Software Engineering

Program
College of Engineering
Major

Bachelor of Software Engineering Study Plan

Fall (Year 1)

Item #	Title	Credits
SE 100	Programming for Engineers	3
SE 100 L	Programming for Engineers Lab	1
CHM 102	Introduction to Chemistry	3
CHM 102 L	Introduction to Chemistry lab	1
MAT 101	Calculus I	3
PHU 103	Mechanics and Waves for Engineers	3
PHU 103 L	Mechanics and Waves for Engineers Labs	1
ENG 101	Freshman English 1	3

Spring (Year 1)

Item #	Title	Credits
SE 117	Software Practice and Society	3
SE 120	Object-Oriented Programming I	3
SE 120 L	Object-Oriented Programming I Lab	1
MAT 112	Calculus II	3
PHU 124	Electromagnetism and Waves for Engineers	3
PHU 124 L	Electromagnetism and Waves for Engineers Labs	1
ENG 112	Freshman English II	3

Fall (Year 2)

Item #	Title	Credits
SE 201	Introduction to Software Engineering	3
SE 214	Algorithms and Data Structures	3
SE 214 L	Algorithms and Data Structures Lab	1
SE 220	Object-Oriented Programming II	3
SE 220 L	Object-Oriented Programming II Lab	1
MAT 212	Linear Algebra	3
ENG 222	Technical Writing	3

Spring (Year 2)

Item #	Title	Credits
SE 212	Discrete Structures for Software Engineers	3
SE 225	Software Requirements	3
SE 225 L	Software Requirements Lab	1
EE 210	Digital Logic Systems	3
EE 210 L	Digital Logic Systems Lab	1
MAT 224	Numerical Methods	3
STA 212	Probability and Statistics for Engineers	3

Fall (Year 3)

Item #	Title	Credits
SE 310	Software Design and Architecture	3
SE 312	Database Management Systems	3
SE 312 L	Database Management Systems Lab	1
SE 314	Operating Systems	3
SE 314 L	Operating Systems Lab	1
EE 305	Computer Networks	3
EE 305 L	Computer Networks Lab	1
ISL 101	Islamic Studies I	2

Spring (Year 3)

Item #	Title	Credits
SE 322	Internet of Things Application Development	3
SE 324	Web Application Development	3
SE 324 L	Web Application Development Lab	1
SE 328	Mobile Application Development	3
SE 328 L	Mobile Application Development Lab	1
SE 330	Introduction to Cybersecurity	3
ARB 101	Arabic Language I	2

Summer (Year 3)

Item #	Title	Credits
SE 390	Software Engineering Summer Internship	0

Fall (Year 4)

Item #	Title	Credits
SE 412	Software Testing and Quality Assurance	3
SE 414	Software Project Management	3
	SE 4** Technical Elective	3
	SE 4** Technical Elective	3
SE 495	Software Engineering Capstone Project I	3
ISL 112	Islamic Studies II	2

Spring (Year 4)

Item #	Title	Credits
SE 423	Software Construction and Processes	3
	SE 4** Technical Elective	3
	SE 4** Technical Elective	3
SE 496	Software Engineering Capstone Project II	3
ARB 112	Arabic Language II	2

Technical Electives

Item #	Title	Credits
SE 435	Undergraduate Research in Software Engineering	3
SE 440	Special Topics in Software Engineering	3
SE 441	Telecommunications Software Design	3
SE 442	Social Networks for Software Engineers	3
SE 443	Cloud Computing for Software Engineers	3
SE 444	Artificial Intelligence	3
SE 445	Information and Software Security	3
SE 446	Introduction to Big Data	3
SE 447	Introduction to Machine Learning	3
SE 448	Blockchain Development	3
SE 449	Data Analytics	3
SE 450	Cryptography and Data Privacy	3
SE 451	Secure Software Engineering	3
SE 452	Network Security	3
SE 453	Security Risk Management & Control	3
SE 454	Ethical Hacking and Systems Defense	3

Software Engineering Tracks

AI & Big Data Track

The world is growing at an exponential rate and so is the size of the data collected across the globe. Current and future sources of data are devices which utilize the Internet of Things (IoT) technology in addition to social networks and business applications. Big data infrastructure and analytics are emerging as key concepts to sorting, managing analyzing this massive amount of generated data from connected objects and applications which helps to take the initiative to improve decision making. Thus, data is becoming more meaningful and contextually relevant, breaking new grounds for new computing concepts such as Machine Learning (ML) and Artificial Intelligence (AI). These concepts will introduce a new approach to shift the traditional computing concepts related to data from just collecting structured data to understanding it, to turning this massive amount of data into knowledge, conclusions, and intelligent actions.

In this track, students will be able to study new emerging technologies in the area of Artificial Intelligence and Big Data. Students enrolled in the Software Engineering program are eligible to register in this track.

Track Course Requirements (15 CRHs)

The following are the core courses required in the <u>AI and Big Data track</u>:

Item #	Title	Credits
SE 322	Internet of Things Application Development	3
SE 444	Artificial Intelligence	3
SE 446	Introduction to Big Data	3
SE 447	Introduction to Machine Learning	3
	One additional course may be taken from this list of track electives	3

Cybersecurity Track

Security is a forefront concern for software vendors and customers and an indispensable quality attribute of software given the high level of interconnectivity of systems running critical software functions and storing confidential data. There is a multitude of attacks that attempt to exploit software systems to gain illegitimate access to functionalities and data. Despite the continuous exposure to threat, software systems cannot simply seize operations as a countermeasure and they are expected to be available and deliver business value to its stakeholders reliably. The Software Engineering Department, part of the College of Engineering at Alfaisal University has approved a cybersecurity track. This track will equip students with the necessary skills and respond to challenges in cybersecurity, data privacy, network security, socio-technical issues in addition to learning how to develop secure systems by practicing proper secure software engineering principles. Students in the Bachelor of Software Engineering program at Alfaisal University are eligible to opt for this track.

Track Course Requirements (15 CRHs)

The following are the core courses required in the <u>Cybersecurity track</u>:

Item #	Title	Credits
SE 330	Introduction to Cybersecurity	3
SE 450	Cryptography and Data Privacy	3
SE 452	Network Security	3
SE 454	Ethical Hacking and Systems Defense	3
	One additional course may be taken from this list of track electives	3