Northeastern University
College of Engineering

INFO 5100 Application Engineering and Development

Course Information
Course Title: Application Engineering and Development
Course Number: INFO 5100
Term and Year : Spring 2022
Credit Hour: 4
Course Format: On-ground

Instructor Information
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Course Prerequisites
N/A

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.

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*

Course Outcomes and Assesment Standards

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.

Students will lean 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.S

Tentative Schedule of the Course

Lecture	Topic/Activity	Lab Work/Testing	Homework	Java Lecture Lab /examples
Week 1	Introduction to the course: Socio-technical engineering and Eco-system Design. Functional vs Component structures	sdk and Netbeans installation, Completing lab 1	Extend lab with additional class attributes	Program structure, java virtual machine, compilation steps
Week 2	Creating and displaying multiple objects	Implement Model relationships in java as complete app. Weekly quizzes start	Extend the lab with more attributes	Java syntax, class files, classes, objects, attributes and methods
Week 3	User Interaction Design	User flows as screen navigation flows using the card layout in java, passing objects between screens	Extend the lab with additional screens and user flows	Data types, integers, strings, primitive types, variables vs values, reference variables, memory usage
Week 4	Modeling the supply-side	Finding bugs or learning how to use the debugger	Write a program with bugs and show how you isolate the problem. Prepare a report	Functions and methods, parameter passing in java, program control flow, code statements and blocks
Week 5	Designing the person (subject and user) into the application	Implement the login process using person and user account directories	Show how to save the hash of the password as part of the user account	Simple arrays, indexing, While and For loops. OOD principle: Abstraction, Inheritance, Polymorphism, Encapsulation.
Week 6	Order Processing Design and model comparison	Implement a program for data(csv) management(CRUD)	Implement an application based on specific model	Java collections(List, Map, Set)
Week 7	Digital Marketing, customization and targeting	Implement a program for data(csv) management(CRUD)	Implement an application based on specific model	Java sort API(Comparator, Comparable)

Week 8	Digital Eco-System Models Final Project Announcement Mid-term exam	Introduce the ecosystem in java application with db4o		Introduction to data structures: stacks and queues with applications
Week 9	Eco-System Design Techniques part I	Introduce the ecosystem in java application with db4o	Final project	Memory management and garbage collection in java
Week 10 *Week 11*	Eco-system Design part II	Finish the final project design doc		Advanced collections,multithreading
	Final Project Status Check	Start final Project		Unit testing best practices
Week 12	Case Studies	Implementation		Introduction to Lambda functions
Week 12	Advanced Topics	Implementation		
Week 13	Advanced Topics	Implementation		
Week 14	Advanced Topics	Weekly quizzes end		
Week 15	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

The class will use visual programming tools like scratch and NetBeans for basis programming and form design.

Grading

Coursework will be weighted as follows:

Name	**Percentage**
Assignment and Lab	20%
Lecture weekly quizzes	20%
Spot Attendance	10%
Final Project	50%

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

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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.

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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.