THE UNIVERSITY OF WESTERN ONTARIO

DEPARTMENT OF COMPUTER SCIENCE
LONDON   CANADA

Computer Science 3340b
Analysis of Algorithms
Course Outline – January 2014

Course Description

Algorithms are precisely stated, general problem solving methods suitable for computer implementation. Data Structures are methods of organizing data involved in computation.

Algorithms and data structures are central objects of study in computer science. Once appropriate algorithms and data structures are chosen, all that remains in most computer programs is routine coding. Moreover, algorithms and data structures go hand in hand: neither can be studied fruitfully without knowledge of the other.

The course studies techniques for designing and analyzing algorithms and data structures. The course concentrates on techniques for evaluating the performance of algorithms. The relationship between inductive proof and creative evolution of algorithms is investigated.

Topics

The topics are drawn from the following lists:

- mathematical induction, big O nation, recurrence relations,

- algorithm design techniques: divide and conquer, dynamic programming, greedy algorithms, backtracking,

- searching and sorting, union-find,

- trees, red-black trees,

- string matching and sequence comparison, Huffman codes,

- graph algorithms,

- NP-completeness.

Prerequisites

Computer Science 2210, 2211, Computer Science 2214 or Mathematics 2155.

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.

Required Textbook

T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein, *Introduction to Algorithms* (third edition), The MIT Press and McGraw-Hill Book Company, 2009.

Suggested Textbook

U. Manber, *Introduction to Algorithms*, Addison-Wesley Publishing Company, First Edition, 1990

Course Website

The CS340b website is accessible through OWL: **http://owl.uwo.ca/portal**. 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.

Computing Facilities

Each student will be given an account on the Computer Science Department senior undergraduate computing facility, GAUL. In accepting the GAUL account, a student agrees to abide by the department's Rules of Ethical Conduct.

Email Contact

We may occasionally need to send email messages to the whole class, or to students individually. Email 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.

Student Evaluation

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

- Exams, worth 70%

- Assignments, worth 30%

To obtain a passing mark in the course, the weighted average of the Midterm and Final exam marks must be at least 50%.

In addition, to achieve a final mark higher than 60% in the course the weighted average of the assignment marks must be at least 50%.

Examinations

There will be a Midterm exam and a Final exam. Midterm weights **25%** and final weights about **45%**.

The Midterm exam will be (**tentative**) on Monday March 10 at 9:30-11:20AM. The Final exam will be in April (date and time: TBA). Both exams are closed book; however, students will be allowed to bring in one 8.5 x 11 sheet of notes. No calculators is allowed.

- There will be no makeup Midterm exam, except for students requesting a Special Midterm Exam for religious reasons. These students must have notified the course instructor and filed documentation with their Dean's office at least 2 weeks prior to the Midterm exam.

- If you miss the Midterm Exam for any other reason, follow the procedure for Academic Accommodation for Medical Illness given below. If accommodation is approved by your Dean's office, your Final Exam mark will be reweighted to include the weight of the Midterm Exam. You must notify the course instructor within a week of the missed Midterm exam, and documentation must be received by your Dean's office within 2 weeks of the missed exam.

- Midterm exam marks will be available within 2 weeks of the exam at the latest.

Assignments

There will be three assignments in this course. Assignments will be graded by their correctness, preciseness, clarity, and efficiency. In addition, programming questions are also evaluated by coding styles, comments, etc.

All assignment are individual assignments. Students may discuss approaches to assignment problems. However, actual work (answering assignment questions, coding assignment questions, etc.) must be the student's individual effort.

The standard departmental penalty for assignments that are judged to be the result of academic dishonesty is, for the student's first offence, a mark of zero for the assignment, with an additional penalty equal to the weight of the assignment also being applied. You are responsible for reading and respecting the Computer Science Department's policy on Scholastic Offences and Rules of Ethical Conduct .

The approximate assignment (**tentative**) due dates, level of difficulty, and mark distribution are given below:

- Assignment 1 – Tuesday, January 28, (medium) **10%**

- Assignment 2 – Tuesday, February 25, (medium) **10%**

- Assignment 3 – Tuesday, April 1, (heavy) **10%**

Assignment Submission Policies

All assignments are submitted electronically. Instructions for the submission of assignments will be posted on the course website. It is each student's responsibility to read and follow the instructions.

All assignments are due by 11:59PM of the due date. Late assignments will be accepted for up to five days after the due date, with weekends (Saturday and Sunday) counting as one single day; the late penalty is $2^n\%$, where n is the number of days late. Lateness is based on the time the assignment is received, not the time it was printed.

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.

Programming parts of the assignments must be able to run on departmental equipment.

All materials of an individual assignment must be submitted at the same time.

To guard against the possibility of lost assignments due to system crashes and errors in recording marks, students are advised to retain all assignments disk files that are submitted as well as graded assignments, at least until final marks for the course are posted.

Assignment Marking

Assignments will be marked by the Teaching Assistant's who follow marking schemes provided by the instructor.

Every effort will be made to have assignments marked within two weeks of the submission date, preferably sooner.

You should direct any questions about marking in the first instance to your TA, and then to the course instructor if the discussion with the TA is not satisfactory.

A request for an adjustment of an assignment mark must be made within 2 weeks following the day in which it was first available after marking. All assignment marks are considered to be final after that date.

The marks for all assignments will be posted after they are marked. It is your responsibility to ensure that the marks posted are correct.

Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Academic Accommodation for Medical Illness

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to your Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed.

A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Record's Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here: **http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf**.

In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. For further information please see: **http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf**.

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

Plagiarism: 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.

Support Services

Students who are emotional/mental distress should refer to Mental Health@Western site **http://www.health.uwo.ca/mental_health/index.html** for a complete list of options about how to obtain help.

Instructor

Dr. Kaizhong Zhang,
372 Middlesex College,
Tel: 661-3826, ext. 83826,
kzhang<at>csd.uwo.ca
Office Hours: Tuesday 2:30-4:30pm

Class Meetings

9:30-11:30am Monday, 2:30-3:30pm Wednesday, MC room 105B.

TA Consulting Hours: TBA