# INFO 5100: Application Engineering and Development

**Course Information**
Course Title: Application Engineering and Development
Course Number:INFO 5100
Term and Year: Fall 2024
Credit Hour: 4
CRN: 20821
Course Format: ON-Ground

**Instructor Information**
Full Name: Zheng Zheng
Email Address: zh.zheng@northeastern.edu

**Instructor Biography**
Dr. Zheng is an Assistant Teaching Professor in the College of Engineering at the Toronto Campus. Before joining Northeastern University, he served as the Technical Vice President and the Head of Artificial Intelligence (AI) Institute at a NASDAQ-listed company. Dr. Zheng earned his Ph.D. in Computer Science from McMaster University and his Master of Engineering degree from the University of Chinese Academy of Sciences. His research interests broadly encompass data management and AI, focusing on data quality, data analytics, text mining, and machine learning. He has published numerous papers in top-tier conferences and journals in his field.

**Teaching Assistant Information**
Full Name: Tapaswi Satyapanthi
Email Address:satyapanthi.t@northeastern.edu
Office Hours:2-3 PM on Friday on-site, or at other times by individual appointment online.
Online Zoom Link: https://northeastern.zoom.us/my/tapaswi

**Course Description**
Takes students in a step-by-step manner through the process of systematically combining UX techniques, business processes, and complex data models to assemble applications that are user-friendly and meet business requirements. Employs the object-oriented paradigm, visual user experience, and system design principles to put together complicated, powerful, real-world applications. The primary objective of this course is to practice social-technical software engineering methods and tools to solve real-world problems. Offers students an opportunity to learn innovative design and programming techniques to build significant business applications quickly; to practice simple and smart ways of making software construction enjoyable; and to master the art of how to systematically write software programs to solve any business problem.

**Course Learning Outcomes**

Based on satisfactory completion of this course, a student should be able to:

CLO1: Formulate use-case diagrams and scenarios to support understanding of user requirements.

CLO2: Use object-oriented design notations, including UML class diagrams and state machine diagrams to  model problem solutions.

CLO3: Use basic object-oriented design patterns to structure solutions to software design problems.

CLO4: Translate design features, such as classes and relationships, to implementations.

CLO5: Design and implement software employing the principles of modularity, encapsulation, information hiding, abstraction, and polymorphism.

CLO6: Design, implement, and use classes and methods that follow conventions and styles, and make appropriate use of advanced features such as inheritance, exception handling, and generics.

CLO7: Evaluate existing classes and software for the purposes of extension through inheritance.

CLO8: Create API documents for classes, fields, and methods.

CLO9: Design and implement test suites for automated unit testing.

CLO10: Re-factor existing source code to improve its design or efficiency.

**Required Tools and Course Textbooks.**

**Textbooks**

        Thinking in Java (Fourth Edition) by Bruce Eckel
        https://chenweixiang.github.io/docs/Thinking_in_Java_4th_Edition.pdf
        Head First Java by Kathy Sierra and Bert Bates
        http://dslab.us/wp-content/uploads/book/pdf/java/HeadFisrt_JAVA.pdf

**Tools**

        IntelliJ IDEA, Eclipse, VSCode, NetBeans, Brower-based IDE
        Other IDEs (Integrated Development Environment)

**Topics Covered.**

| Topic | Name |
|---|---|
| 1 | Introduction to Java |
| 2 | Introduction to Object-Oriented Analysis and Design (OOAD) |
| 3 | UML Use Case Modeling |
| 4 | UML Class Diagrams |
| 5 | UML State Machines |
| 6 | Introduction to MVC |
| 7 | Advanced  Java Features |
| 8 | Documenting with Javadoc |
| 9 | Testing using Unit Test |
| 10 | Design Patterns |
| 11 | User Interface Design |
| 12 | Multi-threaded Programming |
| 13 | Introduction to Business Process Modeling |
| 14 | Introduction to Software Testing |

**Plicy on late work**: late submissions of course work will not be graded or considered without a

documented and approved excuse.

**Assignment Grading**

| Assignments | 20% |
|---|---|
| Labs and Project (**Attendance Mandatory**) | 25% |
| Midterm | 25% |
| Final Exam (comprehensive) | 30% |

**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.*