Northeastern University
College of Engineering

INFO 5100 Application Engineering and Development
Summer 2025 Course Syllabus

Course Information

Course Title:	Application Engineering and Development
Course Number:	INFO 5100 (CRN: 53284)
Credit Hour:	4
Course Format:	Online
Lecture Time:	Tuesday 6:00-9:20 pm
Duration:	May 5 – Aug 16

Instructor Information

Instructor:	Professor Kal Bugrara
Email:	kmb@coe.neu.edu
Secondary Contact:	Zihao Liu
Email:	zi.liu@northeastern.edu

Course Prerequisites

None

Course Aims

The primary objectives of this course are to practice social-technical software engineering techniques to solve real-world business problems. Students will be equipped with practical design and programming techniques for the purpose of building significant business applications quickly. In a step-by-step manner, the instructor will take you through the process of systematically combining UX techniques, business processes, and complex data models to assemble designs that are user friendly and meet business requirements. You will learn how to employ systems thinking, the object-oriented paradigm, visual user interface design principles, the visual Programming technique, as well as productivity tools to put together complicated, powerful designs. We will practice simple and smart ways of making software programming enjoyable.

Course Outcomes

Students will learn how to build models that represent the full functionality of software applications. The modularity principle will be used to build powerful models that lend themselves to specifications for software implementation. In addition, the student will learn basic programming techniques to prepare them for INFO 5100 and other technical courses. Overall, the class will teach the students how to be a functional architect and take the lead in using software to drive innovative solutions to business problems, in healthcare, financial, as well as other social challenges.

An Interactive Setting

Besides the lectures, the class will have lab sessions, which will permit continuous interaction. The time will be divided into lecture, lab, help sessions; students will engage in hands-on design and application modeling under instructor supervision. For the duration of the class, we will focus on a single business problem – you will focus on one problem for the entire semester and that you will start small and gradually expand the scope. Students will practice the art of how to break down business requirements into small manageable components, program the components, and assemble those components into useful designs.

Our Approach

Students will select a practical business problem and articulate its underlying user requirements. They will engineer an information model capturing the important aspects of the business problem and define the business processes necessary to deliver the solution that will satisfy the stated business requirements as well as define the user tasks as screen designs. We will work on identifying and incorporating the information needed for the task (screen) at hand. The information model will be linked to user screens through input and output flows and data transformation.

Tentative Schedule of the Course

Date	**Lecture Topic/Activity**	**Java Lecture with examples**	**Lab Work**	**Assignment**
W 1 May 5	Introduction to the course: Socio-technical engineering and Ecosystem Design. Functional vs Component structures	Java programming concepts, Class and Objects	Lab 0	
W 2 May 12	Creating and displaying many components, reference objects, back design principles	Java Class & Object	Lab 1	Assignment 1
W 3 May 19	Designing the person (subject and user) into the application User Profiles and the Reference Architecture		Lab 2	Assignment 2
W 4 May 26	Login techniques/ procedures (how to engineer human into application), the concept of roles, decoupling entities (person/user account),	Variable, Keywords, Java Constructors	Lab 3	
W 5 Jun 2	Introduction to multi-party relationships	Java Data Types	Lab 4	Assignment 3

W 6 Jun 9	Case Study: Digital University Model 1		Lab 5	
W 7 Jun 16	Case Study: Digital University Model 2	Java abstraction/ encapsulation/ inheritance/ polymorphism/ object instantiation	Lab 6	Assignment 4
W 8 Jun 23	Case Study: Digital University Model 3		Lab 7	
W 9 Jun 30	Case Study: Order Processing Design and Model Comparison	Java Container	Lab 8	Assignment 5
W 10 Jul 7	Ecosystem Design Technique I Final Project Announcement Midterm Exam		Lab 9	
W 11 Jul 14	Ecosystem Design Technique II			
W 12 Jul 21				
W 13 Jul 28				
W 14 Aug 4				Final Project
Final Week Aug 11	Final Project Presentation			

Element of the Smart Programming

This course will review the essential elements of any programming language—such as arrays, control structures, class definitions, as well as visual forms and components. It shows how to develop and execute Java applications. Various assignments, which strengthen the understanding of how programming works will be studied.

Tools

Students are required to have a personal laptop that is in good working condition, free from significant hardware or software issues, to ensure seamless participation in programming, labs, and assignments. The class will use visual programming tools like scratch and NetBeans for basic programming and form design.

Git and GitHub will be used for version control and collaborative coding practices.

Grading

Coursework will be weighted as follows:

Name	**Percentage**
Assignment	20%
Lab Work	10%
Quizzes & Exams	20%
Attendance	10%
Final Project	40%

Grading Standard:

Letter Grade	**Cumulative Percentile**
A	95% - 100%
A-	90% - 94.99%
B+	87% - 89.99%
B	84% - 86.99%
B-	80% - 83.99%
C+	77% - 79.99%
C	74% - 76.99%
C-	70% - 73.99%
F	Below 70%

Student performance in this course will be assessed through a combination of assignments and lab work, quizzes, examinations, and the execution and presentation of a final project.

A 10% deduction per day will be applied to late submissions, for a maximum of 3 days. Submissions that are more than 3 days late will not be accepted.

Exams and quizzes will assess students on all material covered up to that point in the course. This includes but not limited to lecture content, java lecture, lab work, assignment. No make-up quizzes or exams will be given unless an emergency arises, in which case documentation is required for consideration.

Students are responsible for achieving the grades necessary to fulfill any external requirements, such as those related to course prerequisites, employment opportunities, visa conditions, scholarships, or financial aid. This requires sustained effort and consistent performance throughout the semester.

Grades will be assigned based solely on demonstrated academic performance and will not be adjusted to accommodate individual circumstances. Extra credit opportunities, if offered, will be

made available to the entire class and not to individual students. Final grades may be subject to curving at the discretion of the professor.

Assignments & Lab Work Code Review

Typically, Lab work will be assigned weekly; Assignment will be assigned bi-weekly. All lab and assignment materials will be posted on Canvas weekly.

After each assignment deadline, TAs will conduct a 30-minute code review session with each student (duration depends on the assignment). These sessions will cover all previously assigned lab work and assignments. Each student will be assigned to a TA for their code review session. The grades for all lab work and assignments will be determined based on the student's performance during the code review session. Missing the code review session will result in a grade of 0 for the assignments and labs.

Attendance

Attendance will be tracked using the Qwickly Attendance App. Please download and sign up for the app from the AppStore or PlayStore using your Northeastern credentials before lecture, as you will need to scan a QR code during each lecture to register your attendance.

During each lecture, a QR code will be displayed at a random time and/or multiple times. Students must scan the code using the app to register their attendance. Failure to scan will result in being marked absent for that lecture.

Students registered in MGEN courses 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.

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. 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 email 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.

When there is evidence that a student has committed plagiarism, copied the work of others, allowed others to copy their work, cheated on an exam, altered class material or scores, or has inappropriate possession of exams, or sensitive material, the incident will be investigated. The consequences for academic dishonesty are severe and that will include a straight F in the course with the potential for dismissal.

Go to https://osccr.sites.northeastern.edu/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 https://disabilityaccessservices.sites.northeastern.edu/

Library Services

The Northeastern University Library is 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 Canvas Technical Help

For immediate technical support for Blackboard, call 617-373-4357 or email help@northeastern.edu

Within Canvas, 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, 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/Links to an external site. 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.