

SOFTWARE ENGINEERING (SE)

SE 111 HTML and JavaScript

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

In this course, students will gain an introduction to internet technologies and basic programming logic through the study of HTML 5 and JavaScript. File organization and implementation of web graphics will be stressed throughout this course.

SE 116 Programming Essentials Using Python

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

A study of the Python programming language will be used as the vehicle to introduce flowcharting, control structures, calculations, interactive programming techniques, and editing. Students will be introduced to a distributed version control system using git. Students will learn to write high-quality Python programs solving a variety of applications. Laboratory projects will grow in complexity as students gain hands-on experience. Both software engineering and networking engineering applications will be provided.

SE 126 Intermediate Programming Using Python

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 116

A study of the Python programming language will be used as the vehicle to introduce advanced programming concepts. At the end of the course, students should be able to analyze problems and develop their solutions by applying advanced flowcharting, coding and programming techniques. Students should be able to design, develop, test and implement programs that involve nested conditional control structures, file handling, interactive processing, data editing, array processing, and sort and search algorithms.

SE 133 Introduction to Database Management Systems

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: NE 115

Given a business scenario, students will learn how to design and implement a relational database that will store and secure information according to industry standards. Students will become proficient in the Structured Query Language (SQL) and apply their skills on both MySQL and SQL Server. Students are taught to create and maintain database objects and to store, retrieve, and manipulate data.

SE 135 Introduction to Data Analytics

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 126

Students will learn the fundamentals of data analytics. Python and Microsoft Excel will be used to analyze data sets for trends in the data. Students will also gain an understanding of the workflow of a typical data engineering project. Topics include pivot tables, charts, Jupyter notebooks, NumPy and Python pandas.

SE 137 Cascading Style Sheets

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Prerequisites: SE 111

Students will learn how to use responsive design to create web sites that are visually appealing on any device with Cascading Style Sheets (CSS). Topics include code reuse, grid layouts and flexboxes. Students will also research current CSS frameworks and use best practices to determine which framework is best suited for a given project.

SE 245 C#

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 126

This first programming course in C# introduces students to topics that may include an overview of a microcomputer system, an introduction to control structures, beginning the problem-solving process, completing the problem-solving process and getting started with C#, variables, constants, arithmetic operators, and assignment statements, built-in functions, program-defined value-returning functions, and program-defined void functions.

SE 247 Introduction to Data Visualization

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 133 and SE 135

Students will learn how to perform data analysis with Excel and Python using different summarization techniques and consequently displaying the data through charts, graphs and pivot tables. In addition, a current data visualization platform such as Microsoft's PowerBI or Tableau will be used to create rich dashboards allowing end-users the opportunity to view and analyze the data in a user-friendly and visually appealing manner.

SE 251 JavaScript

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 111

This course builds on the student's understanding of JavaScript learned in previous courses. JavaScript is the programming language used to extend the capabilities of the web browser to include animation, interactive forms, object control, and basic decision-making. Topics addressed will include client-side form validation, Object Oriented Programming, DOM Manipulation, data IO, persistence and the HTML 5 canvas.

SE 256 Web Development Using .NET

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: (SE 111 and SE 245) or (GDS 111 and GDS 134)

Students will learn the use of server-side scripting to create dynamic, database driven sites using the .NET platform.

SE 264 User Interface Design

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Prerequisites: SE 256 or SE 266

This is a project-based course focused on developing a polished and logical user interface for a project of the student's choosing. Ideally, students will design and develop an interface for their capstone project. This course will instruct students in the logistical concerns inherent in designing an intuitive UI. Topics to be covered are user experience, I/O and visual hierarchy. In addition, this course will provide insight into the fundamentals of utilizing Photoshop for front end production. Photoshop topics include wireframe and comp creation, image file formats, image compression, resizing, color space, resolution, pixel measurements, batch processing, and sprite sheets. Students will learn and utilize advanced CSS 3.0 techniques combined with JavaScript and jQuery to develop their designs into functional web pages.

SE 265 AS Capstone Project

6 Lab Hours, 3 Quarter Credit Hours

Prerequisites: SE 256 or SE 266

This course provides an opportunity for each student to develop a substantial project in an area of interest. The resulting project, in conjunction with a faculty member, can include work conducted with companies in the area. The culmination of this course is a major presentation of project results.

SE 266 Web Development Using PHP and MySQL

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 111 and SE 133

Students will learn the use of server-side scripting to create dynamic, database driven sites using PHP and MySQL. Emphasis is placed on applications that are user-friendly and secure.

SE 373 Advanced Open Source Web Development

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 251 and SE 266

This course builds on the student's understanding of web applications. This course explores the MEAN stack: Server-Side JavaScript and libraries, Open Source View Engines and NoSQL databases. Students will create web applications that use Mongo for the data layer, Express and Node for the server-side logic, and view engines for the front-end. This course provides students with an opportunity to research and learn about Open Source technologies of their choosing. Finally, students will learn about routing, testing and deploying web applications to a number of different cloud platforms.

SE 377 Cloud-Based Application Development

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 373 and SE 385

This course offers an in-depth introduction to cloud-based development, focusing on key areas such as storage, security, computing, and messaging. Through hands-on experiences, students will learn to design and develop applications using serverless technologies. By the end of the course, participants will have the skills to build and deploy scalable applications on the AWS cloud platform, empowering them to apply these techniques in real-world scenarios

SE 379 React Programming

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 251

In this course, students will learn about the use of the React framework in front-end web application development. Topics will include but are not limited to: the benefits of React; the render lifecycle; how to build multipage applications; how to send HTTP requests using React and custom hooks; as well as global state management with Redux.

SE 380 React Native

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 379

In this course, students will examine cross-platform mobile development using React Native. Topics will include but are not limited to: the advantages and drawbacks compared to native development, distinctions from React for web, accessing device capabilities such as device storage, establishing mobile navigation patterns, and creating animations to improve the overall look and feel of your mobile application.

SE 385 Java

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 245

Students will be introduced to the concepts of object-oriented programming using Java. In addition to a further development of programming constructs and concepts, students will be exposed to programming methods unique to object-oriented languages such as classes, inheritance and polymorphism.

SE 394 Algorithms in Software Engineering

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 385

This course includes an overview of the algorithms and data structures used in software applications today. Topics include but are not limited to linked lists, queues, stacks and trees. Students will learn to analyze the complexity of different algorithms and gain an appreciation for efficient computing.

SE 398 Advanced SQL

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Prerequisites: SE 133

Students will study advanced topics in SQL, including views, triggers, indexes and stored procedures. The course emphasizes SQL dos and don'ts for these topics and students are introduced to a multitude of database standards: Military, ANSI, ISO, and Industry.

SE 402 Design Patterns

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 252 or SE 385

In software engineering, a design pattern is a general repeatable solution to a commonly occurring problem in software design. Design patterns can speed up the development process by providing tested, proven development paradigms. This course will introduce students to this state-of-the-art software development methodology.

SE 407 Advanced .NET

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 256

Students will use the .NET framework to develop highly interactive and robust web applications in teams of two or three students. Robustness of the applications is ensured by utilizing database layers, component-based development and proper use of advanced error handling techniques.

SE 408 Programming Mobile Devices

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 131 or SE 385

Students will learn how to develop games for mobile devices such as iPhones, iPads and Apple Watch. Students will use one of the programming languages commonly used in developing for Apple platforms, such as Swift or Objective-C, and use it to develop gaming apps that will run on an Apple device of their choice. Topics include memory management, sprites, Apple's model-view-controller architecture, sounds, and graphics.

SE 409 iOS Programming

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 245

Students will learn how to develop applications for mobile devices such as cell phones, handhelds (PDAs) and tablets. Students will use languages such as C#, Obj-C, C++ or Java to develop applications that will run on a mobile device. Topics include memory management, user interfaces, storage cards, sounds and graphics.

SE 414 Introduction to Senior Project

3 Class Hours, 3 Quarter Credit Hours

Prerequisites: SE 398 and SE 407

The objective of the senior project is to integrate skills learned during the students' time at New England Tech. Within a team of at least 2 and no more than 4 students, a real-world application is developed over a period of 20 weeks. The Introduction to the Senior Project spans the first 10 weeks of this period and in this course, a proposal, a functional specification and a database design is created and implemented. In addition, Microsoft Project is used to develop and create a Gantt Chart that specifies in detail how the project will be implemented during the last 10 weeks of the senior project. The final project will be presented to the faculty and is evaluated by three faculty members.

SE 417 Software Security

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

This course studies known problems in the field of software security. The focus will be on awareness of security risks in software development and students will learn methods to avoid these issues when they write their own applications. Topics include unvalidated input, buffer overflows, injection flaws, insecure storage and improper error handling.

SE 419 Big Data

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Prerequisites: SE 398

This course will introduce students to data warehousing and mining concepts by focusing on big data lakes, storage strategies, data queries, data operations and predictive analytics. This course will examine storage solutions and architectures as well as trending technologies necessary to enable organizations to maximize their investment within their business intelligence departments. Students will compare and contrast product offerings from major vendors as well as analyze case studies of organizations using these technologies to drive their business. Students will also gain experience with the latest tools and techniques through a series of hands-on exercises.

SE 423 Operating Systems

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 385

This course covers basic operating system concepts and relates them to important tasks and activities in software development. The operating system is a resource manager and its design must be intimately tied to the hardware and software resources that it manages. These resources include processors, memory, secondary storage (such as hard disks), other I/O devices, processes, threads, files, databases and more. This course addresses interactions with the operating system from the perspective of a software engineer to utilize these resources through process management and concurrency, memory management strategies and file system management.

SE 425 Senior Project

6 Lab Hours, 3 Quarter Credit Hours

Prerequisites: SE 414

This course provides an opportunity for each student to develop a substantial project in an area of interest as proposed in SE 414. The resulting project, in conjunction with a faculty member, can include work conducted with companies in the area. The culmination of this course is a major presentation of project results.

SE 426 Web Services

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

Prerequisites: SE 256

Students will learn how to design and access different kinds of web services using primarily Microsoft technology. The course covers an introduction to web services as well as other topics including SOAP, JSON, WCF, Web API, gRPC and GraphQL.

SE 428 Emerging Technologies in Software Engineering and Web Development

3 Class Hours, 3 Quarter Credit Hours

This course is a discussion of emerging and future technologies that are likely to impact the industry. Students will study a variety of emerging technologies, write a paper on a topic of interest and present this paper to their peers.

SE 429 Applied Machine Learning

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Prerequisites: IT 379 and SE 419

This course introduces the student to machine learning and data mining concepts by focusing on supervised learning and unsupervised learning models used for classification and predictive analysis. The course examines theory and implementation of deep learning models necessary to enable organizations to maximize their investment within their business intelligence departments, analyze images and process natural language text and audio. The differences and dependencies between machine learning and artificial intelligence applications are addressed. Students will gain experience with the latest Python/R libraries and modeling techniques through a series of hands-on exercises.