

# THE UNIVERSITY OF WESTERN ONTARIO

DEPARTMENT OF COMPUTER SCIENCE  
LONDON CANADA

## Computer Science 9832a

### Topics in Bioinformatics

#### Course Information – September 2019

#### 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
- 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

#### 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 will 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.

## Recommended Textbook

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

## Suggested Textbook

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 website is at <http://owl.uwo.ca/portal> and <http://www.csd.uwo.ca/courses/CS9832a>. Lecture notes, assignments and class information will be posted on this website. You are responsible for reading this information frequently.

## Lecture Notes

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

## Student Evaluation

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

- Assignments, worth 30%
- Project presentation, worth 30%
- Project final report worth 40%

To achieve a final mark higher than 60% in the course the mark for each individual components must be at least 50%.

There will be no examination for the course.

## Assignments

There will be two assignments for the course. 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.

Late assignments will be accepted for up to three days after the due date, with weekends (Saturday and Sunday) counting as a single day; the late penalty is 5% of the available marks per day.

*Assignment due dates (tentative):*

- Assignment 1 – Wednesday, October 9, 2019
- Assignment 2 – Wednesday, November 13, 2019

## Projects

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

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 one hour in class. 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.

## Accommodation and Accessibility

If you are unable to meet a course requirement due to illness or other serious circumstances, you must follow the university procedures to request academic consideration. Except for submitting a Self-Reported Absence form assuming that the conditions for such submission are met, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at [scibmsac@uwo.ca](mailto:scibmsac@uwo.ca).

For further information, please consult the university's academic considering policy [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic\\_Consideration\\_for\\_absences.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf).

## Academic Policies

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

*University email account*

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, 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.

*Academic offences*

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 site: [http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf). You are also responsible for reading and respecting the Computer Science Department's policy on Scholastic Offenses (<http://www.csd.uwo.ca>

[/current\\_students/undergraduate\\_students/scholastic\\_offences.html](#)) and Rules of Ethical Conduct ([http://www.csd.uwo.ca/current\\_students/undergraduate\\_students/rules\\_of\\_ethical\\_conduct.html](http://www.csd.uwo.ca/current_students/undergraduate_students/rules_of_ethical_conduct.html)).

#### *Use of plagiarism-checking software*

Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence.

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.

#### *Use of cheating-analysis software*

Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

## **Support Services**

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 Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations.

The policy on Accommodation for Students with Disabilities can be found here:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_disabilities.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_disabilities.pdf).

The policy on Accommodation for Religious Holidays can be found here:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_religious.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf).

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) 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.

Students who are in emotional/mental distress should refer to Mental Health@Western ([http://www.health.uwo.ca/mental\\_health](http://www.health.uwo.ca/mental_health)) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.

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

## **Instructor**

Dr. KaiZhong Zhang, 372 Middlesex College, Tel: 519 661-3826, Email: [kzhang@uwo.ca](mailto:kzhang@uwo.ca).

## **Class Meetings**

3:30-5:30pm Thursday, MC 320.