Northeastern
College of Engineering

INFO 6205: Program Structure and Algorithms

Fall 2025

Course Information:

- **Course Title:** Program Structure and Algorithms
- **Course Number:** INFO 6205
- **Term and Year:** Fall, 2025
- **Credit Hour:** 4
- **CRN:** 17668
- **Course Format:** Traditional

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:

- Aakash Chothani chothani.aa@northeastern.edu (Lead TA)
- Praveen Kumar Vijaya Kumar vijayakumar.p@northeastern.edu

Class Schedule:

- Lecture (T): 3:25 pm - 5:05 pm
  - Classroom: Behrakis Health Sciences Center 325
- Lecture (F): 3:25 pm - 5:05 pm
  - Classroom: Behrakis Health Sciences Center 325

Office Hours: (Online via zoom)

- Jones:
  - Hours: 10 am - 12 pm (Thursday)
  - Zoom Link: https://northeastern.zoom.us/j/91344853313?pwd=6EwlwBGLJ8VmTF4rrszqAcgLSV5RJl.1
- Aakash:
  - Hours: 4 pm - 5 pm (Monday)
  - Zoom Link: https://northeastern.zoom.us/j/99733284778?pwd=UYDlQX0GvIUF6AtN1wY1aVj2xLFlMp.1
- Praveen:
  - Hours: 4 pm - 5 pm (Wednesday)
  - Zoom Link: https://northeastern.zoom.us/j/99791837019?pwd=wqMQrqPdbSHFo6AfFJJnd1ubID0yFK.1

Course Prerequisites:

- 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:

- Comprehension of Program Structures and Algorithms: By the end of the course, students will be able to explain fundamental program structures, data structures, and algorithms. They will have the ability to analyze diverse computational challenges using various methods and tools.
- Proficiency in Algorithmic Problem Solving: Upon completion of the course, students will be proficient in designing, implementing, and analyzing algorithms for tasks such as searching, sorting, and recursion.
- Application of Data Abstraction and Encapsulation Principles: Emphasizing modular and reusable programming practices, students will develop proficiency in applying principles of data abstraction and encapsulation in code design.

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)
- Robin Hillyard. Data Structures, Algorithms, and Invariants - A Practical Guide, 1st Edition, Cognella Academic Publishing, December 9, 2024. (ISBN: 978-1793588845)

Course Website:

- https://northeastern.instructure.com/courses/229107

Assignment Grading:

There will be 5 lab 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. In this class, we will have two exams. To ensure students know how to apply learned knowledge, there will be a team-based final project as well.

Specifically, student grades are based upon the following criteria:

Attendance & Participation	Weekly	5%
Lab Assignments	5 assignments	25%
Exam 1	Week 7 or 8	25%
Final Project	Week 13	20%
Exam 2	Week 14	25%

Grading Scale:

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/

Incomplete Grades

An incomplete grade may be reported by the instructor when a student has failed to complete a major component of a required course, such as homework, a quiz or final examination, a term paper, or a laboratory project. Students may make up an incomplete grade by satisfying the requirements of the instructor. Be aware that instructors' policies on the granting of incomplete grades may vary and that the final decision on an incomplete grade is up to the instructor. **Instructors may deny requests for an incomplete grade.** If the missing assignment(s) have not been submitted to the instructor within 30 days from the end of the term in which the course was offered, or the agreed upon due date, the grade entered will reflect the student's grade in the course for the work completed and the missing assignments receiving no credit toward the final grade.

Attendance/Late Work Policy:

Attendance Policy

In each term, students enrolled in on-ground sections are expected to be on campus and attending class beginning with the first day of classes. Students in online sections are expected to log in and participate in class beginning with the first day of classes.

Students who join a class after the first day of class during the university add period, or who are approved for late registration by the instructor and the Graduate School of Engineering, are responsible for all coursework missed

prior to enrolling. In the interest of students' success, the college does not support the arrival of students to class after the university add deadline. Enrolled students who do not attend class during the first week of a semester risk being dropped from the course.

In cases where an enrolled student cannot arrive to campus by the first day of class due to circumstances beyond their control, it is the student's responsibility to contact the instructor for approval and notify the Graduate School of Engineering.

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. Course instructors are not expected to make accommodations and students are expected to inform their instructors of any absences in advance of the class. 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 and accommodations in accordance with the University's academic and global entry expectations. Students may be asked to share communications about class absences with their Academic Advisor. 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-gradadvising@northeastern.edu) to learn more about the Medical Leave of Absence. 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

Standard Deadlines: Assignments must be submitted by the deadlines specified in the syllabus or as posted on Canvas.

Late Submissions: Late submissions will incur the following penalties unless prior approval is obtained:

- Up to 24 hours late: 10% deduction.
- 24 - 48 hours late: 20% deduction.
- More than 48 hours late: No credit (0 points).

Extension Requests: Students must request an extension within 24 hours before the deadline via email. Requests submitted after this timeframe will only be considered under exceptional circumstances (e.g., medical emergencies).

End-of-Course Surveys:

Student feedback on their learning experience is valuable and helps improve future courses. We encourage all students to complete the course evaluation surveys when they become available.

Surveys are distributed at both the midterm mark and the end of the term via email and are completely anonymous and confidential. Any questions about the surveys can be directed to mgen-programs@coe.northeastern.edu

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.

The following is a broad overview, but not an all-encompassing definition, of what constitutes a violation of academic integrity:

Cheating: The University defines cheating as using or attempting to use unauthorized materials, information, or study aids in any academic exercise. When completing any academic assignment, a student shall rely on their own mastery of the subject.

Fabrication: The University defines fabrication as falsification, misrepresentation, or invention of any information, data, or citation in an academic exercise.

Plagiarism: The University defines plagiarism as using the words, ideas, data, code, or other original academic material of another without providing proper citation or attribution. Plagiarism can apply to any assignment, either final or drafted copies, and it can occur either accidentally or deliberately. Claiming that one has "forgotten" to document ideas or material taken from another source does not exempt one from plagiarizing.

Unauthorized Collaboration: The University defines unauthorized collaboration as instances when students submit individual academic works that are substantially similar to one another. While several students may have the same source material, any analysis, interpretation, or reporting of data required by an assignment must be each individual's independent work unless the instructor has explicitly granted permission for group work.

Participation in Academically Dishonest Activities: The University defines participation in academically dishonest activities as any action taken by a student with the intention of gaining an unfair advantage over other students.

Facilitating Academic Dishonesty: The University defines facilitating academic dishonesty as intentionally or knowingly helping or contributing to the violation of any provision of this policy.

Please visit https://osccr.sites.northeastern.edu/academic-integrity-policy/ to access the full academic integrity policy.

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/Disability Access Services (DAS):

Northeastern University and the Disability Access Services (DAS) 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, students must provide appropriate documentation as provided by the DAS office.

If the course is conducted in an on-ground (in-person) format, students are expected to attend class physically as scheduled. Professors are **not required to provide virtual attendance links** unless a student has documented accommodation approved by the **Disability Access Services (DAS) office** and their **Academic Advisor**. If a student requires accommodation for remote participation, they must submit a formal request through the **Disability Office** and coordinate with their **Academic Advisor** prior to the course start date.

For more information, visit https://disabilityaccessservices.sites.northeastern.edu/

Office of Global Services:

As an F-1, J-1, or Study Permit student, you must meet certain obligations in order to maintain lawful nonimmigrant status. Maintaining status is necessary in order to retain eligibility for the benefits of F-1 or J-1 status, such as employment authorization and program extension, and can be crucial to a successful application for a change or adjustment of nonimmigrant status in the future. Failure to maintain your nonimmigrant status can result in serious problems with immigration and *could lead to deportation from the U.S. or Canada.*

Students must maintain on-ground presence throughout the academic term. At Northeastern, there are four different defined instructional methods: Traditional, Hybrid, Live Cast, and Online. Traditional, Hybrid, and Live Cast courses meet the Visas' on-ground presence requirements. **Online courses do not meet the Visas' on-ground presence requirements.**

Students enrolled in Summer courses should adhere to OGS guidelines on maintaining status during the Summer term.

For more information please visit, https://international.northeastern.edu/ogs/current-students/understanding-visa-requirements/guidelines-on-maintaining-status/

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

Outreach, Engagement, Belonging:

Northeastern University is committed to fostering a community of belonging, which is essential to the advancement of Northeastern University's mission of teaching and research. Our university is stronger as a result of the varied backgrounds, experiences, and perspectives that all members of our global community bring to the pursuit of knowledge. Embracing this pluralism is not the work of one office, department, or academic unit. It is a shared responsibility that spans disciplines and boundaries. By harnessing the power of our differences, we will continue to light the path to bold new ideas and life-changing discoveries.

It is my intention that students from all backgrounds and perspectives will be well served by this course, and that the diverse experiences 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 belonging environment for every other member of the class. Your suggestions are encouraged and appreciated.

Please visit Belonging at Northeastern – Northeastern Provost for complete information.

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.

The Office for University Equity and Compliance (OUEC) leads Northeastern University's efforts in maintaining compliance with all federal, state, and provincial civil rights laws and prohibits discrimination within any of its programs, activities, and services. Please visit https://ouec.northeastern.edu/ for more information and for the link to file a report.

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	Assignment 1
3	Bags and Bag Implementations	Chapter 1, 2, 3, Java Interlude 1, 2, 3, 5, 8	
4	The Efficiency of Algorithms	Chapter 4	Assignment 2
5	Stacks and Stack Implementations	Chapter 5, 6	
6	Stacks and Stack Implementations	Chapter 5, 6	Assignment 3
7	Midterm Review and Exam		Exam 1
8	Recursion	Chapter 9, 14	
9	An Introduction to Sorting	Chapter 15	Assignment 4
10	Faster Sorting Methods	Chapter 16	
11	Lists and List Implementations	Chapter 10, 11, 12	Assignment 5
12	Iterators and Iterator Implementations	Chapter 13, Java Interlude 4	
13	Trees and Tree Implementations	Chapter 24, 25	Final Project Duo
14	Summary		Exam 2
15	Final Exam Week - No Classes		

Note 1: If time permits, we might invite domain experts from the industry to give guest lectures.