Northeastern College of Engineering

INFO 5100 & Application Engineering and Development Fall 2024

Course Information
Course Title: Application Engineering and Development
Course Number: INFO 5100
Term and Year: Fall 2024
Credit Hour: 4
CRN: 20823
Course Format: In-person, lecture-based, project oriented, and hands-on

Instructor Information
Full Name: Ahmed Abdeen Hamed
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Office Hours: M/W 130PM-3PM

Instructor Biography
Professor of Data Science, LLMs, and Artificial Intelligence

Teaching Assistant Information
Full Name: Siddhant Subhashchandra Burse
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Office Hours:TBD

Course Prerequisites
N/A

Course Description
This is an in-depth course designed to provide students with the skills necessary to develop robust, real-world systems using Java. The course systematically guides students through the process of combining business processes and complex data models to create fully functional applications that meet stringent business requirements.

Students will gain a solid foundation in Java-based object-oriented programming (OOP), exploring essential concepts such as encapsulation, inheritance, polymorphism, and advanced design patterns. Emphasis is placed on engineering comprehensive systems that can be deployed across various platforms, including web applications, desktop applications, APIs, and service-based architectures.

The primary objective of this course is to practice software engineering methods and tools to solve complex, real-world problems. Through hands-on projects, students will learn innovative design and

programming techniques that allow for the rapid and effective construction of significant business applications. Additionally, the course will focus on developing the ability to analyze, refactor, and optimize Java code, ensuring that systems are not only functional but also maintainable and scalable.

By the end of this course, students will have mastered the art of systematically writing software programs that address a wide range of business challenges, utilizing Java's powerful object-oriented capabilities. This course is ideal for those seeking to deepen their expertise in Java and software engineering, with the goal of creating high-quality, fully functioning systems for diverse application domains.

Course Learning Outcomes
- **Understand Core Java and OOP Concepts:** Gain a comprehensive understanding of Java's core features and how they support object-oriented programming principles such as encapsulation, inheritance, polymorphism, and abstraction.
- **Design and Implement Object-Oriented Systems in Java**: Develop the ability to design and implement complex software systems using Java's object-oriented capabilities.
- **Master Java Syntax and APIs**: Become proficient in Java syntax, standard libraries, and APIs, particularly those related to system-level programming and data structures.
- **Apply OOP Principles in Java System Development**: Learn how to apply OOP concepts to the development of system-level programs in Java, including file handling, multithreading, and network communication.
- **Explore Advanced Java OOP Features**: Dive into advanced Java topics such as generics, lambda expressions, stream API, and the Java Collections Framework to build more efficient and flexible software.
- **Develop Robust Java Applications**: Cultivate strong skills in debugging, testing, and optimizing Java applications to ensure they are reliable, efficient, and maintainable.
- **Analyze and Refactor Java Code**: Learn to analyze Java code for performance and maintainability, and practice refactoring techniques to improve code quality.
- **Integrate Java with Other Technologies**: Explore how Java can be integrated with databases, web services, and other technologies to build comprehensive, real-world systems.

Required Tools and Course Textbooks.
- Optoinal Java Programming Textbook:Starting out with Java, From Control Structure through Objects
- Optional Information Systems Textbook: Introduction to Information Systems, 4th edition, by Patricia Wallace

Programming Language: Java JDK/SDK

Course Schedule/Topics Covered.

Week	Date	In Class Topic	Assignment Due
1	09/04	Introductions to Java	
		Information Systems and People	
2	09/11	Java Fundamentals	

		Information Systems and Strategy	
3	09/18	Decision Structures	Assignment 1
		Information and Communications Technologies: The Enterprise Architecture	
4	09/25	Loops and Files	
		Information Systems and the Enterprise	
5	10/2	Methods	Assignment 2
		Developing a Digital Presence: Websites, Social Media, and Mobile Apps	
6	10/9	A First Look at Classes	
		Business Intelligence and Analytics	
7	10/16	A Second Look at Classes and Objects	Assignment 3
		Collaborating with Technology	
8	10/23	Arrays and ArrayList class	
		Knowledge Management and E-Learning	
9	10/30	Text Processing and Wrapper Classes	Assignment 4
		Ethics, Privacy, and Security	
10	11/6	Inheritance	
		Systems Development	
11	11/13	Exceptions and Advanced File I/O	Assignment 5
		Information Systems Project Management and Strategic Planning	
12	11/20	Databases	
13	11/27	Project Discussions	Assignment 6
14	12/4	Project Presentation Final Exam	
15	12/11	Project Presentation Final Exam	

Rubric and Grading
- Attendance and Class Participation – 5 %
- 6 Assignments: 50%
- Midterm Exam: 20% : Exam date to be determined
- Final Exam: 25% Oral Presenting your project in fully functioning manner, answering questions from Professor, classmates, and potential observers –

Grading Scale

	87-89.9% B+	77-79.9% C+	
	84-86.9% B	74-76.9% C	
95-100% A			
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) 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

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.*