Course Information.

Instructor: Shahin Kamali
Lectures: 10:30-11:20 am, Mondays, Wednesdays, and Fridays in EITC E2-165
Office: E2-586
Office hours: 13:00–14:00 am Monday and 10:30–11:30 am Tuesday, in E2 586 or by appointment
Email: shahin.kamali@umanitoba.ca (allow 24 hours for response)

Piazza: We will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates and the instructor. Rather than emailing questions, I encourage you to post your questions on Piazza (this can be done anonymously).
Find our class page at: https://piazza.com/umanitoba.ca/winter2018/comp3170/home

Prerequisites. Analysis of Algorithms (COMP 2080) and Data Structures and Algorithms (COMP 2140). Students are expected to be familiar with intermediate topics in design and analysis of algorithms, data structures, and discrete mathematics (including sorting, searching, big Oh notation, trees, and hash tables) and introductory concepts in logic, set theory, algebra, calculus, and graph theory.

Course Goals and Intended Learning Outcomes. This course exposes students to fundamentals of algorithm design and analysis. By the end of this course, students are expected to be able to:

- understand and quantify why one algorithm is better than another
- apply classic algorithms to specific problems which can benefit from them
- utilize general techniques and design methods to introduce and analyze algorithms for different problems
- recognize NP-complete and undecidable problems.

Course Overview. COMP 3170 is a course on analysis of data structures and algorithms. Students will learn new techniques for solving fundamental algorithmic problems efficiently. Possible topics to be covered include:

asymptotic notations (review)    lower bounds
selection                        computational complexity
balanced search trees            approximation algorithms
skip lists                        graph algorithms
Bionomial heaps                   randomized algorithms
amortized analysis               string matching
disjoint sets
Textbook. The following book is required and is available at the University of Manitoba bookstore:


The following books are useful references available on reserve at the Sciences and Technology Library:


Most Springer publications are available online at SpringerLink through the University of Manitoba Library.

Grading. All students will be required to complete six assignments, two quizzes, a midterm exam, and a final exam. The number of assignments and quizzes may be decreased at the discretion of the instructor. Grades will be calculated according to the following table:

- assignments 30%
- quizzes 10%
- midterm exam 20%
- final exam 40%

Assignments. Assignments will be distributed in class during the term. Solutions must be submitted on Desire2Learn (UMLearn) by the start of class on the due date. To permit the prompt distribution of solutions and return of marked assignments, late assignments will not be accepted. Please include your name and student number on all submitted material.

Examinations. Two quizzes will be given in class. There will be a midterm exam held in class and a final exam held during the April exam period. Exams and quizzes will be closed book.

Important Dates.

- January 3 first class
- January 22 assignment 1 due
- January 31 quiz
- February 9 assignment 2 due
- February 19 assignment 3 due
- February 20–23 midterm break - no class
- February 28 midterm exam
- March 9 assignment 4 due
- March 16 voluntary withdrawal deadline
- March 19 assignment 5 due
- March 14 Pi (π or pie) day
- March 28 quiz
- March 30 Good Friday - no class
- April 4 assignment 6 due
- April 6 last class
- April 9–23 exam period
**Academic Integrity.** The Faculty of Science takes academic integrity very seriously. Any evidence of academic dishonesty on assignments, labs and/or tests will be forwarded to the appropriate authorities for potential disciplinary actions. The University Student Discipline By-Law may be accessed at: [http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html](http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html). Information from the Faculty of Science regarding Cheating and Plagiarism can be found at [http://umanitoba.ca/faculties/science/undergrad/resources/webdisciplinedocuments.html](http://umanitoba.ca/faculties/science/undergrad/resources/webdisciplinedocuments.html).

Students are encouraged to discuss course concepts and the general interpretation of homework problems with other students in the class. No written record should be taken from such discussions. Each student must work on the final solution of assignment problems independently. On a cover page, each student must list the names of people with whom he or she has discussed the assignment solution. Submitting the work of another person as your own constitutes academic misconduct. Any collaboration that does not follow these guidelines will be considered plagiarism and will be reported to the Faculty of Science. Students are to abide by the university’s policies regarding academic dishonesty which can be found on this website: [http://umanitoba.ca/student/resource/student_advocacy/academicintegrity/students](http://umanitoba.ca/student/resource/student_advocacy/academicintegrity/students).

Students will discuss fundamental concepts in design of online algorithms, techniques used to analyze online algorithms in the worst-case scenarios, and important recent related research developments in ‘semi-online’ algorithms where partial information is available about the input sequence. The students are expected to learn to model online problems in their own domain of research, design practical online algorithms, and analyze their algorithms in the framework of competitive analysis (that is, providing worst-case guarantees).

**Class Communication.** All announcements for the class will be posted on the webpage of the course as well as on the course Piazza page. The piazza page will also be the central place for class discussions and for any questions about the lectures and assignments.

Please note that all communication between the instructor and you as a student must comply with the electronic communication with student policy ([http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html](http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html)). You are required to obtain and use your U of M email account for all communication between yourself and the university.

Updated 22 December 2017.