

Western University
Department of Computer Science
CS9668/4446A Internet Algorithmics
Course Outline – Fall 2023

Instructor

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Office hours: Monday 2:30 pm - 4:00 pm. Office hours will be held through zoom.

Lectures: Friday 1:30 pm - 3:30 pm at HSB 35

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 knowledge of another programming language and willingness to learn Java on your own

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 October 4.
- Assignment 2 (all students) due on October 23.
- Assignment 3 (undergraduate students) due on November 8.
- Assignment 4 (all students) due on November 23.
- Assignment 5 (undergraduate students) due on December 7.
- Project (graduate students) due December 7.

Assignments, Project Topics, and Late Penalties

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 penalty for late submissions 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.

TA Consulting Hours (To be posted in course's website)

Contingency Plan for Pivoting to 100% Online Learning

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will not change. Any assessments affected will be conducted online as determined by the course instructor.

OWL

All course material will be posted to OWL: (<http://owl.uwo.ca>). Students are responsible for checking the course OWL site on a regular basis for course material, assignments, news and updates. This is the primary method by which information will be disseminated to all students outside the classroom.

If students need 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.

Technical Requirements to Take this Course

- A computer, laptop, or tablet
- A webcam and microphone, and
- Reliable high-speed internet connection

In addition to the technology requirements associated with this course, you should also possess a set of computer skills that include: installing and executing software, installing security, and virus protection on your computer, managing files/folders on your computer, using the internet using a web browser.

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 (or from an AI bot), 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 the course's OWL site on a regular basis for news and updates. This site and email are the primary methods by which information will be disseminated to all students outside the classroom. **Students are responsible** for checking OWL 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. However, you should note that email at ITS (your UWO account) and other email providers such as hotmail.com or yahoo.com may have quotas or limits on the amount of space they can use. If you let your email

accumulate there, your mailbox may fill up and you may lose important email from your instructors. Losing email that you have forwarded to an alternative email address is not an excuse for not knowing about the information that was sent.

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.

Academic Consideration for Student Absences

Students who experience an extenuating circumstance (like illness or injury) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration. 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

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

The Student Medical Certificate is available at

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

Students should also note that individual 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 must be submitted to the Academic Counselling office of a student's Home Faculty.

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.

Note: missed work can only be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is not sufficient on its own.

Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD), 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:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf,

Academic Policies

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

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

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.

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>

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.

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

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

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

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](mailto:MentalHealth@Western)

<http://www.uwo.ca/uwocom/mentalhealth>

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>.