WENTWORTH INSTITUTE OF TECHNOLOGY
School of Computing and Data Science

Algorithms

Fall 2023

Email address: kreimendahlf@wit.edu

Instructor Name: Frank Kreimendahl

Classroom: Wentworth 010

Office Location: Ira Allen 304

Class Schedule: MW class, F lab

Office Hours: T 2:00-3:00 PM, W 2:00-3:20 PM

Lecture/Lab/Total Credits: 3/2/4

Course Website: 2350.witcompsci.com

COURSE DESCRIPTION:

This course introduces algorithmic design and analysis: students assess the complexity of algorithms in terms of time and space requirements for large input sizes. Topics include searching, sorting, pattern matching, hashing and encryption.

COURSE PREREQUISITES/COREQUISITES:

Prerequisites: COMP2000.

REQUIRED TEXTBOOK(S):

Cormen, Leiserson, Rivest, and Stein. 2009. *Introduction to Algorithms*, Third Edition (3rd ed.). The MIT Press.

THE COLLEGE BOOKSTORE:

Location: 103 Ward Street Boston MA 02115
Telephone: 617-445-8814

COURSE LEARNING OUTCOMES:

At the completion of this course, you should be able to:

- Evaluate asymptotic complexity, run-time efficiency, and space needs of algorithms
- Select and justify the best algorithm in terms of asymptotic complexity, run-time efficiency, and space needs to solve a real-world scenario
- Design and analyze an original algorithm to solve a particular problem
- Implement an algorithm in a programming language and empirically evaluate space and time efficiency

INSTRUCTIONAL METHODOLOGIES:

Lectures and in-class examples will provide knowledge about both theoretical and practical aspects of algorithms. Students will practice algorithm implementations in coding assignments, and practice analysis in groups with written labs.

GRADING POLICY:

A midterm is worth 12% of the final grade, and a final exam is worth 18%. Assignments (9) will be worth 50% of the final grade, and group labs (~8) will be worth 20%. Assignments will be accepted up to two days after the due date, at a penalty of **20 points per day**.

WENTWORTH GRADING SYSTEM:

Grade	Weight	Numerical Definition	Definition
A A-	4 3.67	93-100 90-92	Student learning and accomplishment far exceeds published objectives for the course/test/assignment and student work is distinguished consistently by its high level of competency and/or innovation.
B+ B B-	3.33 3 2.67	87-89 83-86 80-82	Student learning and accomplishment goes beyond what is expected in the published objectives for the course/test/assignment and student work is frequently characterized by its special depth of understanding, development, and/or innovative experimentation.
C+ C C-	2.33 2 1.67	77-79 73-76 70-72	Student learning and accomplishment meets all published objectives for the course/test/assignment and student work demonstrates the expected level of understanding and application of concepts introduced.
D+ D	1.33 1	67-69 60-66	Student learning and accomplishment based on the published objectives for the course/test/assignment were met with minimum passing achievement.
F	0	0-59	Student learning and accomplishment based on the published objectives for the course/test/assignment were not sufficiently addressed or met.

ADD/DROP:

Students should check the academic calendar to confirm the add/drop deadline. Dropping and/or adding courses is done online. Courses dropped in this period are removed from the student's record.

Non-attendance does not constitute dropping a course. If a student has registered for a course and subsequently withdraws or receives a failing grade in its prerequisite, **then the student must drop that course**. In some cases, the student will be dropped from that course by the Registrar. However, it is the student's responsibility to make sure that he or she meets the

course prerequisites and to drop a course if the student has not successfully completed the prerequisite. The student must see his or her academic advisor or academic department chair for schedule revision and to discuss the impact of the failed or withdrawn course on the student's degree status.

ACADEMIC SUPPORT:

The Success Studio (Beatty Hall, 3rd floor) offers many resources and supports to facilitate your success including:

- Academic Advising –Student Success Advisors
- Academic Support Services –Tutoring, Study Groups
- Student Accessibility Services – for students with documented disabilities
- Resources and Workshops on academic success skills

In addition to meeting with your Student Success Advisor when you have questions or concerns, you can participate in appointment based individual tutoring, drop-in group tutoring, and workshops. Most individual appointments can be scheduled to take place remotely or in-person.

Did you know that 70% of Wentworth students participate in tutoring? Our data shows that attending three or more tutoring sessions is proven to significantly increase your grade!

To make an advising or tutoring appointment, please login to Navigate (https://wit.campus.eab.com/) using your Wentworth email credentials. If you do not see a tutor for your class, please contact academicsupport@wit.edu.

For up-to-date information on our workshops, programs, and drop-in study groups, please visit the Success Studio on wit.edu.

Student Accessibility Services:

Wentworth Institute of Technology requires that students with disabilities are provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact me privately to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services (contact 617–989–4545 or visit Success Studio on wit.edu. for more information on registration procedures).

ACADEMIC HONESTY STATEMENT:

Students at Wentworth are expected to be honest and forthright in their academic endeavors. Academic dishonesty includes but is not limited to cheating, prohibited collaboration, coercion, inventing false information or citations, plagiarism, tampering with computers, destroying other people's coursework or lab or studio property, theft of course materials, posting coursework/course materials to websites, or other academic misconduct. If you have any questions, contact your professor prior to submitting an assignment for evaluation. See your academic catalogue for a full list of definitions and the WIT Academic Honesty website for the procedures: wit.edu/academic-honesty.

STUDENT ACCOUNTABILITY STATEMENT:

Any attempt to pass off another's work as one's own is plagiarism.

In this course the penalty for plagiarism is a failing grade in the course for any parties concerned. It is permissible for students to discuss the nature of an assignment or how to use a particular feature of the software. However, not a single keystroke of the work you submit should be done by anyone but you, nor should your work be based on commands supplied by someone else or developed in collaboration with someone else. In other words, you should not sit down and

work together with anyone else on the assignments. Nor should you give, receive, or solicit specific information (such as code, commands) from other students in this course. (This, of course, does not apply to labs that are explicitly assigned to a group.) Exchange of detailed information about an assignment is cheating and will not be tolerated.

- Copying code, online answer keys, or answers on exams, or allowing others to copy your work.
- Using unauthorized aid during an exam.
- Copying code from other students' labs or assignments, or allowing others to copy your code.
- Using labs or assignments from current or past students and submitting them as your own.
- Providing your classwork to students now or in future semesters.

For this course, if I catch you plagiarizing you will fail the course. The penalty for sharing your work with someone else is the same as receiving work from someone else. This failure supersedes a withdraw or P/NC grade. Once again, the penalty for plagiarism is **immediate course failure**.

THE CENTER FOR WELLNESS:

College can be challenging and it is common to feel overwhelmed or stressed at times. If these feelings are related to course work or academic performance, please talk to me. For more significant mental health concerns, **The Center for Wellness (Williston Hall, 2ⁿᵈ Floor, 617-989-4390)** provides free and confidential mental health counseling.

If you or someone you know needs support around thoughts of suicide, the following resources are available:

- The Center for Wellness, 617-989-4390, M-F 8:30-4:30
- BeWell@WIT 24/7 telephonic emotional support, 617-989-4390 and pressing number 2
- Public Safety, First level of 610 Huntington Avenue, 617-989-4444, 24/7
- Samaritans, call or text 1-877-870-4673
- Crisis Text Line, text "start" to 741-741
- National Suicide Prevention Lifeline, call 1-800-273-8255
- GLBT Youth Hotline, call 1-866-488-7386
- Beth Israel Deaconess Emergency Room, 190 Pilgrim Rd Boston, MA

The Center for Wellness will be providing mental health counseling sessions virtually and in person for the 2021-2022 academic year. Appointments can be scheduled by calling 617-989-4390. Additionally, 24/7 emotional support is available by this same phone line.

COLLEGE OF THE FENWAY STUDENTS:

If you are enrolled in this course through COF Cross Registration, notify your course instructor. Please provide her/him with your email address to be sure that you receive course information in a timely way. You should also discuss how to access online applications that might be used in the course.

SYLLABUS OUTLINE:

Week	Topic	Chapter Readings
1	Introduction	2-3
2	Sorting	8
3	Searching	6
4	Randomized Sorting	9
5	Binary Trees	12
6	Red-black Trees	13
7	Tries	
8	Midterm, Dynamic Programming	15
9	More Dynamic Programming	15
10	Greedy Algorithms	16
11	Graph Introduction	22
12	Graph Traversal	24
13	Spanning Trees	21, 23
14	Applications and Review	
15	Final Exam	