Northeastern University
College of Engineering

INFO 6205 Program Structure and Algorithms

Course Information
Course Title: Program Structure and Algorithms
Course Number: INFO 6205
Term and Year: Spring 6205
Credit Hour: 4
Course Format: On-Ground

Instructor Information
Full Name: Jagadeesh Vasudevamurthy Ph.D.
Email Address: j.vasudevamurthy@northeastern.edu

Course Prerequisites
Graduate Level CSYE 6200 Minimum Grade of B- or Undergraduate Level INFO 5100 Minimum Grade of B- or Graduate Level INFO 5100 Minimum Grade of B-

Course Description
This course covers fundamental programming constructs and their performance. These include lists, stacks, queues, trees, tries, and graphs. The course emphasizes several problem- solving techniques: brute force, recursion, divide-and-conquer, dynamic programming, greedy algorithms, iterative improvement and backtracking. The course also covers both theoretical and experimental measurement of performance, as well as the concept of complexity. The course will also illustrate the various design techniques with problems in graph theory as it applies to social networking paradigms.

Data structures and algorithms are two facets of one fundamental technique of programming. It is impossible to have one without the other. The class will be detail oriented and will provide an essential component for anyone contemplating a career as a software developer. Although the subject could be studied using any language, the language of this class is Java.

Standard Learning Outcomes

Learning outcomes common to all College of Engineering Graduate programs:
1. *An ability to identify, formulate, and solve complex engineering problems.*
2. *An ability to explain and apply engineering design principles, as appropriate to the program's educational objectives.*
3. *An ability to produce solutions that meet specified end-user needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.*

The Information Systems Program accepts students of different engineering backgrounds with minimum programming skills and produces first class Information Systems engineers that operate at the intersection of real-world complexity, software development, and IT management. Graduating students will be able to construct end-to-end advanced software applications that meet business needs.

Specific Learning Outcomes for the Information Systems program:
1. *Create a strong technical foundation through diverse, high-level courses*
2. *Built crucial interpersonal skills needed to succeed in any industry*
3. *Foster a deep level of applied learning through project based case studies*

Discussion forum

If you have general questions about the assignments, lectures, textbook, or other course materials, please post via Canvas.

Grading
Your grade for the course will be based on the following components:

1. Programming assignments, (includes problems in Leetcode and Hacker Rank)
2. Midterm exam,
3. Final exam.

Textbook

The following textbook is required. It contains a wealth of information beyond what we can cover in lecture; it is certain to enhance your understanding of algorithms and data structures.

Algorithms, 4th Edition by Robert Sedgewick and Kevin Wayne, Addison-Wesley Professional, 201x, ISBN 0-321-57351-X.

Programming assignments

The programming assignments involve applying the material from lecture to solve problems in science, engineering, and commerce.

Exercises

The exercises will be available on Canvas. The test cases will be provided by the instructors. All test cases must pass. The test cases should also pass on Leetcode site.

Exams

The schedule for the in-class midterm exam will be announced. The final exam is scheduled by the Registrar during the finals.

Course Outline will include a subset of the following topics depending on time

1. Data Structures: Stacks, Queues, Linked lists, trees, graphs
2. Elementary Sorts
3. Heapsort
4. Quicksort
5. Algorithm Complexity and Measures of Performance [big-O, big-Omega, and big-Theta]
6. Collections and Priority Queues
7. Elementary Symbol Tables
8. Balanced Search Trees
9. Hash Tables · Searching Applications 10)Undirected Graphs
10. 11)Directed Graphs 12)Minimum Spanning Trees 13)Shortest Paths 14)Substring Search 15)Regular Expressions
11. 16)Reductions, Tractability, and P=NP

End-of-Course Evaluation Surveys

Your feedback regarding your educational experience in this class is very important to the College of Professional Studies. 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 HuskyMail 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.

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/.

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 http://subjectguides.lib.neu.edu/edresearch.

24/7 Blackboard Technical Help
For immediate technical support for Blackboard, call 617-373-4357 or emailhelp@northeastern.edu

Within Blackboard, open a support case via the red support button on the right side of the screen, click Create Case

myNortheastern, e-mail, and basic technical support
Visit the Information Technology Services (ITS) Support Portal
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, member 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 www.northeastern.edu/titleix for a complete list of reporting options and resources both on- and off-campus.