CS 466/666 – Algorithm Design and Analysis

Spring 2019 course outline

Last updated: 23 April 2019
Course website: https://cs.uwaterloo.ca/~lapchi/cs466

Please note that any term-specific content of this document is decided tentatively at the beginning of the term, and is subject to change. See the course website for current, up-to-date information.

Instructor

Name: Lap Chi Lau
Email: lapchi@uwaterloo.ca
Office: DC 3120

Office hours: Mondays and Wednesdays 1:30-2:30.

Lectures

Mondays and Wednesdays 11:30-12:50, E2 1732.

Tutors

Surname	Given name	Userid	Office hours
Chen	Zhengkun	z283chen	
Deng	Jian	j47deng	
Zhou	Hong	h76zhou	TBA

Course Description

We will study probabilistic techniques in algorithmic design. Particular examples will be chosen from different areas of active research and application.

The lectures will be delivered on the blackboard. All other communications for the course will be made on the course website (for assignment postings) and on the Piazza page for the course (for all other notices and for discussions and questions about the assignments and all other aspects of the course).

Course Text

Course notes will be provided. The following is a list of main references.

- Probability and Computing, by Mitzenmacher and Upfal
- Randomized Algorithms, by Motwani and Raghavan

Posting Lecture Slides and Course Information
The lectures notes, syllabus, and assignments will be posted in the course homepage at https://cs.uwaterloo.ca/~lapchi/cs466.

Announcements and discussions about the course material or assignments will take place on Piazza (piazza.com/uwaterloo.ca/spring2019/cs466).

The current marks will be available to the students throughout the term online via the course's LEARN course site.

Course requirements
Prerequisites: CS 341
Taken a first course in probability.

Evaluation

Assignments	40%
Midterm Exam	20%
Final Exam	40%

Schedule of Exams and Assignment Tentative Due Dates
- Assignment 1: due May 24, 11pm.
- Assignment 2: due June 7, 11pm
- Assignment 3: due June 28, 11pm
- Midterm, June 19, 2018, 7:00-8:50 PM
- Assignment 4: due July 12, 11pm
- Assignment 5: due July 26, 11pm
- Final Exam: to be scheduled by the Registrars' Office

Submitting Assignments
Assignments are due at 11PM and are to be submitted electronically on the school's system (linux.student.cs.uwaterloo.ca).

Students are strongly encourage to typeset their solutions. *Clearly legible* handwritten solutions sets will also be accepted. Marks can be deducted for unclear handwriting.

Late Assignments
- Late submissions will be accepted up to 24 hours after due date.
- There will be a penalty of 10% for accepted late submissions.

You must notify your instructor of any severe, long-lasting problem that prevents you from doing an assignment and submit the current version of the Verification of Illness form, https://uwaterloo.ca/health-services/sites/ca.health-services/files/uploads/files/VIFonline.pdf.

Assignment policy
Students are allowed to collaborate with other students about the assignments. If you collaborate with others, you must clearly indicate the collaboration *for each problem*. Marks will be deducted if you failed to do so.

You are not allowed to use any references other than the course notes and the two main references listed in the course page. Searching for solutions is considered plagiarism. If you happen to find the solution of a problem while reading from some external sources, you must give a proper citation of the source, failing to cite the source properly is considered plagiarism.

In any case, you must write your own solutions, without the help of others and without the use of any references other than the course notes and the three main references.

No Makeup for Midterm
There will be no deferred/makeup midterm exam. Under extenuating circumstances that are pre-approved, where a student is unable to write the mid-term, the instructor will assign a higher weight to student's final exam.

Regrading Request
Requests for regrading will be accepted up to 14 days after students have the opportunity to pick up their assignments or midterm. Details of how to request a regrade will be posted in Piazza after the first assignment is due.

Retention of Assignments and Midterms
Unclaimed midterms and assignments will be retained for one month after the term grades become official in Quest. After that time, they will be destroyed in compliance with UW's confidential shredding procedures.

Topics to be Covered (Tentative)
- Introduction, tail inequalities (2-3 lectures).
- Graph algorithms, approximation algorithms (2-3 lectures).
- Balls and bins, hashing, data streaming (4 lectures).
- Polynomial identity testing, network coding (2-3 lectures).
- Probabilistic methods, local lemma (2-3 lectures).
- Random walks, Markov chain Monte Carlo (6 lectures).

Academic Integrity
In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. All members of the UW community are expected to hold to the highest standard of academic integrity in their studies, teaching, and research. The Office of Academic Integrity's website

(https://www.uwaterloo.ca/academicintegrity) contains detailed information on UW policy for students and faculty. This site explains why academic integrity is important and how students can avoid academic misconduct. It also identifies resources available on campus for students and faculty to help achieve academic integrity in — and out — of the classroom.

Grievance
A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4,
https://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm

Discipline
A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about 'rules' for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offences and types of penalties, students should refer to Policy 71 - Student Discipline, https://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm

Avoiding Academic Offences:
Most students are unaware of the line between acceptable and unacceptable academic behaviour, especially when discussing assignments with classmates and using the work of other students. For information on commonly misunderstood academic offences and how to avoid them, students should refer to the Faculty of Mathematics Cheating and Student Academic Discipline Policy,
https://www.math.uwaterloo.ca/navigation/Current/cheating_policy.shtml

Appeals:
A student may appeal the finding or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals,
https://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm

Note for students with disabilities:
The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.
See http://www.studentservices.uwaterloo.ca/disabilities for more information.