



جامعة الفيصل  
Alfaisal University

# Software Engineering Program

Alfaisal University, College of Engineering

## Curriculum Structure and Study Plan

The Software Engineering curriculum is composed of **134** Credit Hours (CRHs) divided as follows:

**I. General Education Requirements (47 CRHs)**

1. Mathematics & Statistics (15 CRHs)
2. Basic Sciences (12 CRHs)
3. Humanities (20 CRHs)

**II. Core Requirements (87 CRHs)**

1. Software Engineering Courses (70 CRHs)
2. College of Engineering Courses (8 CRHs)
3. Technical Electives (9 CRHs)
4. Summer Internship (0 CRHs)

<b>I. General Education Requirements (47 CRHs)</b>
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**1. Mathematics & Statistics (15 CRHs)**

Course Code	Course-Title	Credit Hours (CRHs)				Pre-Requisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect.	Lab	Tut		
MAT 101	Calculus I	3	3	0	2		
MAT 112	Calculus II	3	3	0	2	MAT 101	
MAT 212	Linear Algebra	3	3	0	0	MAT 112	
MAT 224	Numerical Methods	3	3	0	0	MAT 212, CSC 112 or equivalent	
STA 212	Probability and Statistics for Engineers	3	3	0	0	MAT 112	

**2. Basic Sciences (12 CRHs)**

Course Code	Course-Title	Credit Hours (CRHs)				Pre-Requisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect	Lab	Tut		
CHM 102	Introduction to Chemistry	3	3	0	1		
CHM 102 L	Introduction to Chemistry Lab	1	0	2	0		CHEM 102
PHU 103	Mechanics and Waves for Engineers	3	3	0	1		MAT 101
PHU 103 L	Mechanics and Waves for Engineers Lab	1	0	2	0		PHU 103
PHU 124	Electromagnetism and Optics for Engineers	3	3	0	1	PHU 103 & MAT 101	
PHU 124 L	Electromagnetism and Optics for Engineers Lab	1	0	2	0	PHU 103 & MAT 101	PHU 124

**3. Humanities (20 CRHs)**

Course Code	Course-Title	Credit Hours (CRHs)				Pre-Requisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect	Lab	Tut		
ENG 101	Freshman English I	3	3	0	0		
ENG 112	Freshman English II	3	3	0	0	ENG 101	
ENG 222	Technical Writing	3	3	0	0	ENG 112	
PHL 101	Engineering Ethics	3	3	0	0		
ISL 101	Islamic Studies I	2	2	0	0		
ISL 112	Islamic Studies II	2	2	0	0	ISL 101	
ARB 101	Arabic Language and Literature I	2	2	0	0		
ARB 112	Arabic Language and Literature II	2	2	0	0	ARB 101	

**II. Core Requirements (87 CRHs)**

**1. Software Engineering Courses (70 CRHs)**

Course Code	Course-Title	Credit Hours (CRHs)				Pre-Requisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect	Lab	Tut		
SE 100	Programming for Engineers	3	3	0	0		
SE 100 L	Programming for Engineers Lab	1	0	2	0		SE 100
SE 120	Object-Oriented Programming	3	3	0	0	SE 100	
SE 120 L	Object-Oriented Programming Lab	1	0	2	0	SE 100	SE 120
SE 201	Introduction to Software Engineering	3	3	0	0	SE 120	
SE 201 L	Introduction to Software Engineering Lab	1	0	2	0	SE 120	SE 201
SE 212	Discrete Structures for Software Engineers	3	3	0	0	SE 120	
SE 214	Algorithms and Data Structures	3	3	0	0	SE 120	
SE 214 L	Algorithms and Data Structures Lab	1	0	2	0	SE 120	SE 214
SE 217	Software and Society	3	3	0	0		
SE 221	Software Requirements and Design	3	3	0	0	SE 201 & SE 214	
SE 221 L	Software Requirements and Design Lab	1	0	2	0	SE 201 & SE 214	SE 221
SE 223	Digital Logic Design	3	3	0	0	PHU 124	
SE 223 L	Digital Logic Design Lab	1	0	2	0	PHU 124	SE 223
SE 312	Database Management Systems	3	3	0	0	SE 214	
SE 312 L	Database Management Systems Lab	1	0	2	0	SE 214	SE 312
SE 314	Operating Systems	3	3	0	0	SE 214	

## Software Engineering - CoE

SE 323	Software Project and Process Management	3	3	0	0	SE 221	
SE 324	Web Application Development	3	3	0	0	SE 312	
SE 324 L	Web Application Development Lab	1	0	2	0	SE 312	SE 324
SE 327	Embedded Systems	3	3	0	0	SE 314	
SE 329	Human-Computer Interface Design	3	3	0	0	SE 221	
SE 410	Software Architecture	3	3	0	0	SE 221	
SE 412	Software Testing and Quality Assurance	3	3	0	0	SE 221	
SE 415	Professional Practice and Software Documentation	3	3	0	0	SE 412	
SE 416	Mobile Application Development	3	3	0	0	SE 221 & SE 312	
SE 416 L	Mobile Application Development Lab	1	0	2	0	SE 221 & SE 312	SE 416
SE 421	Software Maintenance, Configuration Management and Evolution	3	3	0	0	SE 412	
SE 490	Software Engineering Capstone Project I	2	1	3	0	101 CRHs passed	
SE 491	Software Engineering Capstone Project II	2	1	3	0	SE 490	

### 2. College of Engineering Courses (8 CRHs)

Course Code	Course-Title	Credit Hours (CRHs)				Pre-Requisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect	Lab	Tut		
EE 305	Computer Networks	3	3	0	0	SE 100	
EE 305 L	Computer Networks Lab	1	0	2	0	SE 100	EE 305
EE 307	Computer Architecture	3	3	0	0	SE 100 & (SE 223 or EE 210)	
EE 307 L	Computer Architecture Lab	1	0	2	0	SE 100 & (SE 223 or EE 210)	EE 307

**3. Technical Electives (9 CRHs)**

Select from the following courses:

Course Code	Course-Title	Credit Hours (CRHs)				Pre-Requisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect	Lab	Tut		
SE 440	Special Topics in Software Engineering	3	3	0	0	101 CRHs passed	
SE 441	Telecommunications Software Design	3	3	0	0	101 CRHs passed	
SE 442	Social Networks for Software Engineers	3	3	0	0	101 CRHs passed	
SE 443	Cloud Computing for Software Engineers	3	3	0	0	101 CRHs passed	
SE 444	Artificial Intelligence	3	3	0	0	101 CRHs passed	
SE 445	Information and Software Security	3	3	0	0	101 CRHs passed	
SE 440	Special Topics in Software Engineering	3	3	0	0	101 CRHs passed	

**4. Summer Internship (0 CRHs)**

Course Code	Course-Title	Credit Hours (CRHs)	Pre-Requisite Course Code	Co-Requisite Course Code
SE 390	Software Engineering Summer Internship	0	101 CRHs passed and department approval	

**Typical Study Plan-Software Engineering Program**

**4-Year Curriculum: 134 Credit Hours Total**

Each course below follows the following format:

Course code, Course Title, and Course Credit Hours (Lecture contact hours – Lab contact hours – Tutorial contact hours)

<i>1<sup>st</sup> Year</i>			
<b>Fall</b>	Course Code	Course-Title	CRHs
	<b>ENG 101</b>	<b>Freshman English I</b>	<b>3 (3-0-0)</b>
	<b>MAT 101</b>	<b>Calculus I</b>	<b>3 (3-0-2)</b>
	<b>PHU 103</b>	<b>Mechanics and Waves for Engineers</b>	<b>3 (3-0-1)</b>
	<b>PHU 103 L</b>	<b>Mechanics and Waves for Engineers Lab</b>	<b>1 (0-2-0)</b>
	<b>SE 100</b>	<b>Programming for Engineers</b>	<b>3 (3-0-0)</b>
	<b>SE 100 L</b>	<b>Programming for Engineers Lab</b>	<b>1 (0-2-0)</b>
	<b>CHM 102</b>	<b>Introduction to Chemistry</b>	<b>3 (3-0-1)</b>
	<b>CHM 102 L</b>	<b>Introduction to Chemistry Lab</b>	<b>1 (0-2-0)</b>
<b>Total</b>			<b>18</b>
<b>Spring</b>	Course Code	Course-Title	CRHs
	<b>PHL 101A</b>	<b>Engineering Ethics</b>	<b>3 (3-0-0)</b>
	<b>ENG 112</b>	<b>Freshman English II</b>	<b>3 (3-0-0)</b>
	<b>MAT 112</b>	<b>Calculus II</b>	<b>3 (3-0-2)</b>
	<b>PHU 124</b>	<b>Electromagnetism and Optics for Engineers</b>	<b>3 (3-0-1)</b>
	<b>PHU 124 L</b>	<b>Electromagnetism and Optics for Engineers Lab</b>	<b>1 (0-2-0)</b>
	<b>SE 120</b>	<b>Object-Oriented Programming</b>	<b>3 (3-0-0)</b>
	<b>SE 120 L</b>	<b>Object-Oriented Programming Lab</b>	<b>1 (0-2-0)</b>
<b>Total</b>			<b>17</b>

<i>2<sup>nd</sup> Year</i>			
<b>Fall</b>	Course Code	Course-Title	CRHs
	<b>ENG 222</b>	<b>Technical Writing</b>	<b>3 (3-0-0)</b>
	<b>MAT 212</b>	<b>Linear Algebra</b>	<b>3 (3-0-0)</b>
	<b>SE 201</b>	<b>Introduction to Software Engineering</b>	<b>3 (3-0-0)</b>
	<b>SE 201 L</b>	<b>Introduction to Software Engineering Lab</b>	<b>1 (0-2-0)</b>
	<b>SE 212</b>	<b>Discrete Structures for Software Engineers</b>	<b>3 (3-0-0)</b>
	<b>SE 214</b>	<b>Algorithms and Data Structures</b>	<b>3 (3-0-0)</b>
	<b>SE 214 L</b>	<b>Algorithms and Data Structures Lab</b>	<b>1 (0-2-0)</b>
<b>Total</b>			<b>17</b>
<b>Spring</b>	Course Code	Course-Title	CRHs
	<b>MAT 224</b>	<b>Numerical Methods</b>	<b>3 (3-0-0)</b>
	<b>STA 212</b>	<b>Probability and Statistics for Engineers</b>	<b>3 (3-0-0)</b>
	<b>SE 217</b>	<b>Software and Society</b>	<b>3 (3-0-0)</b>
	<b>SE 221</b>	<b>Software Requirements and Design</b>	<b>3 (3-0-0)</b>
	<b>SE 221 L</b>	<b>Software Requirements and Design Lab</b>	<b>1 (0-2-0)</b>
	<b>SE 223</b>	<b>Digital Logic Design</b>	<b>3 (3-0-0)</b>
	<b>SE 223 L</b>	<b>Digital Logic Design Lab</b>	<b>1 (0-2-0)</b>
<b>Total</b>			<b>17</b>



<i>3<sup>rd</sup> Year</i>			
<b>Fall</b>	Course Code	Course-Title	CRHs
	<b>ISL 101</b>	<b>Islamic Studies I</b>	<b>2 (2-0-0)</b>
	<b>EE 305</b>	<b>Computer Networks</b>	<b>3 (3-0-0)</b>
	<b>EE 305 L</b>	<b>Computer Networks Lab</b>	<b>1 (0-2-0)</b>
	<b>EE 307</b>	<b>Computer Architecture</b>	<b>3 (3-0-0)</b>
	<b>EE 307 L</b>	<b>Computer Architecture Lab</b>	<b>1 (0-2-0)</b>
	<b>SE 312</b>	<b>Database Management Systems</b>	<b>3 (3-0-0)</b>
	<b>SE 312 L</b>	<b>Database Management Systems Lab</b>	<b>1 (0-2-0)</b>
	<b>SE 314</b>	<b>Operating Systems</b>	<b>3 (3-0-0)</b>
<b>Total</b>			<b>17</b>
<b>Spring</b>	Course Code	Course-Title	CRHs
	<b>ARB 101</b>	<b>Arabic Language and Literature I</b>	<b>2 (2-0-0)</b>
	<b>SE 323</b>	<b>Software Project and Process Management</b>	<b>3 (3-0-0)</b>
	<b>SE 324</b>	<b>Web Application Development</b>	<b>3 (3-0-0)</b>
	<b>SE 324 L</b>	<b>Web Application Development Lab</b>	<b>1 (0-2-0)</b>
	<b>SE 327</b>	<b>Embedded Systems</b>	<b>3 (3-0-0)</b>
	<b>SE 329</b>	<b>Human-Computer Interface Design</b>	<b>3 (3-0-0)</b>
<b>Total</b>			<b>15</b>

<b>Summer</b>	Course Code	Course-Title	CRHs
	<b>SE 390</b>	<b>Software Engineering Summer Internship</b>	<b>0</b>
<b>Total</b>			<b>0</b>

<i>4<sup>th</sup> Year</i>			
<b>Fall</b>	Course Code	Course-Title	CRHs
	<b>ISL 112</b>	<b>Islamic Studies II</b>	<b>2 (2-0-0)</b>
	<b>SE 410</b>	<b>Software Architecture</b>	<b>3 (3-0-0)</b>
	<b>SE 412</b>	<b>Software Testing and Quality Assurance</b>	<b>3 (3-0-0)</b>
	<b>SE 416</b>	<b>Mobile Application Development</b>	<b>3 (3-0-0)</b>
	<b>SE 416 L</b>	<b>Mobile Application Development Lab</b>	<b>1 (0-2-0)</b>
	<b>SE 44*</b>	<b>Technical Elective</b>	<b>3 (3-0-0)</b>
	<b>SE 490</b>	<b>Software Engineering Capstone Project I</b>	<b>2 (1-3-0)</b>
<b>Total</b>			<b>17</b>
<b>Spring</b>	Course Code	Course-Title	CRHs
	<b>ARB 112</b>	<b>Arabic Language and Literature II</b>	<b>2 (2-0-0)</b>
	<b>SE 415</b>	<b>Professional Practice and Software Documentation</b>	<b>3 (3-0-0)</b>
	<b>SE 421</b>	<b>Software Maintenance, Configuration Management and Evolution</b>	<b>3 (3-0-0)</b>
	<b>SE 44*</b>	<b>Technical Elective</b>	<b>3 (3-0-0)</b>
	<b>SE 44*</b>	<b>Technical Elective</b>	<b>3 (3-0-0)</b>
	<b>SE 491</b>	<b>Software Engineering Capstone Project II</b>	<b>2 (1-3-0)</b>
<b>Total</b>			<b>16</b>

**Technical Electives**

<b>Course Code</b>	<b>Course Name</b>	<b>CRHs</b>	<b>Pre-Requisite Course Code</b>
SE 435	Undergraduate Research in Software Engineering	3(0-6-0)	Department chair approval. A GPA of at least 3.0/4.0, and a signed research contract
SE 440	Special Topics in Software Engineering	3 (3-0-0)	101 CRHs Passed
SE 441	Telecommunications Software Design	3 (3-0-0)	101 CRHs Passed
SE 442	Social Networks for Software Engineers	3 (3-0-0)	101 CRHs Passed
SE 443	Cloud Computing for Software Engineers	3 (3-0-0)	101 CRHs Passed
SE 444	Artificial Intelligence	3 (3-0-0)	101 CRHs Passed
SE 445	Information and Software Security	3 (3-0-0)	101 CRHs Passed

### Course Descriptions

In this section we give the course descriptions of Software Engineering courses of the program.

Each course below follows the following format:

**Course code: Course Title Course credit hours (Lecture contact hours – Lab contact hours – Tutorial contact hours)**

Course Description

*Pre-requisites*

*Co-requisites*

### Core Courses

**SE 100: Programming for Engineers**

**3 (3-0-0)**

Fundamentals of computers and computing. Introduction to a typical object-oriented programming language. Basic data types and operators. Console input/output. Logical expressions and control structures. Methods and arrays. Introduction to Classes.

*Pre-requisites: None*

**SE 100 L: Programming for Engineers Lab**

**1 (0-2-0)**

Laboratory experiments dealing with Object Oriented Programming.

*Pre-requisites: None*

*Co-requisites: SE 100*

**SE 120: Object-Oriented Programming**

**3 (3-0-0)**

Advanced object-oriented programming; inheritance; polymorphism; abstract classes and interfaces, container and collection classes, packages, object-oriented design, software modeling, event-driven programming. Design and implement simple GUI applications. Write simple multithreaded applications. Use API in writing applications.

*Pre-requisites: SE 100*

**SE 120 L: Object-Oriented Programming Lab**

**1 (0-2-0)**

Laboratory experiments dealing with advanced Object Oriented Programming.

*Pre-requisites: SE 100*

*Co-requisites: SE 120*

**SE 201: Introduction to Software Engineering**

**3 (3-0-0)**

Introduction to Software Engineering through programming with particular focus on the fundamentals of computing & programming, using an exploratory problem-based approach. Building abstractions with procedures, data & objects; data modeling; designing, coding & debugging programs of increasing complexity. Introduction to life cycle models from requirements specification, design, construction, testing and deployment. Software engineering standards. Code of ethics for software engineers.

*Pre-requisites: SE 120*

**SE 201 L: Introduction to Software Engineering Lab**

**1 (0-2-0)**

Laboratory experiments dealing with fundamental concepts in software engineering.

*Pre-requisites: SE 120*

*Co-requisites: SE 201*

### **SE 212: Discrete Structures for Software Engineers**

**3 (3-0-0)**

Logic, sets and functions, algorithms, mathematical reasoning, counting, relations, graphs, trees, Boolean Algebra, computation, modeling.

*Pre-requisites: SE 120*

### **SE 214: Algorithms and Data Structures**

**3 (3-0-0)**

Survey of important computer algorithms and related data structures used in object-oriented software engineering. Design, performance analysis and implementation of such algorithms, stressing their practical use and performance certification of large software applications. Understand how to "seal" designs to guarantee performance goals and insure that all error conditions are caught.

*Pre-requisites: SE 120*

### **SE 210 L: Algorithms and Data Structures Lab**

**1 (0-2-0)**

Laboratory experiments dealing with algorithms and data structures.

*Pre-requisites: SE 120*

*Co-requisites: SE 210*

### **SE 217: Software and Society**

**3 (3-0-0)**

The significant role played by technology in our time and the resulting tensions between software technology and society are often viewed as defining aspects of modernity. This course will be to explore the extent to which interactions between software technology and society have always been central and to consider the extent to which many of today's debates concerning that relationship have been prefigured in earlier cultures.

*Pre-requisites: None*

### **SE 221: Software Requirements and Design**

**3 (3-0-0)**

Requirements includes a feasibility study of the desired systems, elicitions and analysis of user's needs, the creation of a precise description of what the system should and should not do along with any constraints on its operation and implementation, and the validation of this specification by the users. Non-functional requirements. Requirements engineering and management. Requirements validation.

*Pre-requisites: SE 201 & SE 214*

### **SE 221 L: Software Requirements and Design Lab**

**1 (0-2-0)**

Laboratory experiments dealing with software requirements and design.

*Pre-requisites: SE 201 & SE 214*

*Co-requisites: SE 221*

### **SE 223: Digital Logic Design**

**3 (3-0-0)**

Introduction to numbering systems and Boolean algebra. Manipulation and minimization of completely and incompletely specified Boolean functions. Physical properties of gates: fan-in, fan-out, propagation delay, timing diagrams and tri-state drivers. Combinational circuits design using multiplexers, decoders, comparators and adders. Basic sequential circuits. Latches and flip-flops. Analysis and design of simple sequential circuits. Registers and counters. Implementation of digital circuits.

*Pre-requisites: PHU 124*

### **SE 223 L: Digital Logic Design Lab**

**1 (0-2-0)**

Laboratory experiments dealing with digital logic design.

*Pre-requisites: PHU 124*

*Co-requisites: SE 223*

### **SE 312: Database Management Systems**

**3 (3-0-0)**

The focus is to teach database fundamentals required in the development and evolution of most software applications by providing a basic introduction to the principles of relational database management systems such as Entity-Relationship approach to data modeling, relational model of database management systems and the use of query languages.

*Pre-requisites: SE 214*

### **SE 312 L: Database Management Systems Lab**

**1 (0-2-0)**

Laboratory experiments dealing with database management systems.

*Pre-requisites: SE 214*

*Co-requisites: SE 312*

### **SE 314 Operating Systems**

**3 (3-0-0)**

Theory and construction of operating systems, including real-time and embedded systems aspect from an engineering point of view, stressing performance measurement and metrics. Quality of Service issues leading to certification that an operating system will satisfy hard real-time constraints.

*Pre-requisites: SE 214*

### **SE 323: Software Project and Process Management**

**3 (3-0-0)**

Project Management and Software Process life cycles. Includes detailed analysis of components of each process. Metrics, tools and related standards associated with those components. Integration into a complete software plan. Capability maturity model. Software estimation techniques.

*Pre-requisites: SE 221*

### **SE 324 Web Application Development**

**3 (3-0-0)**

The course focuses on learning fundamentals of Web-based programming techniques, Web application development and client-server database integration. It provides in-depth coverage of introductory programming principles, various markup languages (e.g., XHTML, Dynamic HTML and XML), several scripting languages (e.g., JavaScript, PHP, Ruby/Ruby on Rails and Perl), Ajax, Web services, Web servers (e.g., IIS and Apache) and relational databases (e.g., MySQL/Apache Derby/Java DB)

*Pre-requisites: SE 312*

### **SE 324 L: Web Application Development Lab**

**1 (0-2-0)**

Laboratory experiments dealing with web application development.

*Pre-requisites: SE 312*

*Co-requisites: SE 324*

### **SE 327: Embedded Systems**

**3 (3-0-0)**

The course explains the concept of real-time system and why such systems are usually implemented as concurrent processes. The course describes the process for real-time systems, and overviews the role of a real-time OS. It introduces the generic process architectures for monitoring and control and data acquisition systems.

*Pre-requisites: SE 314*

### **SE 329: Human-Computer Interface Design**

**3 (3-0-0)**

Introduction to human-computer interaction. User interface design and architectures. Evaluation of user interfaces. Design of user interface components including windows, menus, and commands. Usability engineering. Task analysis, user-centered design, and prototyping. Conceptual models and metaphors. Software design rationale. Voice and natural language I/O. Response time and feedback. Color, icons, and sound.

*Pre-requisites: SE 221*

### **SE 390: Software Engineering Summer Internship (0 CRHs)**

An internship it is an important aspect of Software Engineering curriculum that provides the student with hands-on experience and a good sense of what an actual job in an organization will be like. Students are required to join an IT department in a government or private organization for a summer period of at least 8 weeks in the last summer prior to student graduation. Students should be able to relate the internship experience to the knowledge that he or she has gained through the Software Engineering program courses.

*Pre-requisites: 101 credit hours passed and department approval*

### **SE 410: Software Architecture 3 (3-0-0)**

The course gives students an understanding of the concept of software architecture and how this phase in the development between requirement specification and detailed design plays a central role for the success of a software system. The students will get knowledge of some well-known architecture patterns, and be able to design, construct and evaluate architectures for software systems. In addition, the students should get some understanding of how the developers' experiences and the technical and organizational environment will influence on the choice of architecture.

*Pre-requisites: SE 212*

### **SE 412: Software Testing and Quality Assurance 3 (3-0-0)**

The course focuses on software verification and validation throughout the software life cycle, including reviews (inspections and walkthroughs), testing techniques (functional and structural – black box and white box), levels of testing (unit, integration, system, and acceptance), and testing tools (static and dynamic). Testing and quality assurance standards.

*Pre-requisites: SE 221*

### **SE 415: Professional Practice and Software Documentation 3 (3-0-0)**

This course consists of two parts. The first part provides students with an awareness of the professional practice they will encounter in private and public organizations. The course introduces topics of communication, professional ethics, professional judgment, and social intelligence. The second part covers an overview of the methods and practices that software engineering professionals use to create software documentation. This part is concerned with questions about the suitability of documentation, its content, format, and interaction style.

*Pre-requisites: SE 412*

### **SE 416: Mobile Application Development 3 (3-0-0)**

This project-oriented course examines the principles of mobile application design and development. Students will learn application development on the Android platform. Topics will include memory management; user interface design; user interface building; input methods; data handling; network techniques and URL loading; and, finally, specifics such as GPS and motion sensing. Students are expected to work on a project that produces a professional-quality mobile application. Projects will be deployed in real-world applications.

*Pre-requisites: SE 221 and SE 312*

### **SE 416 L: Mobile Application Development Lab 1 (0-2-0)**

Laboratory experiments dealing with mobile application development.

*Pre-requisites: SE 221 and SE 312*

*Co-requisites: SE 416*

### **SE 421: Software Maintenance, Configuration Management and Evolution 3 (3-0-0)**

Software quality issues, defect detection and prevention, reliability engineering, examination of maintenance issues, configuration management. Software evolution issues, planning for evolution.

*Pre-requisites: SE 412*

### **SE 490: Software Engineering Capstone Project I** **2 (1-3-0)**

This course is the first part of a two-semester senior-year capstone project. It is intended to complement the theory and to provide an in-depth, hands-on experience in all aspects of software engineering. The students will work in teams on projects of interest to IT sector and will be involved in analysis of requirements, architecture and design, implementation, testing and validation, project management, software process, software maintenance, and software re-engineering. In this part students give project plan, provide software requirement specification document and develop software high-level design.

*Pre-requisites: 101 credit hours passed*

### **SE 491: Software Engineering Capstone Project II** **2 (1-3-0)**

This is the second part of the capstone project started in SE 490 course. In this part, students provide software low-level design produced in SE 490, implement the design, test their code, and manage and evaluate their final product. Student teams must deliver the code, a final report and a do a presentation and demonstration for their implemented software.

*Pre-requisites: SE 490*

## **Elective Courses**

### **SE 435: Undergraduate Research in Software Engineering** **3 (0-6-0)**

Students participate in supervised research with a faculty member. Supervised research can be: 1) independent research undertaken by the student (thesis, independent study), or 2) assistance on a faculty member's research project. Students must find a faculty member who is willing to supervise him/her as an assistant on an existing project or as the author of an individual project. The student and the faculty supervisor will complete and sign a research contract which will be turned in to the chair of the Electrical and Software Engineering Department. Drafting the contract will allow the student to develop ideas about what should be accomplished and what the faculty supervisor's expectations are. All academic requirements are at the discretion of the supervising faculty member. Students should agree on a plan for the semester with the faculty mentor before the research begins. The plan should include academic requirements, the basis for grading the experience, and a plan for student/professor meetings for the semester. It is the student's responsibility to report progress and seek guidance when needed. Students are expected to be active and reliable participants in the research experience.

*Pre-requisites: GPA of at least 3.0/4.0, signed research contract, and consent of the departmental chair.*

### **SE 440: Special Topics in Software Engineering** **3 (3-0-0)**

This course provides instruction and experience in timely topics related to the design and development of quality-engineered software.

*Pre-requisites: 101 credit hours passed*

### **SE 441: Telecommunications Software Design** **3 (3-0-0)**

Formal models for telecommunications software design and analysis. Protocol specification, design and validation. Protocol verification and testing. Conformance testing. Protocol synthesis. Protocol conversion.

*Pre-requisites: 101 credit hours passed*

### **SE 442: Social Networks for Software Engineers** **3 (3-0-0)**

Student will learn the fundamental interface, systems, and algorithms concepts in designing social software. The case-based syllabus will cover insights from both research and industry. As a student, the student will contribute to this burgeoning field through a quarter-long, team-based project. Students are required to enter the class with an initial project idea.

*Pre-requisites: 101 credit hours passed*

### **SE 443: Cloud Computing for Software Engineers**

**3 (3-0-0)**

This course will leverage the World Wide Web to fulfill computing needs. It packages applications, computing power, and storage as a metered service similar to a utility. This model is designed to supplant the traditional mechanism of desktop computing in many cases. This course will cover the origin, theory, enabling technology, and hands-on labs for key concepts in cloud computing.

*Pre-requisites: 101 credit hours passed*

### **SE 444: Artificial Intelligence**

**3 (3-0-0)**

This course aims in developing computer applications, which encompasses perception, reasoning and learning and to provide an in-depth understanding of major techniques used to simulate intelligence.

*Pre-requisites: 101 credit hours passed*

### **SE 445: Information and Software Security**

**3 (3-0-0)**

This course provides an introduction to the topic of security in the context of computer networks. The goals are to provide students with a foundation allowing them to identify, analyze, and solve network-related security problems in information systems with the emphasis on the engineering aspects of information security and software security issues.

*Pre-requisites: 101 credit hours passed*