



## INFO 6205: Program Structures and Algorithms

### Course Information

Course Title: Program Structures and Algorithms

Course Number: 6205

Term and Year: Fall 2024

Credit Hour: 4

CRN: 18681

Course Format: On-Ground

### Instructor Information

Full Name: Dr. Frank Kadwell

Email Address: f.kadwell@northeastern.edu

Office Hours: By Apt

### Instructor Biography

Frank earned his Bachelor of Science from the University of Minnesota, majoring in Computer Science. In 2008, Frank earned his Master of Science from Capella University. Frank earned his PhD in Information Technology from Capella University in 2019. Frank has over twenty-eight years of industry experience. Frank's major area of expertise is in data engineering, analytics, and machine learning. Frank has helped companies take advantage of their competition through predictive and data analytics. Frank has been teaching for four years and his research focus is on Algorithms and specifically, generative AI. Frank is passionate about teaching and helping students to achieve their greatest potential.

### Teaching Assistant Information

Full Name: Sherin Rajkumari Premkumar

Email Address: premkumar.sh@northeastern.edu

Office Hours: Mondays and Tuesdays between 7PM and 8PM or by Apt.

### Course Prerequisites

Info5100 C or Better

### Course Description

Takes students in a step-by-step manner through the program structures, data structures, and algorithms. In this class, we will begin by reviewing data structures. This class will quickly move to learning bags, queues, and stacks. The next step will be learning how to analyze algorithms and then move into common algorithms in searching, sorting, and graphs. This class will continue the object-oriented paradigm and use good programming techniques in all programming projects. The course will continue the objective of practicing social-technical software engineering and using tools to solve real-world problems.

## Course Learning Outcomes

- 1) 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.
- 2) 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.
- 3) 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 Tools and Course Textbooks.

Algorithms (4th Edition) by Robert Sedgwick and Kevin Wayne ISBN-13 978-0321573513 (Available on Amazon in different formats and the bookstore)

Tools – VSCode / Docker / Kubernetes, Programs will be done in Java only

**Course Schedule/Topics Covered. Please note that this is a tentative schedule and most likely will change slightly throughout the term**

Week	Date	In Class Topic	Assignment Due
1	09/04	Data Structures Review	
2	09/11	Recursion and Reduction	
3	09/18	Bags / Stacks / Queues	
4	09/25	Runtime of Algorithms	
5	10/2	Computational Experiments and order of growth	
6	10/9	Binary Trees	
7	10/16	Decision Trees / Balanced Trees	
8	10/23	Selection Sort / Insertion Sort	
9	10/30	Merge Sort / Quick Sort	
10	11/6	Applications of sorting	
11	11/13	Directed and Undirected Graphs	
12	11/20	Minimum Spanning Trees	
13	11/27	Shortest Paths	
14	12/4	String Sorts	
15	12/11	Event Driven Simulation	

## Assignment Grading

- Attendance – 10 %
- Assignments – 20%
- Quizzes – 20%
- Midterm Project – 25%
- Final Project – 25 %

## Grading Scale

	87-89.9% B+	77-79.9% C+	
95-100% A	84-86.9% B	74-76.9% C	
90-94.9% A-	80-83.9%B-	70-73.9% C-	
			69.9% or below F

## 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](mailto: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 Evaluation 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](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/uahcs>.

### **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](mailto: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](mailto: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.*