assignments and class information will be posted on this website.

Students are responsible for checking the course OWL site (http://owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Lecture Notes

Most of the course notes will be available online through the course OWL web site. Students are cautioned, however, that getting course notes is not a sufficient substitute for attending lectures.

Technical Requirements

Completion of this course will require you to have a reliable internet connection and a computer with working microphone and webcam that meets the system requirements for Zoom.

Online Conduct:

All of the remote learning sessions for this course may be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals participating in the course for their private or group study purposes. Please contact the instructor if you have any concerns related to session recordings.

All Zoom contact will require that your video is turned on and that you can be seen by the instructor. Not only is this a simple curtsey and the standard of Zoom classes, but it allows for a positive interaction.

Methods of Evaluation

There are three components that will be used for the evaluation.

- Assignments, worth 40%

- Project presentation, worth 30%

- Project final report, worth 30%

To achieve a final mark higher than 50% in the course the mark for each individual components must be at least 45%.

There will be no examination for the course.

MMASc students enrolled in this class may have an alternate grading scheme which will form an addendum to the official course outline.

Assignments

There will be two assignments for the course. For each assignment, there will be more advanced questions for graduate students. Assignments will be graded by their correctness, preciseness, clarity, and efficiency.

All assignment are individual assignments. Students may discuss approaches to assignment problems. However, actual work (answering assignment questions, etc.) must be the student's individual effort. Assignments that are judged to be the result of academic dishonesty will be given a mark of zero, and an additional penalty, equal to the weight of the assignment, will be applied. You are responsible for reading and respecting the Computer Science Department's policy on Scholastic Offences and Rules of Ethical Conduct.

The assignments have to be typed. **We do not accept handwritten assignment.** However, you can include handwritten figures, but not text and formula, in your assignment.

Assignment due dates (tentative):

- Assignment 1 – Tuesday, October 4, 2022

- Assignment 2 – Tuesday, November 8, 2022

Late assignments will be accepted for up to three days after the due date. The late penalty of the total mark is 5% for one day late, 25% for two days late, and 50% for three days late. After three days, the penalty will be 100%. Lateness is based on the time the assignment is **received through OWL**, not on the time it was created on student's own computer or his/her Gaul account.

If you have submitted an academic consideration for an assignment, we acknowledge the university policy and the arrangement of the course is that you must provide documentation in the **CS9832 Assignment Academic Consideration Form** or in the **CS4463 Assignment Academic Consideration Form** when you submit your assignment for penalty reduction. If your approved academic consideration is for a few days, you do not need to contact the instructor as long as you include the document with your submission.

The documentation will be in the form of the approved document or email from student services allowing the extension. The teaching assistant grading the assignment will then apply the supplied extension to the grade.

Projects

Each student will participate in a project. The projects will be individual or group depending on the enrolment.

For CS4464a students the projects will be related to the topics covered by lectures. For each project, there will be four components: literature survey, programming, presentation, and report. The presentations will be in class. The presentations should include a brief literature survey, an analysis of the algorithm used for the project, and a explanation and demo of the project programming. The report will be due by the end of the semester.

For CS9832a students, the projects will be related to research topics chosen individually and approved by the instructor. For each project, there will be three components: literature survey, presentation, and essay. The presentations will be in class. The presentations should include a brief literature survey, an explanation of the basic approach of the topic, a brief introduction of the more advanced approach of the topic, and a conclusion. By the end of the semester, there will be an essay due for each project of about fifteen pages. This should be a survey paper on the research topic of the project. If the research topic is related to your current research, then a summary of the current research could also be included.

Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessments worth 10% or more of the overall course grade

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at this website. The Student Medical Certificate is available at this website.

Accommodation and Accessibility

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at this website.

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at: this website.

Academic Policies

The website for Registrarial Services is http://www.registrar.uwo.ca.

In accordance with policy, see this website, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following website: see this link.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (http://www.turnitin.com).

Completion of this course will require you to have a reliable internet connection and a device that meets the system requirements for Zoom. Information about the system requirements are available at the following link: https://support.zoom.us/hc/en-us.

Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: https://www.uwo.ca/sci/counselling/.

Students who are in emotional/mental distress should refer to Mental Health@Western (at this website) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at this website.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessible Education at this website if you have any questions regarding accommodations.

Learning-skills counsellors at the Student Development Centre are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being.

Additional student-run support services are offered by the USC, see this website.