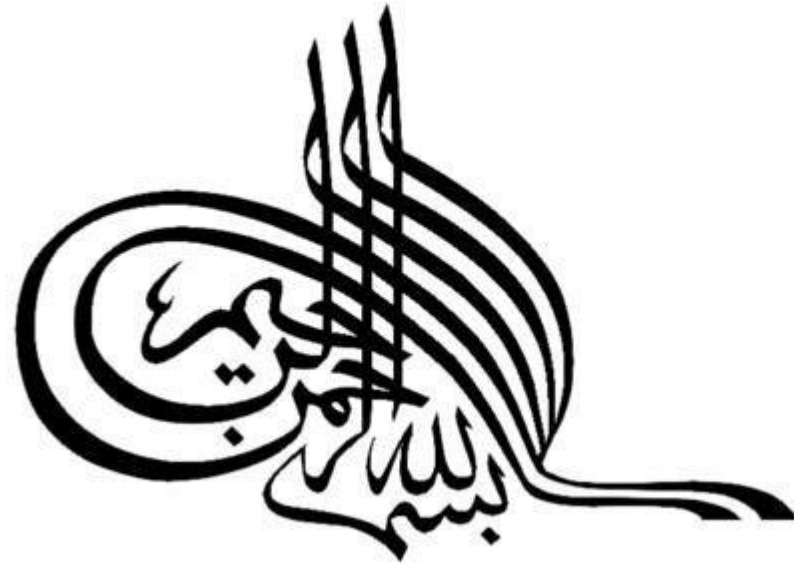


SOFTWARE ENGINEERING PROGRAM BOOKLET

Department of Software Engineering

2023-2024



Chairman's Message

Dear Students, Faculty, Parents, Alumni,

Welcome to the Department of Software Engineering at our esteemed university. As the Chairman of this vibrant and relatively young department, I am thrilled to invite you to join us in our journey of exploration, learning, and innovation. In the six short years since our inception, we have grown into a dynamic community of thinkers, creators, and problem solvers, dedicated to pushing the boundaries of software technology and enhancing the world around us.

Our curriculum, while new, is designed with a forward-thinking approach, equipping students with cutting-edge knowledge and practical skills in software engineering. Our faculty are educators and researchers, who bring their significant contributions to their respective domains into our classrooms. They are committed to providing students with a comprehensive perspective on software engineering, merging theoretical knowledge with hands-on experience to prepare them for the ever-evolving world of technology.

To our students, we promise a journey both enriching and challenging. Your time with us will not only equip you with advanced skills in software engineering but will also enhance your critical thinking, problem-solving abilities, and teamwork skills. We are committed to fostering an environment of inclusivity, respect, and collaboration.

To the parents, rest assured that your children are in a nurturing environment that encourages a balance of academic rigor and personal development.

To our alumni and industry partners, we look forward to continuing our collaborations and appreciate your support and contributions to the department's growth.

Thank you for being a part of our vibrant community.

Sincerely,

Dr. May Altulayan

Head of Software Engineering Department

Software Engineering Department

The College of Computer Engineering and Sciences at Al-Kharj was established, under Royal Decree No. 8626/B dated 27/09/1428 H, and appended to King Saud University at that time. The study began in the college at the beginning of the academic year 1429/1430 H. In the middle of the 1st semester of the academic year 1430/1431 H a Royal Decree was issued to transfer all colleges in the provinces south of Riyadh city to independent university under the name of Al-Kharj University, and thus became the College of Computer Engineering and Sciences among the colleges of Al-Kharj University, and in 1433 H a Royal Decree was issued for amending its name to "Salman bin Abdulaziz University". Since the beginning of 1436H, its name has become Prince Sattam bin Abdulaziz University (PSAU). Since its establishment, the college experienced a major development in the number of students, alumni, faculties, staff, and reflected this development on all aspects of the college and its facilities in terms of the quality of teaching and application of quality standards.

The Software Engineering Department at the Prince Sattam bin Abdulaziz University is striving to be a center for research and teaching in software engineering. Currently, the department offers an undergraduate degree in Software Engineering. The department's faculty members are highly enthusiastic professionals who have extensive experience in the field of Software Engineering. They are committed to providing students with the best possible education and training in Software Engineering. The department also encourages its students to explore new technologies and develop innovative solutions to real-world problems.

Department Vision

To be a leading software engineering department that produces highly skilled and innovative graduates who contribute to the advancement of technology and society.

Program Mission

To introduce a competitive educational program in the field of software engineering to produce highly qualified software engineers, who can actively participate in the fulfillment of the national needs and contribute to transform the society into a knowledge-based society.

Program Vision

The program aims to be among the top educational programs and to become a center of excellence for studies and research in the Software Engineering field according to national, regional, and international standards.

Program Educational Objectives

The program educational objectives are our expectations for what graduates of the program will accomplish within a few years of graduation. Within that time frame, graduates of the BS in Software Engineering program are expected to:

- PEO1: Advance successfully in their career or postgraduate studies.
- PEO2: Practice professionally and ethically as individuals, team members or leaders in software engineering or related fields.
- PEO3: Maintain currency through self-learning or other professional development.

Student Outcomes

The software engineering program enables students to acquire, by the time of graduation, the following learning outcomes:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyse and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Awarded:

The Department awards a Bachelor of Science degree in Software Engineering.

Curriculum of the bachelor's in software engineering

The curriculum for the Bachelor of Science Degree in Software Engineering consists of 133 credit hours distributed over a period of 8 levels. The program is focused on successive levels of classes to better understand the constituent areas of knowledge among students in each level. The credits cover core courses in Software Engineering domains environment, elective courses in advanced topics, field training and graduation projects.

Requirements of the Study Plan:

To pursue a B.Sc. in Software Engineering, students are required to complete 133 credit hours distributed as follow:

No.	Category	Credit Hours	Percentage
1	University Requirements	8	6%
2	College Requirements	86	64.6%
3	SE Department Requirements	33	24.8%
4	SE Department Elective Requirements	6	4%
Total		133	100%

SE Study Plan

The following is the twelve semesters study plan:

First Year – Semester (1)								
Course Code	Course Number	Course Name	Pre-requisite	Co-requisite	Credit hours	Units		
						L	P	T
PHYS	1010	General physics(I)	---	---	4	2	1	1
MATH	1050	Differential Calculus	---	---	3	2	0	1
ENGL	1210	Reading Skill	---	---	3	2	0	1
ENGL	1220	Writing Skills	---	---	3	2	0	1
Total					13	8	1	4

First Year – Semester (2)								
Course Code	Course Number	Course Name	Pre-requisite	Co-requisite	Credit hours	Units		
						L	P	T
ARAB	101	Language Skills	---	---	2	2	0	0
MATH	1060	Integral calculus	MATH 1050	---	3	2	0	1
ENGL	1230	Conversation and listening skills	---	---	3	2	0	1
CT	1400	Computer Skills	---	---	3	1	2	0
MC	1400	Communication Skills	---	---	2	2	0	0
ENG	1604	English for Technical Purposes	---	---	3	2	0	1
Total					16	11	2	3

Second Year – Semester (3)								
Course Code	Course Number	Course Name	Pre-requisite	Co-requisite	Credit hours	Units		
						L	P	T
CE	1111	Logic Design	---	---	3	3	0	0
CS	1112	Discrete Mathematics	---	---	4	4	0	0
CS	1301	Computer Programming 1	---	---	4	2	2	0
MATH	2220	Linear Algebra for Computer Students	---	---	3	3	0	0
Total					14	12	2	0

Second Year – Semester (4)								
Course Code	Course Number	Course Name	Pre-requisite	Co-requisite	Credit hours	Units		
						L	P	T
STAT	1050	Probability and Statistics for Computer Students	---	---	3	3	0	0
SE	2111	Software Engineering Foundations	CS 1301	---	3	3	0	0
CS	2301	Computer Programming 2	CS 1301	---	4	2	2	0
CS	2321	Algorithms and Data Structures	CS 1301	---	3	3	0	0
CE	2401	Computer Organization & Design	---	---	3	3	0	0
SE	3131	Formal Specifications	CS 1112	---	2	2	0	0
Total					18	16	2	0

Third Year – Semester (5)								
Course Code	Course Number	Course Name	Pre-requisite	Co-requisite	Credit hours	Units		
						L	P	T
ARAB	103	Arabic Editing	---	---	2	2	0	0
PHYS	1040	General Physics (II)	---	---	4	3	1	0
SE	3121	Software Requirements Engineering	SE 2111	---	3	3	0	0
MATH	3310	Differential Equations for Computer Students	MATH 1060	---	3	3	0	0
CS	3701	Operating systems	CS 2321	---	3	3	0	0
Total					15	14	1	0

Third Year – Semester (6)								
Course Code	Course Number	Course Name	Pre-requisite	Co-requisite	Credit hours	Units		
						L	P	T
IS	2511	Fundamentals of Database Systems	---	---	3	2	1	0
MATH	2540	Numerical Methods	MATH 2220	---	3	2	0	1
SE	3111	Human Computer Interaction	---	---	3	3	0	0
SE	3201	Software Design and Architecture	SE3131	---	3	3	0	0
CE	3761	Computer Network Systems	CE 2401 STAT 1050	---	3	3	0	0
Total					15	13	1	1

Fourth Year – Semester (7)								
Course Code	Course Number	Course Name	Pre-requisite	Co-requisite	Credit hours	Units		
						L	P	T
CS	3821	Web Applications Programming	IS 2511	---	3	2	1	0
SE	4111	Software Construction	SE 3201	---	3	3	0	0
SE	4221	Software Quality Assurance	SE 3121	---	3	2	1	0
SE	4231	Software Project Management	SE 2111	---	3	3	0	0
CS	4831	Mobile Applications Development	CE 3761	---	3	2	1	0
SE	4911	Graduation Project 1	80 CHs	---	2	2	0	0
Total					17	14	3	0

Fourth Year – Semester (8)								
Course Code	Course Number	Course Name	Pre-requisite	Co-requisite	Credit hours	Units		
						L	P	T
CS	3501	Introduction to Artificial Intelligence	CS 2321	---	3	3	0	0
xxxx	---	Selected Elective 1	---	---	3	3	0	0
xxxx	---	Selected Elective 2	---	---	3	3	0	0
SE	4921	Graduation Project 2	SE 4911	---	3	3	0	0
Total					12	12	0	0
Course Code	Course Number	Course Name	Pre-requisite	Co-requisite	Credit hours	Units		
						L	P	T
xxxx	xxxx	Free course	---	---	2	---	---	---
Total					2	2	0	0
Field Training								
Course Code	Course Number	Course Name	Pre-requisite	Co-requisite	Credit hours	Units		
						L	P	T
SE	4901	Field Training	80 CHs	---	3	3	0	0
Total					3	3	0	0

L: Lecture

P: Practical

T: Tutorial

Elective Courses

Selected Elective Courses (1) (8 CHs)

Code	Course Name	Requisite	Credit hours
IC 101	Introduction of Islamic Culture	-	2
IC 102	The Islam and Society Building	-	2
IC 103	The Foundation of the Economic System in Islam	-	2
IC 104	Foundations of the political system in Islam	-	2
IC 106	Biography of the Prophet	-	2

Selected Elective Courses (2) (6 CHs)

Code	Course Name	Requisite	Credit hours
SE 4561	Software Engineering for Big Data	SE 2111 - / P	3
SE 4571	Component Based Development	SE 3201 - / P	3
SE 4591	Developing Reusable Software	SE 3201 - / P	3
SE 4631	Software Engineering for the Web	CS 3701 - / P	3
SE 4011	Emerging software engineering tools	SE 4111 - / P	3
SE 3221	Software Security Engineering	SE 2111 - / P CE 3761 - / P	3
SE 4121	Software Reliability	SE 4221 - / P	3
SE 4222	Software maintenance and evolution	SE 4111 - / P	3
SE 4961	Software Entrepreneurship	SE 4231 - / P	3
SE 4112	Game development	SE 4111 - / P	3
SE 4541	Advanced Software Engineering	SE 2111 - / P	3
SE 4981	Selected Topics in Software Engineering	SE 3201 - / P	3
CS 4531	Neural Networks	CS 3501 - / P	3
CS 4551	Machine learning	CS 3501 - / P	3
IS 4571	Data Mining	IS 2511 - / P	3
CS 4651	Digital Image Processing	CS 2321 - / P	3

Courses Description:

Core SE Courses

SE 2111 Software Engineering Foundations

The main aim of this course is to give a basic understanding of software life cycle requirements, design and testing, principles of object orientation, Object Oriented analysis using UML. Introducing frameworks, APIs, basic modelling and design; basic of project management, software cost estimation, configuration management, and testing.

SE 3121 Software Requirements Engineering

The course introduces requirement engineering and process. The course enables the students to formulate the problem statement for any software system. The course introduces the standard techniques to prepare stakeholder requirements. The course introduces elicitation methods and prepares specifications based on the elicitation methods. The course enables students to elicit and conceptualize customer needs. The course throws light on the management of requirements and applying standard quality assurance techniques. Validation and verification of the model defined is also explained in the course.

SE 3131 Formal Specification

Formal specification is a fundamental concept in the field of software engineering. This course is designed to provide students with a deep understanding of formal methods and their application in software development. Formal methods offer a rigorous and mathematically based approach to specifying, designing, and verifying software systems, ensuring correctness and reliability in critical applications. This course will equip students with the knowledge and skills needed to create precise and unambiguous specifications for software projects.

SE 3201 Software Design and Architecture

This course introduces the software architecture & design process and their models. It also discusses representations of design/architecture and software architectures & design plans. The course covers major design notations and methodologies. In addition, the course provides the basics of software evolution, reengineering.

SE 3111 Human-Computer Interaction

The course highlights the design, development, and evaluation of human-computer interfaces, with an emphasis on usability, interaction paradigms, and computer-mediated human activities. These issues are studied from a number of perspectives including that of the engineer and end-user. Students design a user interface for a system and implement a prototype from a list of informal requirements.

SE 4111 Software Construction

This course introduces Issues, methods and techniques associated with constructing software. Topics include detailed design methods and notations, implementation tools, coding standards and styles, peer review techniques, and maintenance issues.

SE 4221 Software Quality Assurance

This course introduces the theory and practice of determining whether a product conforms to its specification and intended use. Topics include software quality assurance methods, fundamentals of testing, unit, integration, system, and acceptance level testing, black-box, and white-box test techniques, static and dynamic testing, review process, test management and tool support for testing.

SE 4231 Software Project Management

Project Management is generally seen as a key component of successful software projects. Together with software techniques, it can produce software with high quality. This course introduces the key concepts of software project management. It focuses on project management methodology to initiate and manage projects efficiently and effectively through learning the key project management skills and the strategies required for managing projects from their genesis to completion.

SE 4911 Graduation project 1

Development of significant software system, employing knowledge gained from courses throughout the program. Including development of requirements, design, implementation, and quality assurance. Students may follow any suitable process model, must pay attention to quality issues, and must manage the project themselves, following all appropriate project management techniques. Success of the project is determined in large part by whether students have adequately solved their customer's problem.

SE 4901 Field Training

This course aims to help students acquire experience in a public/private sector in the field of software engineering. This is accomplished in full time schedule for at least 8 weeks in summer. The ultimate aim of the training is that student will apply what he learned during previous years. This is done in a real life and in teamwork environment. The training is evaluated according to training advisor at the training field and the training committee at the department of software engineering.

SE 4921 Graduation project 2

The student is expected to deliver a detailed report including all the software development phases; the algorithms; or models. The student must be discussed in a seminar and in the presence of arbitrators

- Use of various approaches of self-learning during literature review and analysis.
- Recognize alternatives, selecting and justifying the approach taken at each point in the project and identify those parts of the project that are feasible within the time.
- Overcome unforeseen problems, make informed decisions, and work under the constraints of limited time, human and financial resources.
- Demonstrate in the technical execution of the project the required level of analysis, design, and technical skill.
- Communicate with users and peers regarding user requirements and technical concepts verbally (via meetings and presentations), in writing (via reports) and in action (via demonstrations).

Elective Courses

SE 4561 Software Engineering for Big Data

The focus in this course is on the development, maintenance and evolution of applications dealing with large volumes of data. This course applies data science techniques in the context of software engineering. The richness and volume of data available make techniques rooted in machine learning and optimization particularly suitable in this context with many practical applications.

SE 4571 Component Based Development

The objective of the course is to give the students the fundamental knowledge in developing component-based software systems out of the latest research trends in the domain. Further, the course gives a deeper understanding in a sub-topic that is selected by the students. Students will be trained in identifying relevant information, summarizing, reporting and presenting the information, and also in using critical thinking to support their argumentation.

SE 4591 Developing Reusable Software

Software reuse is the use of existing software artifacts and knowledge to construct new software. Systematic reuse has always been a major goal in software engineering since it promises large gains in productivity, quality, and time-to-market reduction. This course covers the concepts of software reuse, the technical and business value, and their most effective use.

SE 4611 Network Centric Computing

Network-centric Computing focuses on large-scale distributed computing systems and applications that communicate through open, wide-area networks like the Internet. Typical examples of large-scale network-centric systems are the World-Wide Web and Computational Grids. Research in Network-centric computing focuses on the challenges that arise in the context of the study, the design, the implementation and the operation of efficient, scalable, and robust internet-based services and applications at a global scale.

SE 4631 Software Engineering for the Web

This is a course for students who already have some programming and software engineering experience, as this course is trying to give students some experience in dealing with those challenges that are unique to Internet applications such as:

- Concurrency
- Unpredictable load
- Security risks
- Opportunity for wide-area distributed computing, i.e., using “Web services” provided by other machines on the Internet
- Creating a reliable and stateful user experience on top of unreliable connections and stateless protocols
- Extreme requirements and absurd development schedules
- Requirements that change mid-way through a project, sometimes because of experience gained from testing with users
- User demands for a multi-modal interface: Web, mobile (WAP), and voice

SE 4222 Software maintenance and evolution

Software systems continuously change and, eventually, they become difficult and costly to maintain. Even new applications are typically constructed by combining existing components. Software engineers spend busy time in modifying software to meet user requirements, fixing bugs and defects. This made software maintenance the most costly phase in the software life cycle, with 80% of total effort spent on software maintenance. To reduce such costs, different strategies can be adopted by software practitioners.

SE 4961 Software Entrepreneurship

The goal of this course is to help students identify, establish, and commercialize entrepreneurial opportunities in the software industry. Students will be coached on how to identify market opportunities, build teams and scalable technologies, design business models and make wise decisions about where to focus their energy. As part of their work on the class project, students will form teams and build entrepreneurial software products that move from an early-stage proof of concept (PoC) to a final marketable product. The class is run in a team-based format where students collaborate to build a product and then work together to commercialize it.

SE 4011 Emerging software engineering tools

This course is focused on the tools that enable the software engineer to stay relevant or even thrive in a turbulent business environment and their practical application. Emerging tools are characterized by novelty, relatively fast growth, prominent impact, and uncertainty. They are the tools that enable startups to disrupt whole industries.

SE 4981 Selected Topics in Software Engineering

This course is designed to enable students to study emerging topics of interest, which are carefully selected from software engineering topics. The contents of such a course are to be determined by the department council each time the course is offered. Topics of interest could be one or several of the following: Design patterns, Software security architecture, Component-based development, Agile and eXtreme programming, Aspect-oriented architecture, Service-oriented computing and architecture, etc. Other topics can be added as needed. Students participate in group projects related to the special topic(s) selected.

SE 4541 Advanced Software Engineering

Software engineers work in diverse teams to create and comprehend complex information, such as: code structure, implementation rationale, dynamic software behavior and change implications. This course is intended to equip students with modern practices and concepts in software engineering. The students will work on practical projects to understand and extend the state of the art in software engineering.

SE 4112 Game development

This course introduces the fundamental concepts of game development, role of game designer, elements of games, design approaches, system dynamics, game mechanics and game play, visual design, sound engineering, game prototyping, playtesting, directing and producing. This course also focuses on technical aspects of game development, including the ability to create the digital game prototype and 2D/3D game development principles to build working games.

CS 4654 Digital Image Processing

This course covers the fundamentals of computer graphics and the techniques for digital image processing and analysis. Course topics include Computer graphics and Visualization (GV) , image sensing and acquisition, some basic gray level transformations for image enhancement, image contrast enhancement using histogram processing, image smoothing using spatial filters, image sharpening using spatial filters, point, line and edge detection, basic global and adaptive thresholding for image segmentation, optimal global and adaptive thresholding for image segmentation, region-based image segmentation and edge-based segmentation, image restoration in the presence of noise-spatial filtering, image enhancement.

CS 4552 Machine Learning

Definition and examples of machine learning, inductive learning, statistical based learning, reinforcement learning, supervised learning, unsupervised learning, learning decision trees, learning neural networks, learning belief networks, the nearest neighbor algorithm, learning theory, the problem of overfitting, clustering, and computational learning theory.

CS 4531 Neural Networks

This course introduces the concepts of connectionism, along with algorithms for simulating neural networks, discussion of alternative network architectures and training algorithms. Topics include basic neuron models, neural network models, learning algorithms and applications.

IS 4571 Data Mining

In this course, preliminary data mining concepts and techniques are introduced. Topics covered are: Data mining algorithms and methods including association analysis, classification, cluster analysis, as well as emerging applications and trends in data mining (such as Web data mining, biomedical data mining and security).

Mandatory Courses**CS 2321 Data Structures and Algorithms**

This course concerns non-computer science students and introduces to them the basic data structures and algorithm analysis which are to be used as tools in designing solutions to problems. Topics include algorithm analysis using both asymptotic notations and empirical measurements of performance and applying them to functions involved in complexity analysis, pointers and recursion, abstract data type concepts. Data structures include lists and linked-lists, stacks, queues, priority queues, trees and its traversal, binary search trees, heaps, hash tables and graphs and graphs' algorithms. Also, important sorting and searching algorithms will be discussed including bubble sort, insertion sort, selection sort, merge sort, heap sort and radix sort, sequential search and binary search.

CS 1112 Discrete Mathematics

Introduces the foundations of discrete mathematics as they apply to computer science, focusing on providing a solid theoretical foundation for further work. Topics include introduction to: Basic logic: logic and proof techniques. Fundamental discrete structures: sets, relations, functions, Sequences and Summations. Growth of functions. Integers and Division, Rings & Fields, Applications of Number Theory. Basics of counting: Counting arguments, The pigeonhole principle, Permutations and combinations, Recurrence relations. Graphs and Trees. Discrete Probability.

CS 1301 Computer Programming 1

Introduction to concepts, principles, and skills of programming including compilers, compiling process, algorithms, and introduction to problem-solving. Implementation of algorithms in a programming language. Fundamentals of programming concepts include data type assignment statements, standard input/output, selection, repetition, functions/methods, parameters, scope of identifiers, debugging. Data structures and algorithms include arrays (1D and 2D), characters strings, Linear search, binary search, and simple sorting algorithm. Pointers (optional)

CS 2301 Computer Programming 2

Introduces the concepts of object-oriented programming to students with a background in the procedural paradigm. Topics include classes and objects, data members and member functions, constructors, garbage collector and finalize, overloading, inheritance, polymorphism, and templates and exceptions handling. Data structures such as linked lists, stacks and queues, and graphical user interface.

CS 3501 Introduction to Artificial Intelligence

Introduces students to the fundamental concepts and techniques of artificial intelligence. Topics include fundamental issues, agents, solving problems by searching, informed search and exploration, constraint satisfaction problems, knowledge representation and reasoning, advanced search, advanced knowledge representation and reasoning, planning, and uncertainty.

CS 3701 Operating Systems

This course aims to introduce the fundamentals of operating systems design and implementation. Topics include an overview of the modern operating systems, Types of operating systems, operating system structures, process management and thread (concepts of , communication, synchronization and deadlock), CPU scheduling, memory management and virtual memory, File systems; I/O systems; Security and protection.

CS3701 Operating Systems

This course aims to introduce the fundamentals of operating systems design and implementation. Topics include an overview of the modern operating systems, Types of operating systems, operating system structures, process management and thread (concepts of, communication, synchronization, and deadlock), CPU scheduling, memory management and virtual memory, File systems; I/O systems; Security and protection.

CS 4831 Mobile Application Development

The objective of this course is to learn about mobile computing and mobile application development. Mobile computing will be discussed from several perspectives: mobile technology, application development, and user interaction. Topics include quick view for the Mobile Technology-Mobile network architecture, Generations of mobile networks (GSM, UMTS, and LTE). Application development for mobile devices differs significantly from desktop development and in this course, you will learn hands-on about mobile development environments, different mobile platforms, and operating systems (iPhone, Android, Symbian/S60, Web OS, Windows Mobile, BlackBerry OS, BREW, JavaME/JavaFX, Flashlight), and the specific constraints and requirements of user interface design for limited devices and mobile application development. The course combines a conceptual overview, design issues, and practical development issues.

CE 1111 Logic Design

History and overview, Numbers, and conversions, Switching theory, Boolean Algebra, Combinational logic circuits, Function Optimization, Modular design of combinational circuits, Memory elements, Sequential logic circuits, Finite State Machines (FSMs) models, state diagrams, state tables, state reduction and state assignment.

CE 3761 Comp. Network Systems

This course provides an introduction to communication and computer networks and : connectivity, network topologies, analog and digital transmission, modulation and demodulation, transmission media, data encoding, synchronous and asynchronous transmission, digital carriers, access methods and multiplexing, circuit and packet switching, OSI model: (DNS, SMTP, FTP, WWW, socket programming communication protocols, TCP and UDP, Congestion control, Internetworking, addressing and routing algorithms and protocols, framing, flow and error algorithms, PPP, MAC), local area networks; internetworking devices; high-speed bridged networks; wide area networks; Internet and TCP/IP, Client-server architecture.

IS 2511 Fundamentals of Database Systems

This course provides the students with an introduction to the core concepts in data and information management. It is centered around the core skills of identifying organizational information requirements, modeling them using conceptual data modeling techniques, converting the conceptual data models into relational data models and verifying its structural characteristics with normalization techniques, and implementing and utilizing a relational database using an industrial-strength database management system.

Stat 1050 Probability and Statistics for Computer Students

Descriptive statistics, statistical data classification, measures of central tendency, measures of dispersion. Basic probability concepts, conditional probability, Bayes law, random variable, and probability distribution. Some discrete distributions, some continuous distributions, and its applications. Sampling distribution of the mean, central limit theorem, estimation of the population means and proportion, testing hypotheses about population mean and proportion. The course must focus on applications in the field of computer engineering and sciences.

MAT 1050 Differential Calculus

Real numbers, polynomials, Functions, Limits and Continuity: Algebraic Functions – Exponential Functions – Logarithmic Functions – Trigonometric Functions – Limits – Continuity. Derivatives: Techniques of Differentiation – Derivatives of Algebraic Functions – Derivatives of Exponential Functions – Derivatives of Logarithmic Functions – Derivatives of Trigonometric Functions – Equations of the Tangent and Normal – The Chain Rule – Inverse Trigonometric Functions – Hyperbolic Function and Inverse Hyperbolic Functions – Inverse Trigonometric Functions – Derivatives of Inverse Trigonometric Functions – Derivatives of Hyperbolic Functions – Inverse Hyperbolic Functions – Derivatives of Inverse Hyperbolic Functions- Calculation of the nth Derivatives – Differentiation of a composite Functions – Differentiation of Implicit Functions
Applications to Calculus: Function graph – Rolle’s Theorem- mean value theorem - Differentials L'Hospital Theorem - maxima and minim- Related Rates -horizontal and vertical asymptotes.

MAT 1060 Integral Calculus

Integration: Indefinite Integrals – Techniques of Integration: Trigonometric Integrals – Integration by Inverse Substitution – Completing the Square – Partial Fractions – Integration by Parts – Reduction Formulas – Definite Integrals – Arc length – Surface Area- Areas between Curves -Volumes of Revolution– Numerical Integration - Parametric Equations — Polar Coordinates – Area in Polar Coordinates - Indeterminate Forms – Improper Integrals

MAT 2220 Linear Algebra for Computer Students

Matrix Definition – Matrix Operations – Symmetric Matrices – Transpose and Inverse of a Matrix – Hermitian Matrices – Markov Matrices – Factorization – Positive Definite Matrix – Row Operations – Row Reduced Echelon Form – Linear system of Equations – Solving Equation of the form $Ax = 0$ and $Ax = b$.

Vector Spaces and Subspaces – Basis and Dimension – Orthogonality – Similar Matrices – Singular Value Decomposition – Least Squares Approximations – Determinants – Properties of Determinants – Applications of Determinants – Cramer’s Rule – Gauss Elimination Rule – Gauss Jordan Elimination – Eigenvalues and Eigenvectors – Diagonalization – Linear Transformation – Matrices with MATLAB.

MAT 2540 Numerical Methods

Linear and Quadratic Equations - Functions of a Single Variable - Solution of Systems of Linear Equations - Solution of Linear Systems by Elimination - Elementary Introduction to Linear Programming - Convex Sets - Maxima and Minima of Linear Functions - Problems of Maximizing or Minimizing a Linear Function to Linear Constraints - Linear Programming Problems - Numerical Solution of Differential Equations - Mathematical Preliminaries - Simple Difference Equations - Euler Method - Runge-Kutta Methods - Systems of Linear Equations – Introduction - Properties of Matrices - Diagonal and Triangular Matrices - Numerical Solution of Linear systems - The Pivoting Strategy - Introduction, Properties and the Numerical Methods.

1010 Phys General Physics

HEAT: Thermal Basics: Temperature - Temperature Scales and Thermometers. Thermal Concept: Units of thermal energy - Heat capacity and Specific Heat - Newton's law of cooling - Specific heat of gases. Heat Transfer: Thermal conduction - Prevost's theory of heat change - Energy distribution of Black body radiation - Stefan's law - Wien's law - Thermal Expansion of Solids and Liquids. Latent Heat. PROPERTIES OF MATTER: Units and Dimensions - Physical Dimensional analysis - Estimates and order-of-magnitude calculations. Elasticity: Elasticity modulus - Fluid statics: Density and relative density – Pressure - Pascal's principle - Archimedes's Principle - Law of floatation - Relative density measurement. Fluid dynamics: Continuity equation - Bernoulli's Equation – application - Venturi tube - Pitot tube. Surface tension: Molecular theory of surface tension - Surface energy - Surface tension and spherical shape - Contact angle - Capillarity. SOUND: Circular motion – Types of sound waves - Speed of Sound Waves.- Periodic Sound Waves.-Intensity of Periodic Sound Waves - Spherical and plane sound waves -The Doppler Effect - Digital Sound Recording - Motion Picture Sound. Experimental part: Measuring tools – Hooke's law – Simple pendulum – Free falling – speed of sound - Vectors – Viscosity coefficient- Boyle's law – Archimede's principle – Newton's law of cooling – Specific heat capacity of solid and liquid.

The SE department faculty research citation report 2022:

The faculties of Software Engineering department have published scientific research papers in different prestigious journals under the ISI database. The table below shows the faculties citation report:

Faculty Names	Publications - 2022	Citations
Dr.Adel Bajid Othman Binbusayyis	5	17
Dr.Mohammed Sha Mohamed Kunju	5	22
Dr.Abdullah Q F Alqahtani	15	75
Dr.Mawal Ali Abdo Mohammed	2	6
Dr.Abdullah Abdulaziz Abdullah Albanyan	2	2
Dr.Taher Abdelwaheb Youssef Labidi	2	17
Dr. Safaa Eltyeb	1	32

Degree requirements:

The Chair of the Software Engineering Department and the Deanship of Admissions and Registration are jointly responsible to ensure that all graduating students have met all the Software Engineering program graduation requirements. Fortunately, the registration system is more effective in preventing a student from registering for a course without passing its prerequisite courses, and well-presenting student records that can be tracked easily to make sure that graduating students follow their prescribed study plans and fulfilling all the graduation requirements.

The SE program curriculum consists of 133 credit hours. According to the University regulations, the student cumulative average should be 2.0 out of 5.0 or better at the time of graduation, and he has passed all the program requirements. The SE program credit hours requirements are distributed as:

- 32 credit hours of General education (Broad Education).
- 30 credit hours of Mathematics and Basic sciences.
- 69 credit hours of Engineering Topics (95 credit hours required courses and 8 credit hours selected elective courses).
- 2 free elective courses.

Upon successful completion of the SE program graduation requirements, and after being approved by the PSAU council, the student will be awarded the Bachelor of Software Engineering.

Software Engineering job opportunities

1. **Mobile Development:**

- Android Developer
- iOS Developer
- Mobile App UI/UX Designer
- Mobile Game Developer

2. **Healthcare:**

- Health IT Software Engineer
- Medical Imaging Software Developer
- Electronic Health Record (EHR) Developer

3. **Finance and Fintech:**

- Financial Software Developer
- Algorithmic Trading Developer
- Risk Management Software Engineer
- Blockchain Developer for Cryptocurrency

4. **Gaming:**

- Game Developer (PC/Console)
- Game Developer (Mobile)
- Game Designer
- Game Tester

5. **Automotive:**

- Automotive Software Engineer
- Autonomous Vehicle Software Developer
- Infotainment System Developer

6. **Aerospace and Aviation:**

- Aerospace Software Engineer

- Flight Control Software Developer
- Avionics Software Engineer

7. **E-commerce:**

- E-commerce Platform Developer
- Payment Gateway Integration Engineer
- Customer Experience (CX) Developer

8. **Education:**

- Educational Software Developer
- Learning Management System (LMS) Developer
- EdTech Mobile App Developer

9. **Energy and Utilities:**

- Smart Grid Software Engineer
- Energy Management Software Developer
- Renewable Energy Software Engineer

10. **Entertainment and Media:**

- Streaming Media Software Engineer
- Video Game Engine Developer
- Content Management System (CMS) Developer

11. **IoT (Internet of Things):**

- IoT Firmware Engineer
- IoT Application Developer
- Home Automation Software Developer

Faculty Members

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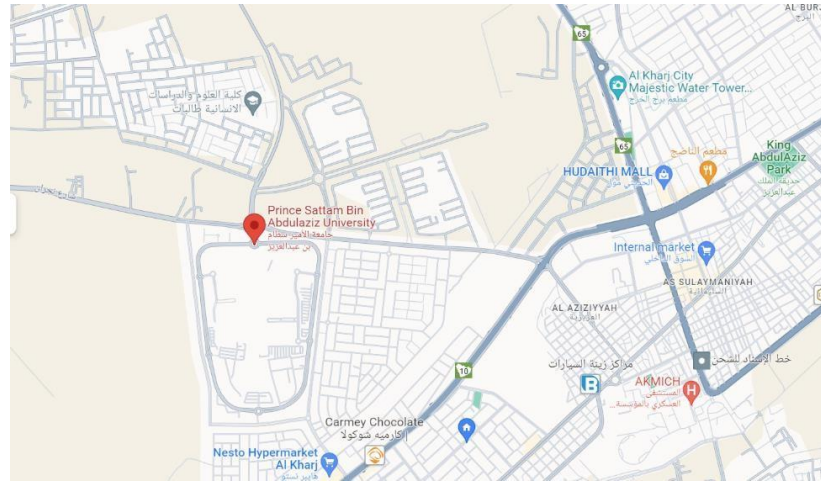
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Department Website:

[Click here](#)

Male section location map:



Female section location map:

