Northeastern
College of Engineering

INFO 6205: Program Structure and Algorithms

Spring 2025

Course Information:

- **Course Title:** Program Structure and Algorithms
- **Course Number:** INFO 6205
- **Term and Year:** Spring, 2025
- **Credit Hour:** 4
- **CRN:** 38129

Instructor Information:

- **Instructor Name:** Prof. Chen-Hsiang (Jones) Yu, Ph.D.
- **Email Address:** jones.yu@northeastern.edu
- **Office Hours:** Listed in “Office Hours” section below

Instructor Biography:

Dr. Chen-Hsiang (Jones) Yu is a full Teaching Professor at the department of Multidisciplinary Graduate Engineering (MGEN) in the College of Engineering at Northeastern University. He is also an affiliated faculty member at the Center for Dynamical Biomarkers, Beth Israel Deaconess Medical Center/Harvard Medical School. He earned B.Eng. and M.S. in Computer Science and Information Engineering (CSIE) from Tamkang University (1998) and National Taiwan University (2000), and Ph.D. in Computer Science from MIT (2013). He won Blittersdorf Faculty Award, Sagan Faculty Fund Grants Award, two times of Faculty Grants Awards, six times of Presidential EPIC Mini Grants Awards, IEEE CCWC Best Paper Award, ACM UIST Best Poster Award, ACM CHI Student Research Competition, and several programming and entrepreneurship competitions. He has 60+ peer-reviewed publications. During his work in industry, he has joined to develop more than 12 commercialized mobile phones and several mobile applications. His research in HCI (Human-Computer Interaction) focuses on mobile health, AI on mobiles, web customization and automation, and readability enhancement. He is an IEEE senior member and ACM member.

Teaching Assistants:

- TBA

Class Schedule:

- Lecture (T): 3:25 pm - 5:05 pm
- Lecture (F): 3:25 pm - 5:05 pm

Office Hours: (Online via Zoom)

- TBA

Course Prerequisites:

- INFO 5100 with a minimum grade of B- or INFO 5100 with a minimum grade of B- or CSYE 6200 with a minimum grade of B-

Course Description:

This course is an introduction to data structures and algorithms. Students will learn the abstract data type (ADT), implement data structures, use them to address the problems and conduct analysis to the programs. Topics will include, but are not limited to, Bags, the Efficiency of Algorithms, Stacks, Recursion, Sorting, Queues, Lists, Iterators, Trees, etc. We will use Java as the programming language to practice all learned knowledge.

Course Learning Outcomes:

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

- Identify common Data Structures
- Understand the importance and use of Abstract Data Types (ADTs)
- Design and implement Data Structures: Stacks, Queues, Lists, Trees
- Explain best, average and worst cases of an algorithm using the Big Oh notation

Required Course Textbook:

- Carrano, F.M. and Henry T.M., Data Structures and Abstractions with Java, 5th Edition, Pearson Education, 2019. (ISBN: 978-0-13-4831695)

Supplemental Materials:

- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. Introduction to Algorithms, 4th Edition, The MIT Press, 2022. (ISBN: 978-0262046305)

Course Website:

- TBA

Assignment Grading:

There will be 5 assignments required to submit during the course. These lab assignments will test the student's ability to think, write and test complete programs from start to finish. Each lab assignment will include a detailed description of the problem and expectations for successful completion. The details will be defined in each lab assignment.

There is a midterm exam in this class, but there will be no final exam. Instead, students will work in teams to complete the final project that incorporates programming constructs and elements from throughout the semester. Each team will have 4 members. Each team will present their final project at the end of the semester.

Specifically, student grades are based upon the following criteria:

Attendance & Participation	Weekly	5%
Lab Assignments	5 assignments	30%
Midterm Exam	Middle of the semester	25%
Final Project Presentation and Demo	Last week of the semester	15%
Final Project Submission	Last week of the semester	25%

Grading Scale: (Updated)

Grade	Weight	Numerical Definition	Definition

Grade	Weight	Numerical Definition	Definition
A A-	4.000 3.667	95-100 90-94.9	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-	3.333 3.000 2.667	87-89.9 84-86.9 80-83.9	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.
C+ C C-	2.333 2.000 1.667	77-79.9 74-76.9 70-73.9	Student learning and accomplishment based on the published objectives for the course/test/assignment were met with minimum passing achievement.
F	0.000	69.9 or below	Student learning and accomplishment based on the published objectives for the course/test/assignment were not sufficiently addressed or met.

https://registrar.northeastern.edu/article/university-grading-system/

Attendance/Late Work Policy:

Attendance Policy

Students registered in MGEN courses (INFO, CSYE, and DAMG) are allowed a maximum of 2 absences per course, with 3 or more absences resulting in an automatic “F” for that course. Students are expected to inform their instructors of any absences in advance of the class; if a student is sick long-term or experiences a medical issue that prevents class attendance, it is strongly encouraged that they speak with their Academic Advisor (coe-mgen-gradadvising@northeastern.edu) to learn more about the Medical leave of Absence. Should a student anticipate being unable to attend 3 or more classes, they should discuss their situation with their Academic Advisor to explore other types of leave in accordance with the University's academic and global entry expectations. International students should review the Office of Global Services webpage to understand their visa compliance requirements. Teaching Assistants (TAs) or Instructional Assistants (IAs) will be present at each class to collect student attendance.

Late Work Policy

Students must submit assignments by the deadline in the time zone noted in the syllabus. Students must communicate with the faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication with faculty will not be graded.

End-of-Course Surveys:

Your feedback regarding your educational experience in this class is particularly important to the College of Engineering. Your comments will make a difference in the future planning and presentation of our curriculum.

At the end of this course, please take the time to complete the evaluation survey at https://neu.evaluationkit.com. Your survey responses are completely anonymous and confidential. For courses 6 weeks in length or shorter, surveys will be open one week prior to the end of the courses; for courses greater than 6 weeks in length, surveys will be open for two weeks. An email will be sent to your Northeastern University Mail account notifying you when surveys are available.

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.

MGEN Student Feedback:

Students who would like to provide the MGEN unit with anonymous feedback on this particular course, Teaching Assistants, Instructional Assistants, professors, or to provide general feedback regarding their program, may do so using this survey: https://neu.co1.qualtrics.com/jfe/form/SV_cTIAbH7ZRaaw0Ki

University Health and Counseling Services:

As a student enrolled in this course, you are fully responsible for assignments, work, and course materials as outlined in this syllabus and in the classroom. Over the course of the semester if you experience any health issues, please contact UHCS. For more information, visit https://www.northeastern.edu/uhcs.

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 https://drc.sites.northeastern.edu.

Library Services:

The Northeastern University Library is at the hub of campus intellectual life. Resources include over 900,000 print volumes, 206,500 e-books, and 70,225 electronic journals.

For more information and for education specific resources, visit https://library.northeastern.edu Network Campus Library Services: Northeastern University Library Global Campus Portals

24/7 Canvas Technical Help:

For immediate technical support for Canvas, call 617-373-4357 or email help@northeastern.edu

Canvas Student Resources: https://canvas.northeastern.edu/student-resources/

For assistance with my Northeastern e-mail, and basic technical support:
Visit ITS at https://its.northeastern.edu
Email: help@northeastern.edu
ITS Customer Service Desk: 617-373-4357

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.

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 https://www.northeastern.edu/ouec for a complete list of reporting options and resources both on- and off-campus.

Course Schedule/Topics Covered:

The following schedule is tentative and subject to change (including topics and assignments).

Week	Topic	Reading	Assignments
1	Introduction and Java Review	Introduction, Prelude, Appendix A, B, C and Supplement 1, 2	
2	Bags and Bag Implementations	Chapter 1, 2, 3, Java Interlude 1, 2, 3, 5, 8	
3	Bags and Bag Implementations	Chapter 1, 2, 3, Java Interlude 1, 2, 3, 5, 8	Assignment 1 Due
4	The Efficiency of Algorithms	Chapter 4	
5	Stacks and Stack Implementations	Chapter 5, 6	Assignment 2 Due
6	Stacks and Stack Implementations	Chapter 5, 6	
7	Midterm Review and Exam		Midterm Exam
8	Recursion and Dynamic Programming	Chapter 9, 14	Assignment 3 Due
9	An Introduction to Sorting	Chapter 15	
10	Faster Sorting Methods	Chapter 16	Assignment 4 Due
11	Lists and List Implementations	Chapter 10, 11, 12	Assignment 5 Due
12	Iterators and Iterator Implementations	Chapter 13, Java Interlude 4	
13	Trees and Tree Implementations	Chapter 24, 25	
14	Final Project Presentation and Demo		Final Project Presentation and Demo Due Final Project Submission Duo
15	Final Exam Week - No Classes		