

Western University
Department of Computer Science
CS9668/4438 Internet Algorithmics
Course Outline – Winter 2021

Instructor

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Office hours: Wednesday 3:00 pm - 4:30 pm. Office hours will be held through zoom.

OWL

This is an online course; all course material will be posted to OWL: <http://owl.uwo.ca>. Students are responsible for checking OWL 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 OWL assistance, 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.

Minimum Technical Requirements to Take this Course

- A computer or tablet able to run a recent version of a web browser such as Chrome, FireFox, or Safari,
- a webcam and microphone, and
- reliable high-speed internet connection

In addition to the technology requirements associated with this course, students should also possess a set of computer skills that include: installing software, setting up security and virus protection, managing files/folders, and using the internet using a web browser. Students should know either Java or C.

Course Description

This course focuses on the study of algorithms used for solving problems that arise from the design and use of wide-area networks, such as the Internet. Among the topics that we might cover are:

- Computer networks and internets
- Distributed algorithms for network problems
- Peer-to-peer systems
- The Web Graph and searching for information in the Web
- Caching
- Game Theory

Prerequisites

- A course on algorithm design and data structures.
- Knowledge of Java or C

Course Learning Outcomes

- Achieve a high level understanding of how computer networks and internets work.
- Design distributed algorithms that correctly solve simple problems.
- Analyze distributed algorithms to determine their time and communication complexities.
- Understand efficient algorithms for storing and locating information in peer-to-peer systems.

- Understand efficient algorithms for finding relevant information on the Web.
- Design and analyze caching algorithms that can be used to improve the efficiency of Internet applications.
- Understand how Game Theory can help design efficient Internet applications.
- For graduate students: Deep understanding of a problem arising from the design and use of computer networks and of algorithmic solutions for it.

Reading Material

The material covered in this course will be taken from the following resources.

- Computer Networks and Internets, D. Comer, Pearson.
- Distributed algorithms for message-passing systems, M. Raynal, Springer.
- Distributed algorithms, N. Lynch, Morgan Kaufmann.
- Research papers.

Relevant chapters of above books and research papers will be posted in OWL.

Student Evaluation

Graduate students:

- 3 Assignments worth 50% of the final mark
- Final Project, worth 50% of the final mark.

Undergraduate students:

- 5 Assignments worth 100% of the final mark

Schedule *(Tentative, some of these dates might change)*

All assignments are due at 11:55pm on the date indicated.

- Assignment 1 (all students) due on February 8.
- Assignment 2 (all students) due on February 24.
- Assignment 3 (undergraduate students) due on March 12.
- Assignment 4 (all students) due on March 29.
- Assignment 5 (undergraduate students) due on April 12.
- Project (graduate students) due April 12.

Assignments and Final Project Topics

Assignments and final project topics will be made available in OWL. The availability of assignments will be announced through OWL. Students are responsible for checking their e-mail and the OWL site for this course on a regular basis.

The late penalty for assignments is $[2.5^i]$ (2.5 to the i -th power, rounded to the nearest integer), where $i > 0$ is the number of days you are late. So if you hand in your assignment 1 day late, you

will be penalized 3%, a delay of 2 days will decrease your grade by 6%, 3 days is penalized 16% and 4 days takes 39% off your grade. You cannot be more than 4 days late.

Extensions will be granted only by the course instructor. If you have serious medical or compassionate grounds for an extension, you should take supporting documentation to the office of the Dean of your faculty, who will contact the instructor.

Appeals of Assignment Marks

Appeals of assignment marks should be addressed to the T.A. first. If you and the T.A. cannot agree, then please discuss the situation with the lecturer.

Appeals **must occur within 1 week** from the first day that the marked assignments were made available to students. After that 1 week period has gone by, no more appeals will be considered.

Accommodation and Accessibility

Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the semester, provided the following conditions are met: The absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student's final grade. Students are not able to use the self-reporting option in the following circumstances:

- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student's final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a Self-Reported Absence are met and the student uses the Self-Reported Absence to request accommodation for an assignment, the student will be granted a 48 hours extension on the deadline.

If the conditions for a Self-Reported Absence are not met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.

For policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs, see:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf
and for the Student Medical Certificate (SMC), see:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

If a student receives academic accommodation, depending on the circumstances the instructor will determine whether the missed components will be excused (so that the completed components will be re-weighted) or if deadlines will be extended for submitting the missing academic work. Accommodation for any work missed must be requested to the student's Dean's Office/Academic Counselling unit.

Ethical Conduct

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 Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

Students must write their 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 assignments are individual assignments. You may discuss approaches to problems among yourselves; however, the actual details of the work (assignment coding, answers to concept questions, etc.) must be an individual effort. Assignments that are judged to be the result of academic dishonesty will, for the student's first offence, be given a mark of zero. You are responsible for reading and respecting the Computer Science Department's policy on Scholastic Offences and Rules of Ethical Conduct

https://www.csd.uwo.ca/undergraduate/current/policies/ethical_conduct.html

We use plagiarism checking software to compare student assignment submissions.

Graduate projects can be individual or group projects.

Email Contact and OWL

Students should check OWL (<http://owl.uwo.ca>) and the course's website on a regular basis for news and updates. These sites and email are the primary methods by which information will be disseminated to all students in the class. **Students are responsible** for checking OWL, the course's website and their email messages on a regular basis.

Email messages will be sent to the UWO email address assigned to students by Information Technology Services (ITS), i.e. your email address @uwo.ca. It is each student's responsibility to read this email on a frequent and regular basis, or to have it forwarded to an alternative email address if preferred. See the ITS website for directions on forwarding email.

Students must use their Western (@uwo.ca) email addresses when contacting the instructor. If you send email to the instructor from a commercial account, send a carbon copy (cc) to your UWO email address. The instructors will respond to your UWO address.

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

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:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_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

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: <https://www.uwo.ca/se/digital>.

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

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>.

Please consult the Web site for Registrarial Services (<http://www.registrar.uwo.ca>), and for USC (<http://westernusc.ca/services>) for a list of student support services and programs.