Syllabus

Fundamentals of Computer Engineering – Fall 2021
13847 – EECE7205 – V30 (In-Person)
19360 – EECE7205 – V35 (Online)

Instructor:
Xue (Shelley) Lin, Assistant Professor, Dept. of Electrical and Computer Engineering
Email: xue.lin@northeastern.edu Website: https://web.northeastern.edu/xuelin/

Class time: 9:50am – 11:30am TF

Classroom: West Village H 108 **Classroom type:** Standard
More classroom info here: https://nuflex.northeastern.edu/classroom-technology/

Office Hours: Friday 2pm – 4pm or by appointment through email
Through this Zoom link https://northeastern.zoom.us/my/shelleyxuelin (also provided at the course homepage on Canvas)

Teaching Assistants:
Zhenglun Kong, PhD Student, Dept. of Electrical and Computer Engineering
Email: kong.zhe@northeastern.edu
Office Hour: for grading issues only.
By appointment through email in advance, Zhenglun's Zoom link
https://northeastern.zoom.us/j/5049760953 (also provided at the course homepage on Canvas)

Rushabh Fegade, Student, Dept. of Electrical and Computer Engineering
Email: fegade.r@northeastern.edu
Office Hour: for grading issues only.
Rushabh is in general available at Microsoft Teams, so you can leave messages and also meet directly on Microsoft Teams.
You can also contact through email in advance, then Rushabh can provide you a Zoom link to meet.

Recording of Classes:
Classes will be recorded to enable all students to review material covered in synchronous classes. Please contact me if you have any concerns.

Classroom Support:
To reach an Instructional Assistant (IA), send an email to classroomITsupport@northeastern.edu from instructor's Northeastern email address. No need to include any text in this email, as the system will recognize you and where you are and will immediately alert an IA to come and assist in the classroom.f

Course Objectives:
This course introduces students to the analysis and design of computer algorithms. Upon completion of this course, students will be able to do the following:

- Analyze the asymptotic performance of algorithms.
- Demonstrate a familiarity with major algorithms and data structures.

- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Course Topics:

- Analysis of Algorithms, Insertion Sort, Mergesort
- Asymptotic Notation, Recurrences, Substitution, Master Method
- Divide-and-Conquer: Strassen, Fibonacci, Polynomial Multiplication
- Quicksort, Randomized Algorithms
- Linear-time Sorting: Lower Bounds, Counting Sort, Radix Sort
- Order Statistics, Median
- Hashing, Hash Functions
- Universal Hashing, Perfect Hashing
- Relation of BSTs to Quicksort, Analysis of Random BST
- Red-black Trees, Rotations, Insertions, Deletions
- Augmenting Data Structures, Dynamic Order Statistics, Interval Trees
- Skip Lists
- Amortized Algorithms, Table Doubling, Potential Method
- Competitive Analysis: Self-organizing Lists
- Dynamic Programming, Longest Common Subsequence
- Greedy Algorithms, Minimum Spanning Trees
- Shortest Paths
- Advanced Topics

Textbook:
Cormen, Thomas, Charles Leiserson, Ronald Rivest, and Clifford Stein. *Introduction to Algorithms*. 3rd ed. MIT Press, 2009. ISBN: 9780262033848.

Grading Policy:

- Homework 25%
- Quiz 25%
- Project I 15%
- Project II 35%

Homework
5 homework assignments posted/submitted on Canvas and due in one week.
Strict deadlines, no extensions.

Quiz
5 quizzes. The quizzes will be given according to the progress of the course. The quizzes will be posted on Canvas with the deadlines within one day. No make up for missed quizzes.

Project I
Program to solve practical problems.

Individual effort.
Report required.

Project II
Program to solve practical problems.
Individual effort.
Report and demonstration required.

Grade Conversion
Your total grade is calculated as a numeric grade between 0 and 100, and converted into a letter grade using the following scale:

A	:	100~95	C	:	76.65~73.33
A-	:	94.99~90	C-	:	73.32~70
B+	:	89.99~86.66	D+	:	69.99~66.66
B	:	86.65~83.33	D	:	66.65~63.33
B-	:	83.32~80	D-	:	63.32~60
C+	:	79.99~76.66	F	:	59.99~0

About Canvas and the Course:
We will use Canvas as the main platform, where we communicate on announcements, course materials, homework, exams, etc. and access to the Zoom sessions for synchronous classes. You are encouraged to participate in the synchronous classes. And I understand that there may be remote students in different time zones, in that case the remote students can watch lecture videos to study the topics, request additional office hours, and arrange exam time with flexibility.
Please post course-related questions at "Discussions" on Canvas. If you send the instructor an email with questions that may benefit others in the class, the instructor will ask you to post your questions on Canvas. For questions pertaining your personal situation, send an email to the instructor instead.

Attendance:
Attendance is an important element for success in class. It is required, unless you are unable to make it due to illness or other urgent or emergent reasons. Contact me via email before the class time for allowed absence, unless you are unable to. Here is the section from the student handbook: Students will not be penalized for excused absences, with the understanding that students may need to make up for the academic commitment from which they were excused. Reasons for an excused absence include religious, medical issues, jury duty, bereavement, and military service. See the course catalog and other applicable policies for the full attendance and excusal policy.

Academic Integrity:
A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.
As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative

work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors. Go to http://www.northeastern.edu/osccr/academic-integrity-policy/ to access the full academic integrity policy.

Student Accommodations:
Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability. For more information,
visit http://www.northeastern.edu/drc/getting-started-with-the-drc/.

Diversity and Inclusion:
Northeastern University is committed to equal opportunity, affirmative action, diversity and social justice while building a climate of inclusion on and beyond campus. In the classroom, members of the University community work to cultivate an inclusive environment that denounces discrimination through innovation, collaboration and an awareness of global perspectives on social justice. It is my intention that students from all backgrounds and perspectives will be well served by this course, and that the diversity that students bring to this class will be viewed as an asset. I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, socioeconomic background, family education level, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. Your suggestions are encouraged and appreciated.
Please visit http://www.northeastern.edu/oidi/ for complete information on Diversity and Inclusion.

TITLE IX:
Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance. Northeastern's Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty and staff. In case of an emergency, please call 911. Please visit www.northeastern.edu/titleix for a complete list of reporting options and resources both on- and off-campus.