

Syllabus

Fundamentals of Computer Engineering – Fall 2020

14510 – EECE7205 – V30

10993 – EECE7205 – V35

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: WVH 108 in West Villiage – Bldg “H”

Classroom type: Standard

More classroom info here: <https://nuflex.northeastern.edu/classroom-technology/>

Office Hours: Friday 2pm – 4pm or by appointment

Through the [Zoom link](#) provided at the course homepage on Canvas

Teaching Assistant:

Kai Li, PhD Student, Dept. of Electrical and Computer Engineering

Email: li.kail@northeastern.edu Office Hour: by appointment for grading issues only

[Zoom link](#) provided at the course homepage on Canvas

The TA will be in general available on Mondays and Wednesdays from 10am – 12pm, but please notify the TA in advance if you have grading issues to discuss.

Teaching Remotely:

This course will be delivered using the Hybrid NUflex learning modality and I will be teaching remotely. I will join you virtually in the class at the scheduled class time using Zoom with some students in the classroom and others joining remotely. You will be able to ask questions, discuss, and interact with me and other students in real time. Remember that on your scheduled days in the classroom, you will need to practice healthy distancing and wear a face mask or face covering. I will also be available for virtual office hours on the days/times in the syllabus.

Recording of Classes:

This course, or parts of this course, may be recorded for educational purposes. These recordings will be made available only to students enrolled in the course, instructor of record, and any teaching assistants assigned to the course. Classes will be recorded to enable all students to review material covered in synchronous classes. Please contact me if you have any concerns.

Classroom Technician (CT):

The college is assigning a Classroom Technician (CT) for every section of every COE course. The CT will automatically be present throughout every scheduled meeting of the course. During class, the CT will assist with the class and can monitor student questions. The CT can also help students with technology questions.

Additional Support:

If there are technology questions that the CT is not able to resolve, an email can be sent to the NU IAs (Instructional Assistants) classroomITsupport@northeastern.edu with the course

CRN 14510 in the subject. No message text is required. IAs will immediately come to the classroom.

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 Canva 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.

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.

Expectations to Students:

The university has put into place a robust plan to make the campus healthy and safe for all - - but you must do your part. On August 22, all students received an email from Senior Vice Chancellor for Student Affairs Madeleine Estabrook on the expectations for behavior both on

*campus and off campus. **Please read it carefully today.***
To Summarize:

1. *Gatherings on or off campus must conform to healthy practices as outlined by university and [Massachusetts state guidance](#). If you host or attend an inappropriate party or gathering, you run the very real risk of immediate removal from the community.*
2. *Wear a mask indoors and outdoors as you maintain a 6-foot distance from everyone.*
3. *Get tested every three days using the COVID-19 Test Scheduler ([Covid19-testing.northeastern.edu](#).) We may require more frequent testing as the semester progresses. It's quick, easy and will help us to quickly identify and care for anyone who tests positive. I will not be told the identity of anyone who tests positive, and you do not need to share that information with me or anyone else unless you want to. If you receive a positive test result, you will be contacted by a member of the university's telehealth team who will provide you with next steps.*
4. *Do a Daily Wellness Check ([wellness-check.northeastern.edu](#)), wash your hands well and regularly, and disinfect high-touch surfaces and spaces.*
5. *I will be wearing a [face covering](#) or mask as I teach and expect that you will do the same in class. If you come to class without a mask, I'll ask you to go and [get one on campus](#). You can get a mask at the Visitor Center or at the Curry Student Center Help Desk. If you refuse to wear a mask in class, I won't be able to continue the class. If you are not sitting six feet apart from your classmate, I'll ask you to do so. We won't be able to eat or drink in class (except water). If you test positive, you will need to enter isolation as directed by the university's telehealth team. I expect that you will not come in-person to class and that you will follow the guidance from the university telehealth team to isolate and get appropriate healthcare if needed.*
6. *Staying safe is a responsibility that we all must take seriously. Keep in mind the "Protect the Pack" theme. Remember that our individual actions will help everyone stay safe this fall.*