University of Prince Mugrin
College of Computer and Cyber Sciences

Program Bulletin

Software Engineering (SE)

Department of Software Engineering
College of Computer and Cyber Sciences
University of Prince Mugrin

Academic Year 2025-26

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At the University of Prince Mugrin (UPM), we are committed to excellence in Software Engineering education and research. Our goal is to equip students with the skills and mindset needed to design and manage innovative software solutions that address real-world challenges. As software continues to drive progress across all sectors, we strive to prepare graduates who will lead in advancing technology and supporting economic development.

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Dr. Jarallah Al Ghamdi

Dean of the College of Computer and Cyber Sciences

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The Software Engineering Department is fully committed to fulfilling its mission of producing highly skilled and motivated graduates. Our focus is on equipping students with strong technical foundations, problem-solving abilities, and a passion for building innovative and reliable software systems. We prepare our students to become future leaders in the software industry and key contributors to digital transformation across sectors.

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Dr. Abdurazzag Almiladi

Head of the Software Engineering Department

About this Bulletin

This Bulletin provides a comprehensive overview of the Bachelor of Science in Software Engineering program offered by the Department of Software Engineering at the University of Prince Mugrin. It outlines the program's mission, vision, structure, educational objectives, student outcomes, and its strategic relevance to the development of the Kingdom of Saudi Arabia's knowledge-based economy.

The document is intended to guide students, faculty, academic advisors, and institutional stakeholders by presenting the key components of the program, including curriculum structure, entry and graduation requirements, and support services. The program is aligned with international standards, specifically the ABET accreditation criteria and the ACM/IEEE curriculum guidelines for Software Engineering.

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Acronyms

UPM: University of Prince Mugrin

SE: Software Engineering

FC: Forensic Computing

CS: Computer Science

COC: College of Computer and Cyber Sciences

ACM: Association for Computing Machinery

ABET: Accreditation Board for Engineering and Technology

IEEE: Institute of Electrical and Electronics Engineers

IGCSE: International General Certificate of Secondary Education

NCAAA: National Center for Academic Accreditation & Evaluation

1. Introduction

In today's digital era, nearly every aspect of modern life is powered by software. From mechanical systems evolving into software-controlled machines to global businesses depending on complex digital infrastructures, software engineering has emerged as one of the most vital and rapidly growing professions worldwide. As a result, the demand for skilled software engineers continues to rise, offering excellent career prospects and flexibility across a wide range of industries.

The Bachelor of Science in Software Engineering program at the University of Prince Mugrin (UPM) is designed to equip students with the essential knowledge and practical skills required to succeed in this dynamic field. The program offers both breadth and depth in core areas of computer science and engineering, including software design and construction, computing fundamentals, requirements analysis, security, verification and validation, and the use of modern tools and processes for the development of complex software systems. Supporting topics such as discrete mathematics, probability, and statistics are also integrated into the curriculum to provide a solid analytical foundation.

Software engineering applies engineering principles to the full software development lifecycle—from requirements definition and system analysis to design, implementation, testing, deployment and maintenance. Graduates of this program will be prepared to contribute effectively to diverse environments, whether working on real-time embedded systems or large-scale enterprise applications. They will be trained on the latest development tools and methodologies, and they will have opportunities to explore emerging technologies such as mobile computing and cloud-based systems.

Furthermore, the program emphasizes collaboration and multidisciplinary teamwork, enabling students to work closely with system and hardware engineers to solve real-world integration challenges. By adhering to high standards of software engineering practice, graduates will be well-positioned to participate in shaping the future of the software industry.

1.1. UPM Vision

“A Nationally Distinguished University, Globally Oriented, Socially Impactful, and Rooted in Values”.

1.2. UPM Mission

“Empowering the individual and the community with excellent educational programs, research, and innovation aligned with development priorities, and community services based on effective partnerships”.

2. Software Engineering (SE) Program

2.1. Program Overview

The Bachelor of Science in Software Engineering is a comprehensive four-year program designed to prepare students with a solid foundation in the principles, methodologies, and practices of modern software development. The program integrates core concepts from computer science and engineering, emphasizing the systematic design, development, testing, and maintenance of reliable, scalable, and secure software systems.

Students will engage in a rigorous curriculum that blends theoretical knowledge with hands-on experience, ensuring they are well-equipped to address the complexities of software engineering in a wide range of domains, including finance, healthcare, education, and enterprise systems. Key areas of study include computing fundamentals, software design and construction, requirements analysis, security, verification, and validation; software engineering processes and tools appropriate for the development of complex software systems; and discrete mathematics, probability, and statistics, with applications appropriate to software engineering.

Throughout the program, students will develop not only technical proficiency but also essential professional skills such as critical thinking, teamwork, communication, and ethical decision-making. The program emphasizes experiential learning through labs, capstone projects, internships, and industry collaboration.

2.2. Program Educational Objectives (PEOs)

The following are the undergraduate Software Engineering (SE) Program Educational Objectives (PEOs); where within a few years after graduation, the Software Engineering Program Graduates are expected to:

SE Program Educational Objectives (PEOs)	
PEO-1	Advance in leading the development and evolution of complex software systems in diverse application domains.
PEO-2	Pursue career development in the software industry, academia, or entrepreneurship.
PEO-3	Demonstrate agility in solving software and systems challenges with a comprehensive set of competencies appropriate to the needs of the dynamic global knowledge-based society.

The PEOs are published on the program web site at: Dept. of Software Engineering - UPM

2.3. Student Outcomes (SOs)

The Student Outcomes (SOs) describe the knowledge, skills, and attitudes that the students are expected to attain by the time of graduation from the Software Engineering program. These outcomes ensure that graduates are adequately prepared to enter the professional practice of software engineering.

Beginning in Fall 2024, the Software Engineering program has adopted the Student Outcomes (1) through (7) as defined by the Engineering Accreditation Commission (EAC) of ABET. These outcomes are listed below and are publicly available on the Dept. of Software Engineering - UPM

Student Outcomes (SO)	Description
(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, analyze 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.

The Bachelor of Science in Software Engineering equips students with essential knowledge and practical skills to design, develop, and manage high-quality software systems for a wide range of industries and applications.

2.4. Admission Requirements

2.4.1. University Admission Requirements

University of Prince Mugrin admits new students, male and female, in a centralized admission procedure through the Deanship of Student Affairs, Admission and Registration, after satisfying general requirements including:

- Having a high school diploma, or its equivalent, from the Kingdom of Saudi Arabia or abroad.
- Being medically fit.
- Should not have been dismissed from any other university for disciplinary reasons. If it appears at any time after admission has been granted that the student had previously been dismissed for disciplinary reasons from an institution of higher education, the admission shall be considered void.

The University of Prince Mugrin accepts students from different Saudi and non-Saudi educational systems, as shown in the table below.

Educational System	High School score
Saudi System	**Sciences Track:** High School Cumulative GPA of 80% and above. **Humanities Track:** High School Cumulative GPA of 80% and above, with conditional acceptance. .
British Diploma **IGCSE**	Must satisfy one of the conditions below: 1. Eight O level courses with grade C and above. 2. Five O level courses with grade C and above in addition to two courses AS level with score not less than D. 3. Five O level courses with grade C and Above in addition to one A level course with grade D.
American Diploma	Students must have obtained the American High School Diploma with a Cumulative GPA of 80% and above, provided the diploma is recognized by the Ministry of Education
Other Types of High School Graduates	Homeschooling and other programs are accepted, provided the Ministry of Education recognizes them and the student meets UPM's general admission requirements.

2.4.2. Program Admission Requirements

New students are admitted into the Software Engineering (SE) Program in the College of Cyber and Computer Sciences (COC) at UPM through one of two ways:

- Direct Admission to the SE program
- Admission to the University Preparatory Year, and then to the SE program

2.4.2.1 Direct Admission to the SE Program

New students must meet the conditions specified in the table below to be directly admitted to the SE program, based on the program capacity.

Certificate & Test Type	Required Score
IELTS, TOEFL, or UPM English Language Placement Test	• Minimum Score of 5.5 in IELTS, or • Minimum Score of 35 in IBT, or 500 in paper-based TOEFL, or • Minimum Score of 71 in Oxford Online Placement Test
UPM Math and Computer Placement Tests	Minimum score of 70% on each test
High School	Sciences Track Or, Humanities Track (Conditional)

Students are allowed to change their specialization within the College of Computer and Cyber Sciences or other colleges, provided they meet the program requirements and submit a form for approval from the respective Head of Department of the program they wish to join.

2.4.2.2 Preparatory Year Admission Requirements

Students who do not fulfill the conditions for direct admission are offered enrollment in the University Preparatory Year Program. This foundational year is designed to equip students with the essential competencies in English, mathematics, and computing necessary for success in the undergraduate curriculum.

The Preparatory Year consists of quarter-based English language instruction along with foundational coursework in mathematics and computer literacy. Students must complete the required courses and achieve the academic standards outlined in the table below before progressing to Level 1 of the Software Engineering program.

Code	Course Name	Credits
ENGL 001	Preparatory English I	4
ENGL 002	Preparatory English II	4
ENGL 003	Preparatory English III	4
ENGL 004	Preparatory English IV	4
ENGL 005	Preparatory English V	4
MATH 001	Preparatory Math for Science I	4
MATH 002	Preparatory Math for Science II	4
PCS 001	Preparatory Computer Skills	3

Upon successfully completing the Preparatory Year, students gain the foundational skills in English, mathematics, and computing needed to confidently begin the Software Engineering program. Admission to the SE program is granted to those who meet the criteria specified in the table below, subject to available program capacity.

University Preparatory Year Courses	Passing Letter Grade	Passing Numerical Grade (out of 100%)
English Language Courses	C and above	70% and above
Mathematics Courses	C and above	70% and above
Computer Science Course	D and above	60% and above

Students enrolled in the Preparatory Year must achieve a minimum cumulative GPA of 2.5 out of 4.0 to be eligible for admission into the programs offered by the College of Computer and Cyber Sciences. Further details on admission criteria are available at: Admission Criteria

2.5. Graduation Requirements

A Bachelor of Science in Software Engineering is awarded to students who meet the minimum credit hour, CGPA, and other program-specific requirements, in accordance with the university's policies and regulations. Below is a summary of the graduation requirements for the Software Engineering program:

- Fulfill all curricular requirements of the Software Engineering Program, as outlined in the table below.
- Complete 132 credit hours necessary for the Bachelor of Science in Software Engineering.
- The student academic record should not include any "Incomplete" or "In-Progress" grades
- Maintain a cumulative GPA of at least 2.0 out of 4.0.
- Students may enroll in additional courses to improve their cumulative GPA if necessary, upon the recommendation of their academic advisor and with approval from the Head of Department (HoD) and the Dean.
- Students must complete at least 60% of their total undergraduate coursework at the University of Prince Mugrin (UPM) to be eligible for an academic degree from the university.

Requirements	Math and Science	Engineering				Other	Total
		Core	Selected Electives	Internship	Capstone Design Project		
University Requirements	-	-	-	-	-	24	24
College of Cyber and Computer Sciences Requirements	14	19	-	-	-	8	41
Program Core Requirements	17	31	12	1	6	-	67
Requirements Subtotal	31	50	12	1	6	32	132
EAC of ABET Criteria Requirements	30	45				-	-

Students are typically expected to complete the program in eight regular semesters beyond the preparatory year, plus one summer field experience or a co-op internship. Students intending to graduate must submit a graduation application to the Office of Student Affairs no later than the last day for withdrawal without academic penalty in their expected final semester. Graduation eligibility is confirmed based on the records in the Student Information System (SIS), and the degree is officially conferred on the date semester results are announced.

2.6. Grading System

The grading system at UPM provides standardized measurements to assess students' levels of attainment in various subjects. Grading can be represented using letters (A, B, C, D, F), numerical values (1-4), or descriptive terms (e.g., Excellent, Very Good, Good, Pass, Fail). The following table outlines the grading system as per the University's Examination Rules and Regulations Lists:

English Descriptive	Points	Grade Limit Code	Code
Exceptional	4	100 – 95	A+
Excellent	3.75	90 less than 95	A
Superior	3.5	85 less than 90	B+
Very Good	3	80 less than 85	B
Above Average	2.5	75 less than 80	C+
Good	2	70 less than 75	C
Pass-High	1.5	65 less than 70	D+
Pass	1	60 less than 65	D
Fail	-	Less than 60	F
In-Progress	-	----------	IP
Incomplete	-	----------	IC
Denial	-	----------	DN
No Grade-Pass	-	60 and more	NP
No Grade-Fail	-	Less than 60	NF
Withdrawn	-	----------	W
Withdrawn with Pass	-	----------	WP
Withdrawn with Fail	-	----------	WF
Audit	-	----------	AU

2.7. Course Structure

2.7.1. General Education Courses:

General Education Compulsory Courses

No	Course Code	Course Title	Credit Units	Lect.	Study Level	Course Prerequisites
1	GIAS 101	Islamic Culture	3	3	1	-
2	GIAS 102	Arabic Language Skills	3	3	2	-
Total Units of Compulsory Courses			**6**			

General Elective Requirements Courses

No	Course Code	Category	Credit Units	Lect.	Study Level
1	GIAS xxx	**Area 1:** Islamic Studies	3	3	8
2	GHAL xxx	**Area 2:** Humanities, Arts, and Languages	3	3	4
3	GSOS xxx	**Area 3:** Social Sciences	3	3	7
4	ENGL xxx	**Area 4:** English Language	3	3	-
Total Units of Elective Courses			**12**		

Students should choose four courses from the list of elective courses with a total of (12 credit units) as indicated below. The specific areas are defined as below:

Area 1: Islamic Studies Elective (GIAS xxx) Courses.
Students should choose one course (3 credit hours) from the following Islamic Studies elective courses.

No	Course Code	Course Title	Credit Hours	Lect.	Study Level	Teaching Media
1	GIAS 211	Science & Interpretation of the Holy Qur'an	3	3	8	Arabic
2	GIAS 221	Prophet Mohamed (PBUH) Biography	3	3	8	Arabic/English
3	GIAS 241	Fiqh of Transactions	3	3	8	Arabic
4	GIAS 242	Human Rights	3	3	8	Arabic
5	GIAS 251	Islamic Civilization	3	3	8	Arabic/English
One Course			**3**			

Area 2: Humanities, Arts, and Languages Elective (GHAL xxx) Courses.

Students should choose one course (3 credit hours) from the following Humanities, Arts and Languages elective courses.

No	Course Code	Course Title	Credit Hours	Lect.	Study Level	Teaching Media
1	GHAL 221	Heritage of Saudi Arabia	**3**	3	4	Arabic/English
2	GHAL 241	Arabic Communication Skills	**3**	3	4	Arabic/English
3	GHAL 242	Modern Arab History	**3**	3	4	English
4	GHAL 243	Modern World History	**3**	3	4	English
5	GHAL 332	Classics of World Literature	**3**	3	4	English
6	GHAL 431	Arabic Literature	**3**	3	4	English
7	GHAL 442	History of Science	**3**	3	4	Arabic/English
One Course			**3**			

Area 3: Social Sciences (GSOS xxx) Elective Courses.

Students should choose one course (3 credit hours) from the following Social Sciences elective courses.

No	Course Code	Course Title	Credit Hours	Lect.	Study Level	Teaching Media
1	GSOS 212	Introduction to Sociology	**3**	3	7	Arabic/English
2	GSOS 214	Work and Society	**3**	3	7	Arabic/English
3	GSOS 216	Mass Media and Society	**3**	3	7	Arabic/English
4	GSOS 218	Science and Social Issues in the Modern World	**3**	3	7	Arabic/English
5	GSOS 222	Introduction to Psychology	**3**	3	7	Arabic/English
6	GSOS 234	Introduction to Political Science	**3**	3	7	Arabic/English
One Course			**3**			

Area 4: English Language (ENGL xxx) Elective Courses.
ENGL111 (English Language 1) and ENGL112 (English Language 2) may substitute any elective core courses from GHAL, GSOS. Students who were not able to get the required score in one of the standardized tests (IELTS, TOEFL) are recommended to study these two courses.

No	Course Code	Course Title	Credit Hours	Lect.	Study Level	Teaching Media
1	ENGL 111	**English Language 1**	**3**	3	*	Arabic/English
2	ENGL 112	**English Language 2**	**3**	3	*	Arabic/English
One Course			**3**			

* Can be taken as electives within any of the GS areas, i.e., GHAL and GSOS.

2.7.2. Mathematics and Basic Sciences Courses

No	Course Code	Course Title	Credit Hours	Course Requisite	
				Pre.	Co.
1	CS 201	Introduction to Discrete Systems	3	MATH 102	
2	MATH 101	Calculus I	4	MATH 002	
3	MATH 102	Calculus II	4	MATH 101	
4	MATH 201	Differential Equations	3	MATH 102	
5	MATH 202	Calculus III	3	MATH 102	
6	MATH 204	Linear Algebra	3	MATH 102	
7	PHYS 101	General Physics I	4	MATH 002	MATH 101
8	PHYS 102	General Physics II	4	PHYS 101	
9	STAT 232	Probability and Statistics	3	MATH 102	
Total Credit Hours			**31**		
Required by EAC of ABET			**30**		

2.7.3. Software Engineering Topics Courses

No	Course Code	Course Title	Credit Hours	Course Prerequisite
1	CS 211	Data Structures and Algorithms	4	CS 112
2	SE 262	Software Engineering	3	Corequisite: CS 112
3	SE 311	Software Requirements Engineering	3	SE 262
4	SE 323	Software Process and Modeling	4	SE 262
5	SE 324	Software Construction	3	SE 323
6	SE 342	Software Architecture and Design	3	SE 323
7	SE 372	Ethics and Professionalism	3	-
8	SE 394	Practical Training	1	-
9	SE 431	Software Maintenance and Evolution	3	SE 262
10	SE 463	Software Testing and Validation	3	SE 311
11	SE 464	Software Project Management	3	SE 262
12	SE 472	Software Security	3	CS 232
13	SE 491	Capstone Project I	3	SE 324, SE 342, SE 372, SE 463, SE 464
14	SE 492	Capstone Project II	3	SE 491
15	SE 4XX	Professional Elective I	3	-
16	SE 4XX	Professional Elective II	3	-
17	SE 4XX	Professional Elective III	3	-
18	SE 4XX	Professional Elective IV	3	-
Total Credit Hours			**54**	
Required by EAC of ABET			**45**	

2.7.4. Software Engineering Program Subject Area Courses

SE Program Subject Areas	Course Code	Course Title	Credit Hours	Course Prerequisite
Computing Fundamentals	CS 211	Data Structures and Algorithms	4	CS 112
	CS 221	Fundamentals of Operating Systems	4	CS 112
	CS 224	Computer Architecture and Organization	3	CS 201
	CS 232	Computer Networks	4	CS 111
	CS 351	Fundamentals of Database Systems	4	CS 112
Software Engineering Core	SE 262	Software Engineering	3	Corequisite: CS 112
	SE 311	Software Requirements Engineering	3	SE 262
	SE 324	Software Construction	3	SE 323
	SE 342	Software Architecture and Design	3	SE 323
	SE 463	Software Testing and Validation	3	SE 311
	SE 472	Software Security	3	CS 232
Software Engineering Processes and Tools	SE 323	Software Process and Modeling	4	SE 262
	SE 431	Software Maintenance and Evolution	3	SE 262
	SE 464	Software Project Management	3	SE 262
Discrete Mathematics, Probability, and Statistics	CS 201	Introduction to Discrete Systems	3	CS 112
	STAT 232	Probability and Statistics	3	MATH 102
Total Credit Hours			**53**	

2.7.5. Program Professional Elective Courses:

Students have the freedom to select professional elective courses according to their interests or career objectives. These electives offer a variety of specialized topics and encompass diverse disciplines, including computer sciences, and foundational courses in software engineering. Students can choose up to 12 credits, which typically equate to four courses, allowing them to customize their education and pursue their individual passions within and beyond the field of software engineering. Example:

No	Course Code	Course Title	Credit Hours	Course Prerequisite
1	AI 381	Artificial Intelligence I	3	**CS 112**
2	AI 316	Human Computer Interaction	3	**SE 262**
3	CS 317	Web Application Development	3	**CS 112**
4	SE496	Enterprise System Architecting	3	**SE 262**
5	SE 495	Introduction to Cloud computing and Security	3	
6	SE 493	Selected Topics in Software Engineering	9	**Approval**
Total Required Credit Hours			**12**	

2.7.6. Practical Training:

Students are required to take the following Practical Training course, offered in the summer term of the Junior Year. Students must pass this course before registering for the Capstone Project course, which is offered in the Senior Year.

No	Course Code	Course Title	Credit Hours	Unit Type			Study Level	Course Prerequisite
				Lect.	Tut.	Lab.		
1	SE 394	Practical Training *	1	-	-	-	Summer Term of Year 3	-
Total Required Credit Hours			**1**					

* All Year Three SE Core courses of first and second semesters must have been passed.

The course Practical Training (SE 394) provides students with an opportunity to integrate theory and practice by working in a supervised environment. The setup of the training is outlined below.

Training Period Setup:

The college arranges student internships in relevant software engineering industries during the summer semester. Each student completes full-time training, 40 hours per week, for a total of eight weeks (320 hours). A formal agreement defines the collaboration between the University and the host organization. Students apply their academic knowledge in real-world environments under the guidance of an on-site supervisor, who coordinates with the student's faculty advisor. The college provides general training guidelines and expected outcomes. At the end of the training, students must submit a technical report and deliver an oral presentation. For full details, refer to the SE 394 – Practical Training course outline. Capstone Project Courses:

No	Course Code	Course Title	Credit Hours	Unit Type			Study Level	Course Prerequisite
				Lect.	Tut.	Lab.		
1	SE 491	Capstone Project I	3	1	-	5	7	SE 324, SE 342, SE 372, SE 463, SE464
2	SE 492	Capstone Project II	3	1	-	5	8	SE 491
Total Required Credit Hours			6					

2.7.7. Credit Requirements Distribution Table

The requirements for graduating from the Program of Software Engineering are that a student successfully completes a total of 132 credit hours with a cumulative GPA of no less than 2.0 out of 4.0. The credit requirements are distributed as listed below.

General Education Courses (Areas 1, 2,3, and 4) and Competency Areas			**Mathematics, Science and Supporting Courses**		**Software Engineering and related Courses**		**Professional Electives**	
Areas	*Course #*	*Credits*	*Course #*	*Credits*	*Course #*	*Credits*	*Areas # Course #*	*Credits*
General Education Compulsory Courses			Mathematics Courses		Program Courses		From Four Areas	
Islamic Culture	GIAS 101	3	MATH 101	4	CS 111	4	SE xxx	3
Arabic Lang	GIAS 102	3	MATH 102	4	CS 112	4	SE xxx	3
General Education Electives:			CS 201	3	CS 224	3	SE xxx	3
Area 1	GIAS xxx	3			CS 211	4	SE xxx	3
Area 2	GHAL xxx	3			CS 232	4		
Area 3	GSOS xxx	3			CS 221	4		
Area 4	ENGL xxx	3*			CS 351	4		
Competency Courses			Sciences Courses		SE 311	3		
ENGLISH	ENGL 101	3	PHYS 101	4	SE 323	4		
	ENGL 102	3	PHYS 102	4	SE 342	3		
	ENGL 201	3			SE 262	3		
					SE 324	3		
			Supporting Courses		SE 394	1		
			STAT 232	3	SE 491	3		
			MATH 201	3	SE 464	3		
			MATH 202	3	SE 372	3		
			MATH 204	3	SE 492	3		
					SE 463	3		
					SE 431	3		
					SE 472	3		
Total per Category		**24**		**31**		**65**		**12**
Total Credit Hours Required for the Software Engineering Program is 132 Credits								

* Can be taken as electives within any of the GS areas, i.e., GHAL and GSOS

2.8. Four-Year Study Plan of Software Engineering Program

Students can choose between two academic paths: one combines diverse coursework with a two-month Summer Practical Training (SE 394), while the other focuses on a six-month Coop Practical Training (SE 493) for a more immersive, hands-on experience. The plan is structured to support practical skill development in Software Engineering.

First Year: First Semester					First Year: Second Semester				
Course code	**Course Title**	**Credit Hours**	**Prerequisite**	**Co Requisite**	**Course Code**	**Course Title**	**Credit Hours**	**Pre requisite**	**Co requisite**
MATH 101	Calculus I	4	MATH 002		MATH 102	Calculus II	4	MATH 101	
PHYS 101	General Physics I	4	MATH 002		PHYS 102	General Physics II	4	PHYS 101	
CS 111	Introduction to Computing and Programming	4	PCS 001		CS 112	Object Oriented Programming	4	CS 111	
ENGL 101	First Year Composition	3	ENGL 005		ENGL 102	Introduction to Report Writing	3	ENGL 101	
GIAS 101	Islamic Culture	3	-		GIAS 102	Arabic Language Skills	3	-	
Total		**18**			**Total**		**18**		
Second Year: First Semester					**Second Year: Second Semester**				
ENGL 201	Technical Writing	3	ENGL 102		MATH 201	Differential Equations	3	MATH 102	
CS 351	Fundamentals of Database Systems	4	CS 112		STAT 232	Probability and Statistics	3	MATH 102	
CS 201	Introduction to Discrete Systems	3	CS 112		CS 224	Computer Architecture and Organization	3	CS 201	
CS 211	Data Structures and Algorithms	4	CS 112		SE 262	Software Engineering	3	Corequisite: CS 112	
MATH 202	Calculus III	3	MATH 102		GHAL xxx	Arabic Language Skills	3	-	
Total		**17**			**Total**		**15**		
Third Year: First Semester					**Third Year: Second Semester**				
MATH 204	Linear Algebra	3	MATH 102		SE 342	Software Architecture and Design	3	SE 323	
CS 221	Fundamentals of Operating Systems	4	CS 112		CS 232	Computer Networks	4	CS 111	
SE 464	Software Project Management	3	SE 262		SE 463	Software Testing and Validation	3	SE 311	
SE 311	Software Requirements Engineering	3	SE 262		SE 324	Software Construction	3	SE 323	
SE 323	Software Modeling and Analysis	4	SE 262		SE 372	Ethics and Professionalism	3	-	
Total		**17**			**Total**		**16**		
SE 394: Practical Training: 1 Credit Hour, Department									
Regular Option Fourth Year: First Semester					**Regular Option Fourth Year: Second Semester**				
SE 491	Capstone Project I	3	SE 324, SE 342, SE 372, SE 463, SE 464		SE 492	Capstone Project II	3	SE 491	
SE 431	Software Maintenance and Evolution	3	SE 262		GIAS xxx	Islamic Studies	3	-	
GSOS xxx	Social Sciences	3	-		SE 472	Software Security	3	CS 232	
SE xxx	Professional Elective I	3	-		SE xxx	Professional Elective III	3	-	

SE xxx	Professional Elective II	3			SE xxx	Professional Elective IV	3		
Total		**15**			**Total**		**15**		
Total Credits Required: 132									

COOP Option Fourth Year: First Semester					**Fourth Year: Second Semester**				
SE 491	Capstone Project I	3	SE 324, SE 342, SE 372, SE 463, SE 464		SE 492	Capstone Project II	3	SE 491	
SE 493	Selected Topics in Software Engineering	9	SE 394		SE 472	Software Security	3	CS 232	
SE 431	Software Maintenance and Evolution	3	SE 262		GSOS xxx	Social Sciences	3		
					GIAS xxx	Islamic Studies	3		
					SE xxx	Professional Elective	3		
Total		**15**			**Total**		**15**		
Total Credits Required: 132									

2.9. Courses Description

2.9.1. First Level Courses (Total Credits:18)

MATH 101 - Calculus I	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: MATH 002	**Co-requisites:** N/A
Description: This course is designed to cover the basic concepts and methods of Calculus. It includes limits, continuity, and differentiability of functions of a single variable: polynomial, exponential, trigonometric, hyperbolic, and their inverses· Applications: related rates, local linear approximation, differentials, curve sketching and optimization problems. During the course, students will learn to recognize and express mathematical ideas graphically, numerically and in writing.	

ENGL 101 - First Year Composition	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: ENGL 005	**Co-requisites:** N/A
Description: Students are exposed to different genres of reading material, such as encyclopedias, magazines, newspapers, and websites. They are taught strategies for dealing with each genre independently and effectively. The writing component teaches argumentation and such rhetorical modes as definition writing, description, exemplification, causal analysis, and comparison. Students are taught the writing process and introduced to paragraphing, cohesion, conciseness, unity, and the use of specific details. They are alerted to common errors in grammar and sentence structure. The vocabulary component is based on the Academic World List, a corpus of vocabulary items based on the most frequently occurring lexis in a broad range of academic texts. In addition, students are expected to deliver short presentations on a variety of topics.	

GIAS 101 - Islamic Culture	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: The course deals with the concept of culture linguistically and idiomatically, its relationship to civilization, and the relationship of Islamic culture with other cultures, and the course also includes the concept of the Islamic faith, its characteristics, and its effects on the individual and society, reviewing faith, its pillars, and the fruits of faith in each corner. The course also includes the concept of worship, its pillars, and conditions, in addition to that the course highlights On ethics and its place in Islam, and models of its applications in life.	

PHYS 101 - General Physics I	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: MATH 002	**Co-requisites:** N/A
Description: The topics covered include introductory concepts of units and dimensions, vectors, kinematics of motion in one, two, and three dimensions, Newton laws, conservation of energy and linear momentum; rotational kinematics; rigid body dynamics; conservation of angular momentum; gravitation; simple harmonic motion; the static and dynamics of fluids. The course material will be presented in lectures (3 hrs./week). Problem solving techniques will be shown in tutorials (1 hr./ week). The understanding of concepts will further be strengthened by laboratory work (3 hrs./ week).	

CS 111 - Introduction to Computing and Programming	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: PCS 001	**Co-requisites:** N/A
Description: The main objective of this course is to teach the students the basics of constructing algorithms and programming languages. Learners will learn about the introduction to computing logic and problem-solving techniques, basics of data representation, and introduce the concept of programming. Programming is the way that computer scientists express their ideas and implement solutions to problems. Students learn the characteristics of computer programming using Python, a general-purpose high-level programming language. Students will design, code, and debug computer programs. The course will cover basic programming constructs including, but not limited to conditions, iterations, and functions. No knowledge of programming is required.	

2.9.2. Second Level Courses (Total Credits 18)

MATH 102 - Calculus II	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: MATH 101	**Co-requisites:** N/A
Description: This course is a continuation of Math 101. The topics covered include definite and indefinite integrals of functions of a single variable. Fundamental Theorem of Calculus. Techniques of integration. Applications of the definite integral to area, volume, arc length and surface of revolution. Improper integrals. Sequences and series: convergence tests, integral, comparison, ratio, and root tests. Alternating series. Absolute and conditional convergence. Power series. Taylor and Maclaurin series, Parametric function.	

ENGL 102 - Introduction to Report Writing	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: ENGL 101	**Co-requisites:** N/A

Description:
This course teaches students how to write a term report on a themed topic. Students select individual topics within themes assigned and approved by the teacher. They are introduced to basic research skills involving the internet and the University's available databases or print collections. They are taught about research report design: the MLA (Modern Language Association) style of documentation and citation, evaluating sources, summarizing, outlining, note taking, drafting, revising and editing. Academic integrity in report writing is strongly emphasized. Students' reading skills are further enhanced through exposure to a variety of reading materials on their research topics. The ENGL 102 course also explores three common academic writing skills: paraphrasing, summary, and synthesis in report writing. Students practice writing, evaluating, and revising during the research report process. Students will advance their skills in introducing, developing, and concluding their term reports, and present them orally. Students are taught presentation skills culminating in a PowerPoint presentation based on their term report.

CS 112 – Object-Oriented Programming	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: CS 111	**Co-requisites:** N/A

Description:
The course includes principles of object-oriented programming including classes, relationships between classes, inheritance, polymorphism, encapsulation, and information hiding; Principles of object-oriented design; program debugging; error handling and documentation techniques; implementation and simple analysis of fundamental algorithms for sorting and searching; event-driven programming and the use of libraries for user interfaces.

PHYS 102 - General Physics II	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: PHYS 101	**Co-requisites:** N/A

Description:
This course is a continuation of PHYS 101.
Topics covered include, the concepts of waves, wave speed on a string, Energy and power, Interference of waves, resonance and standing waves, temperature, heat, zero, first and second law of thermodynamics; kinetic theory of gases, entropy, Coulomb's law, the electric field, Gauss' law; electric potential and energy, capacitors, and dielectrics; D.C. circuits, the magnetic field, Ampere's and Faraday's laws. Students will learn the concepts and applications underlie the working of household appliances, electric motors, power generation, monitoring screens, printers etc. The course material will be presented in lectures (3 hrs./week). Problem solving techniques will be developed in tutorials (1 hr./ week). The understanding of physical concepts will further be strengthened by a set of standard experiments carried out through the laboratory work (3 hrs./ week)

GIAS 102 - Arabic Language Skills	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: This course introduces students to the fundamentals of Arabic grammar essential for reading, writing, and constructing sentences accurately. It includes a variety of exercises and texts designed to facilitate a smooth and easy learning experience.	

2.9.3. Third Level Courses (Total Credits 17)

ENGL 201 - Technical Writing	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: ENGL 102	**Co-requisites:** N/A
Description: This course teaches students to craft a 1500-word report on a problem-solution topic related to their majors, emphasizing APA style and advanced internet research. Instruction covers audience analysis, refining topics, citations, document design, paraphrasing, summarizing, and abstract writing, alongside advanced presentation skills. The latter part of the course focuses on job application processes, including cover letters, résumés, interviews, and key business correspondence aspects like letter formats and tones, particularly for inquiry and complaint letters. It also highlights the significance of academic honesty in all forms of communication.	

CS 201 - Introduction to Discrete Systems	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: CS 112	**Co-requisites:** N/A
Description: The course is intended to mainly cover the topics of fundamental mathematical structures and logical principles that are relevant to Computer Science. In this course students will be encouraged to develop an appreciation for how modern mathematics provides a sound foundation upon which to build a rich and robust understanding of the elements of computing. It also provides students with an introduction to essential elements of mathematics for computing, which include formal logic, sets, relations and functions, elementary theorem- proving methods, with an emphasis on induction, combinatorial, and graph theory.	

CS 211 - Data Structures and Algorithms	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: CS 112	**Co-requisites:** N/A

Description:
This course discusses fundamental concepts of data structures and the algorithms that proceed from them. Topics to be covered include the implementation and use of linked lists, stacks, queues, trees, priority queues, heaps and graphs, with an emphasis on recursion, abstract data types, object-oriented design, and associated algorithms and complexity issues.

MATH 202 – Calculus III	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: MATH 102	**Co-requisites:** N/A

Description:
This course is a continuation of Math 102. Topics covered include various aspects of vector fields: vector fields in two and three dimensions, operations on vectors such as scalar and vector products, gradient, divergence, and curl of vector fields. Basic of analytic geometry: Lines and planes in three dimensions, surface Equations of the tangent plane and normal line to a surface. Vector-valued functions and connecting them with single variable functions. Concepts of motion. Line and surface integrals, multiple integrals. Green and Stokes Theorems. The course material will be presented in lectures (3 hrs./week). Problem-solving techniques will be developed in tutorials (1 hr./ week).

CS 351 - Fundamentals of Database Systems	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: CS 112	**Co-requisites:** N/A

Description:
This course introduces the students to the concepts and design of the database. The course concentrates around core skills of organizational information requirements by modeling data using conceptual data modeling techniques, converting the conceptual data models into relational data models (database schema), and implementing in Structured Query Language (SQL). A team project that builds a database application for a real-world scenario is an important element of the course.

2.9.4. Fourth Level Courses (Total Credits: 15)

CS 224 - Computer Architecture and Organization	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: CS 201	**Co-requisites:** N/A
Description: The course introduces students to the basics of modern computer organization and architecture. The topics covered include program performance, instruction sets, programming using assembly language, digital design, processor datapath and control, pipelining, memory hierarchy and parallel processors.	

SE 262 – Software Engineering	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: Corequisite: CS 112	**Co-requisites:** N/A
Description: This course introduces students to software engineering principles. The students will be exposed to software life cycle and processes. This covers requirements engineering, system analysis and design, modeling using the Unified Modeling Language (UML), and software project management. Students will have the chance to practice systems analysis and design for simple systems that serve real-world scenarios.	

STAT 232 - Probability and Statistics	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: MATH 102	**Co-requisites:** N/A
Description: This course covers Basic and advanced levels of Probability and statistics. The course focuses on the use of quantitative data analysis techniques for software engineering applications. In addition, it highlights both the Descriptive and Inferential statistical tools.	

MATH 201 - Differential Equations	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: MATH 102	**Co-requisites:** N/A
Description: This course covers the following topics: classification of differential equations, first order differential equations, higher order linear differential equations, linear systems of algebraic equations, first order linear systems of ordinary differential equations, Laplace transforms, and their application on initial value problems.	

GHAL XXX - Humanities, Arts, and Languages	
Core/Elective: Elective	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: The Humanities, Arts, and Languages (GHAL xxx) course offers an interdisciplinary exploration of human culture, artistic expression, and languages. Students will study historical, philosophical, and literary contexts; engage with various art forms; and enhance their language skills, deepening their understanding of cultural nuances. Through lectures, discussions, and hands-on projects, the course aims to develop critical thinking, aesthetic appreciation, and global awareness.	

2.9.5. Fifth Level Courses (Total Credits: 17)

MATH 204 - Linear Algebra	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: MATH 102	**Co-requisites:** N/A
Description: This course covers the following topics: system of linear equations, matrix algebra, vector spaces, dot and inner products, eigenvectors, orthogonality and least squares, symmetric matrices and quadratic forms, and linear transformations.	

CS 221 - Fundamentals of Operating Systems	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: CS 112	**Co-requisites:** N/A
Description: This course provides an introduction to operating system design and implementation. The course will start with a brief historical perspective of the evolution of operating systems and will further discuss the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), file systems, and operating systems protection and security.	

SE 464- Software Project Management	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: SE 262	**Co-requisites:** N/A
Description: This course introduces project management concepts, tools, and techniques. With a focus on the essentials of software project management, the course discusses project planning, scope management, scheduling, estimation, human resource management, communication management, risk analysis and management, and project quality management.	

SE 311 - Software Requirements Engineering	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: SE 262	**Co-requisites:** N/A
Description: This course provides an in-depth coverage of software requirements engineering. Topics covered include requirements engineering process, requirements elicitation and analysis, requirements specification, requirements validation and management. Students participate in a team-oriented requirements engineering project.	

SE 323 - Software Process and Modeling	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: SE 262	**Co-requisites:** N/A
Description: This course introduces students to the concepts, methods, techniques, and tools for analyzing and designing software systems. It will focus on the object-oriented approach and the UML notation.	

2.9.6. Sixth Level Courses (Total Credits: 16)

SE 342 - Software Architecture and Design	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: SE 323	**Co-requisites:** N/A
Description: This course build upon what the student has learnt in SE 323 (Process & Modeling) course in terms of software design principles. With a focus on the design principles, architecture styles, among other important topics, the student will learn about middleware architectures, frameworks, service-oriented architecture, and practical use of design patterns. Designing for qualities such as performance, security, reusability, and reliability are also discussed.	

CS 232 - Computer Networks	
Core/Elective: Core	**Credit Hours:** 4
Pre-requisites: CS 111	**Co-requisites:** N/A

Description:
This course introduces the student to the study of fundamental principles in the design and implementation of computer communication networks, their protocols, and applications. Topics to be covered include layered network architectures, network applications, network programming interfaces (e.g., sockets), transport services, data link protocols, local area networks and network routing. Examples will be drawn primarily from the Internet TCP/IP protocol suite. Through homework assignments and class projects, the students will learn how the Internet works and how to design Internet applications.

SE 463 - Software Testing and Validation	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: SE 311	**Co-requisites:** N/A

Description:
This course provides an opportunity for the SE students to learn about software testing and quality assurance in depth with a hands-on approach, where the students will be exposed to some of known test tools in the domain. The course span covers software testing and validation and verification in details, as well as a number of important topics, including: test cases, test levels (unit, system, integration, and acceptance testing), static and dynamic testing, black-box and white-box testing, software reliability and software quality, and finally automated testing.

SE 324- Software Construction	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: SE 323	**Co-requisites:** N/A

Description:
This course introduces students to the concepts, methods, techniques, and tools for analyzing and designing software systems. It will focus on the object-oriented approach and the UML notation.

SE 372- Ethics and Professionalism	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: This course discusses Ethics in Information Technology, Ethics for IT Workers and IT Users, Ethics of IT Organizations, Computer and Internet Crime, Privacy, and Intellectual Copyright. Topics covered also include Licensing, threats, information security & Hackers, vandals, spyware and network security risks. Therefore, a brief introduction to cybersecurity shall be discussed. It also reflects professional Islamic ethics in businesses and workplaces. Recent stories, case studies and real-life examples or use case scenarios will be discussed through forum discussions. Students will have the opportunity to challenge (oppose) an ethical principle or defend it (with respect to all opinions).	

2.9.7. Summer Internship (Total Credits: 1)

SE 394 - Practical Training	
Core/Elective: Core	**Credit Hours:** 1
Pre-requisites: N/A	**Co-requisites:** N/A
Description: The course Practical Training (SE 394) provides students with an opportunity to integrate theory and practice by working in a supervised environment. The college committee arranges student placements in relevant industry for obtaining practical experience. The practical or field placement agreements serve as a contract between the University and the training organization. Each student undertakes full time training for a duration of eight weeks, 30-40 hours a week, during the summer semester in organizations that deal with software engineering related issues. The internships offer practical applications of theoretical studies in software engineering. The supervisor at the workplace is responsible for guiding and assigning tasks to the student as well as reporting the student's progress to the faculty advisor at the Software Engineering Department. The general guidelines about the types of outcomes student is required to produce are provided by the college to the supervisor at the workplace. Upon the completion of practical experience in the industry, students are required to submit technical reports to both on-site supervisor and faculty advisor and give an oral presentation in the presence of the same.	

2.9.8. Seventh Level Courses (Total Credits: 15)

SE 491 - Capstone Project I	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: SE 324, SE 342, SE 372, SE 463, SE 464	**Co-requisites:** N/A
Description: This course is the first part of a sequence of two courses that constitute the graduation capstone project. In this course the students integrate the knowledge areas they learnt into a development-based project in which they will deliver proposals, reports, and oral presentations. The course topics cover planning, analysis, and design phases of the projects (an implementation and testing of parts of the system will also be developed in this course in case of following the agile development methodology)	

SE 431 - Software Maintenance and Evolution	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: SE 262	**Co-requisites:** N/A
Description: This course is an introduction to the main issues related to software systems aging and evolution. Software systems continuously change and, eventually, they become difficult and costly to comprehend and maintain. Consequently, software maintenance and evolution are essential activities that account for more than half of the resources invested in the development of a software system. To reduce such costs, different strategies can be adopted by software practitioners	

GSOS XXX - Social Sciences Elective	
Core/Elective: Elective	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: The Social Sciences (GSOS xxx) course provides a comprehensive introduction to the diverse fields within the social sciences, including psychology, sociology, economics, political science, and anthropology. This course aims to equip students with an understanding of the various theories and methods used to analyze societies, human behavior, and social interactions. Through a blend of lectures, case studies, and research projects, students will explore key concepts such as social structures, economic systems, political ideologies, and cultural practices. The course emphasizes critical thinking, data analysis, and empirical research skills, preparing students for informed civic engagement and potential careers in social science-related fields.	

SE xxx - Professional Elective I, II, III, IV	
Core/Elective: Elective	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: These professional elective courses serve as introduction to specialized topics that are essential to the student's chosen field of career. It is designed to provide fundamental concepts and practices.	

2.9.9. Eight Level Courses (Total Credits: 15)

SE 492 - Capstone Project II	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: SE 491	**Co-requisites:** N/A
Description: This course is the second part of a sequence of two courses that constitute the BSc graduation capstone project. In this project, the student will continue the software development of the project that started in SE491. The student will deliver oral presentations, progress reports, a final report and a demo of a working (implemented and tested) system.	

GIAS xxx - Islamic Studies	
Core/Elective: Elective	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: The course deals with the concept of culture linguistically and idiomatically, its relationship to civilization, and the relationship of Islamic culture with other cultures, and the course also includes the concept of the Islamic faith, its characteristics, and its effects on the individual and society, reviewing faith, its pillars, and the fruits of faith in each corner. The course also includes the concept of worship, its pillars, and conditions, in addition to that the course highlights on ethics and its place in Islam, and models of its applications in life.	

SE 472 – Software Security	
Core/Elective: Core	**Credit Hours:** 3
Pre-requisites: CS 232	**Co-requisites:** N/A
Description: This course deals with producing software that meets specified security requirements. Depending on the requirements, many different techniques and/or processes are used to meet the required level of security. A higher level of security calls for more advanced techniques/processes, which cost more, will be discussed. The topics include, Secure Software Specification, Secure Coding, Secure Testing, Language-based Security, Program Verification and Simulation, and Maintenance	

2.9.10. Elective Courses

The following elective courses, recognized and approved by the SE department, will be offered as Professional Elective I, Professional Elective II, Professional Elective III, Professional Elective IV, and Humanities, Arts, and Languages Elective (GHAL xxx).

SE 495 - Introduction to Cloud computing and Security	
Core/Elective: Elective	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: This course provides the theory and hands-on of the fundamentals of Cloud Computing and its security. The course starts by the definition of what cloud computing is, the advantages and drivers of Cloud Solutions. The provisioning of computer resources on the fly, unlimited storage and processing capabilities, and the cost per usage strategy will be explained. Cloud service models/types (public, private, hybrid, and community clouds) as well as cloud deployment models (IaaS, PaaS, SaaS) will also be covered in the course. Cloud Economics and Billing and Fundamentals of cloud Pricing will be discussed. Cloud Security, Cloud security challenges, Cloud security approaches. Securing Accounts and Securing Data will be explained in detail. Technical considerations regarding Migrating to the Cloud, testing in the cloud, load balancing, caching, distributed transactions, cloud related legal and social issues as well as managing cloud storage will be briefly explained. Through hands-on assignments, labs and projects, students will apply what they learned on Amazon web services (AWS) as case studies, for e.g. AWS IAM (Identity and Access Management), Amazon VPC, AWS EC2, …etc.	

SE 496 - Enterprise System Architecting	
Core/Elective: Elective	**Credit Hours:** 3
Pre-requisites: SE 262	**Co-requisites:** N/A

Description:
In the dynamic landscape of technology and business, the course "Enterprise System Architecture "equips students with the essential skills to bridge the gap between technological innovation and strategic business goals. Through an interdisciplinary approach, students will delve into the critical intersection of architecture and strategy, understanding how to craft technology solutions that harmonize with an organization's vision and mission. This transformative course explores the symbiotic relationship between architecture and strategy, guiding students to design intricate roadmaps that amplify competitive advantage, foster agility, and elevate the alignment between technology and business aspirations. By embracing real-world case studies and practical projects, students will gain the expertise to not only create robust architectural frameworks but also to navigate the intricate realm of strategic decision-making. As they embark on this transformative journey, students will emerge as architects of change, harnessing architecture to catalyze strategic success and shape the future of businesses in an ever-evolving digital era.

SE 493 – Selected Topics in Software Engineering	
Core/Elective: Elective	**Credit Hours:** 9
Pre-requisites: All Junior-Level Courses (All SE3xx Courses, SE 394 - Practical Training	**Co-requisites:** N/A

Description:
This course, Selected Topics in Software Engineering (SE 493), provides students with an opportunity to integrate theory and practice by working in a supervised environment for a full semester. The College Career Services Committee arranges student placements in relevant industry for obtaining practical experience. The practical or field placement agreements serve as a contract between the University and the training organization. Each student undertakes full-time training for a duration of sixteen weeks, 40hours a week, during fall semester in organizations that deal with software engineering projects. The experience offers practical applications of theoretical studies in the areas of software project management and software design and development. The supervisor at the workplace is responsible for guiding and assigning tasks to the student as well as reporting the student's progress to the faculty advisor at the SE Program. The general guidelines about the types of outcomes student is required to produce are provided by the college to the supervisor at the workplace. Upon the completion of the industry experience, students are required to submit technical reports to both on-site supervisor and faculty advisor and give an oral presentation in the presence of the same.

GHAL 103 – FOREIGN LANGUAGE (FRENCH LANGUAGE I)	
Core/Elective: Elective	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: This course for beginners allows students to acquire the basics to begin communicating and expressing themselves in French. It aims to develop, in a structured and progressive way, the four language skills of listening, speaking, reading and writing to satisfy social and professional exchanges in various contexts. Students also build knowledge of French grammar and vocabulary, which directly enhances their ability to perform tasks in the four language skills.	

GHAL 203 – FOREIGN LANGUAGE (FRENCH LANGUAGE II)	
Core/Elective: Elective	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: GHAL 203 builds on the language skills students have learned in GHAL 103. GHAL 203 enables learners to develop a higher level of listening and reading comprehension, apply more specialized vocabulary and grammatical functions, and write more extensively on situations in the hotel, catering and tourism fields. Students also demonstrate greater competence in verbal and non-verbal communication skills while becoming familiar with French culture.	

GHAL 213 – FOREIGN LANGUAGE (FRENCH LANGUAGE III)	
Core/Elective: Elective	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: GHAL 213 is the continuation of GHAL 203, in which students interact orally and in writing in realistic situations to develop their communicative competence in French. The course also reinforces learners' grammar and vocabulary through video sequences on the lives of French professionals, to prepare students for the specialized skills required in the sectors of hospitality and tourism.	

GSOS 214 – Work and Society	
Core/Elective: Elective	**Credit Hours:** 3
Pre-requisites: N/A	**Co-requisites:** N/A
Description: This course is designed to familiarize students with professional ethics and their significance in enhancing workplace productivity and contributing to the economic development of society. It covers key professional misconducts and strategies to address them, along with ethical practices applicable to various occupational systems. Additionally, the course explores the principles of professional ethics within the Islamic context, aiming to foster the growth of dynamic human societies.	

3. Advising and Support Services

Within UPM academic community, UPM prioritizes the success of students. It is recognized that navigating through student's studies can sometimes be challenging, which is why a range of support services are offered to assist students in their journey.

3.1. Academic Advising

The SE team of academic advisors is dedicated to providing support and guidance to students throughout their academic endeavors. Whether students are exploring their course options, planning their schedules, or seeking advice on academic matters, advisors are available to help. They can offer personalized assistance to ensure that students make informed decisions about their academic path and stay on track towards achieving their goals.

3.2. Faculty Office Hours

SE faculty members are committed to supporting students both inside and outside the classroom. They hold regular office hours to provide additional academic and career assistance and guidance. During these office hours, students have the opportunity to engage with their professors, ask questions, and seek clarification on course material or career opportunities. Building relationships with professors can enhance the learning experience and offer valuable mentorship opportunities.

3.3. Resources for Success

The SE Program offers a variety of resources to help students succeed in their program:

- **Tutoring Services:** Students who find themselves struggling with coursework can benefit from tutoring services. Tutors are knowledgeable in a wide range of subjects and can provide support to help students understand difficult concepts, improve their study skills, and boost their confidence.
- **Career Center:** Planning for the future is an important aspect of the educational journey. The UPM career counseling services are designed to help students explore their interests, strengths, and goals. Whether students are considering potential career paths, preparing for interviews, or seeking advice on resumes and cover letters, counselors are available to provide guidance and support.
- **Internship Opportunities:** UPM considers the value of gaining practical experience in the field of study. That is why internship opportunities are offered to help students apply their classroom learning in real-world settings. Internships provide hands-on experience, networking opportunities, and valuable insights into potential career paths.

3.4. English Language Support Center

The purpose of the English Language Support Center at UPM is to address the varying English proficiency levels among students interested in enrolling in scientific bachelor's degree programs. Successful completion of either the IELTS or TOEFL exams, as well as the Math and Computer placement tests, enables direct enrollment into the SE program. Moreover, students can be exempted from English language studies in the Preparatory Year if they achieve passing scores in internationally recognized English language tests, such as a minimum score of 5.5 in the IELTS, 500 in the TOEFL, or meet the requirements of the Michigan testing system. Additionally, students may qualify for an exemption if they attain the necessary score in any other standardized international tests acknowledged by UPM.

Some students may come from backgrounds where their English skills require improvement. In recognition of this need, the English Language Center offers tailored assistance to help students master their English language abilities. Through specialized programs and resources, the center aims to provide students with the necessary linguistic foundation to thrive academically and professionally within the software engineering field. By bridging the gap in English proficiency, the center ensures that all students, regardless of their initial skill level, have the opportunity to excel in their studies and fully participate in the SE Program at UPM.

3.5. Arabic Language Support Center

The purpose of the Arabic Language Support Center at UPM is to cater to the diverse linguistic needs of our student body, which includes a significant number of non-Arabic speakers. A population that rises to approximately 96 students. By providing specialized support in learning Arabic, the center aims to facilitate the integration and cultural immersion of these students within the university community. Through tailored language programs and resources, the center strives to empower students with the necessary linguistic skills to navigate academic, social, and professional contexts where Arabic proficiency is advantageous. Ultimately, the center serves as a bridge to connect students from diverse backgrounds, fostering a more inclusive and enriching educational experience at UPM.

3.6. Counseling Center

The Counseling Center at UPM is dedicated to providing comprehensive psychological, social, and behavioral support to all students, with a particular focus on those with special needs. Through direct psychological and social sessions, the center aims to address a wide range of student concerns and promote holistic well-being. The following are the key objectives of this center:

1. **Understanding Student Needs:** The center emphasizes understanding each student's personality, abilities, inclinations, and developmental stage. By gaining insight into individual requirements, the center can tailor its support to effectively meet the diverse needs of students.
2. **Overcoming Challenges:** Through individual and group sessions, the center assists students in overcoming various challenges, including psychological, social, behavioral, and family-related issues. These sessions aim to empower students to confront their problems, alleviate fear and anxiety, and develop effective coping strategies.
3. **Building Self-Confidence:** One of the primary goals of the Counseling Center is to help students build self-confidence and trust in their abilities and skills. By providing guidance and support, the center encourages students to recognize their strengths and capabilities, fostering a positive self-image.
4. **Promoting Social Connections:** The center actively promotes the development of positive relationships with peers, teachers, and other members of the university community. Through social and educational initiatives, students are encouraged to engage in meaningful interactions within a supportive environment.
5. **Parental Engagement:** The Counseling Center facilitates communication with parents to address students' difficulties stemming from financial constraints or challenging family circumstances. By involving parents in the support process, the center strives to create a cohesive support network that enhances student well-being.

Overall, the Counseling Center plays a pivotal role in nurturing the holistic development of students at UPM. By providing a range of services and programs tailored to individual needs, the center ensures that students receive the necessary support to thrive academically, socially, and emotionally throughout their university journey.

3.7. Scholarship Unit

The Scholarship Unit at UPM serves as a vital resource for students seeking information about available scholarships within the university. With a commitment to supporting students in their academic endeavors, the unit offers a range of services designed to streamline the scholarship application process and provide ongoing support to scholarship recipients.

Key Responsibilities:

1. **Scholarship Application Management:** The unit is responsible for receiving scholarship applications from students and accurately recording them in the system. This ensures that all applications are properly documented and processed in a timely manner.
2. **Application Review and Evaluation:** Scholarship applications are carefully reviewed and evaluated by the unit to assess the eligibility and suitability of applicants. Through this process, the unit determines scholarship percentages based on each student's academic and financial status.
3. **Contract Management:** Upon approval of scholarship applications, the unit facilitates the signing of scholarship contracts between the university and the recipients. Additionally, the unit oversees the proper implementation of scholarship agreements and provides ongoing support to scholarship recipients.
4. **Monitoring and Updates:** The Scholarship Unit maintains regular communication with scholarship recipients to provide updates on any changes or developments related to their scholarships. This includes monitoring students' academic progress and ensuring compliance with scholarship requirements.
5. **Information Dissemination:** Keeping students informed about available scholarships and relevant updates is a priority for the unit. Through various communication channels, including email notifications and informational sessions, the unit ensures that students have access to timely and accurate information about scholarship opportunities.

By effectively managing scholarship applications, providing ongoing support to recipients, and facilitating communication with students, the Scholarship Unit plays a crucial role in promoting access to higher education and supporting student success at UPM.

4. Policies and Procedures

UPM maintains a comprehensive set of procedures and policies overseen by various vice rectorates, departments, and student affairs, ensuring the smooth functioning of academic and administrative processes. These include:

Vice Rectorate for Executive Affairs:

- **Code of Conduct:** Upholds ethical standards and organizational values within the university community.

Vice Rectorate for Academic Affairs:

- **Field Training Manual (Internship):** Guides students through practical training experiences.
- **Handbook for Teaching and Learning:** Provides guidelines for effective teaching methodologies.
- **UPM Manual for Development of a New Academic Program and Curriculum Review:** Ensures the quality and relevance of academic programs.

Accreditation and Quality Assurance Department:

- **UPM Quality Assurance Manual V 2.1:** Ensures adherence to quality standards and continuous improvement in educational practices.

Public Relation Department:

- **Publication Policy:** Oversees the dissemination of information and communication strategies.

Human Resources Department:

- **Code of Conduct:** Establishes ethical guidelines for employees.
- **Conflict of Interest Agreement- Updated:** Manages conflicts of interest among staff members.
- **Full-time Faculty Workloads and Working Hours:** Ensures fair and equitable workload distribution.
- **Faculty and Staff Community Service:** Encourages community engagement and service initiatives.

Student Affairs Policies and Procedures:

- **Academic Advisor Guidelines:** Provides support and guidance for academic planning and career development.
- **Admission and Registration Policies Manual:** Defines procedures for student enrollment and registration.

- **Code of Conduct:** Outlines behavioral expectations and responsibilities of students.
- **Student Disciplinary Regulations:** Ensures compliance with university rules and regulations.
- **Student Handbook:** Provides essential information and resources for student success.
- **Students' Rights and Duties Deanship of Student Affairs:** Advocates for student rights and responsibilities.
- **UPM Explanatory Implementation for the Rules Regulations of Undergraduate Study Examinations:** Clarifies examination policies and procedures.
- **Student Grievance and Appeals:** Facilitates resolution of student grievances and appeals.

These policies and procedures serve to maintain transparency, fairness, and accountability within the university community, fostering an environment conducive to learning, growth, and academic excellence. The details may be found in the following web links:

- **UPM Policies and Procedures**
  UPM Policies and Procedures
- **Student Affairs Policies and Procedures**
  Student Affairs Policies and Procedures

5. Student Resources

As part of our commitment to student success and holistic development, UPM offers a range of resources to support students in their academic pursuits and extracurricular interests. From state-of-the-art facilities to vibrant student organizations, UPM campus provides a conducive environment for learning, research, and personal growth.

5.1. Library

The library is a hub of knowledge and information, providing students with access to a vast collection of resources, including books, journals, periodicals, and electronic databases. Whether you're conducting research for a class assignment or exploring topics of personal interest, the library offers a quiet and comfortable space for study and reflection. Knowledgeable librarians are available to assist in finding resources and navigating academic databases.

5.2. Computer Labs

Equipped with the latest technology and software, the computer labs at UPM provide students with access to essential tools for coursework, research, and project work. Whether you need to access specialized software for your major or require additional computing resources for multimedia projects, the computer labs offer a collaborative and supportive environment for academic endeavors.

5.3. Research Centers

Research centers at UPM serve as hubs of innovation and discovery, fostering interdisciplinary collaboration and advancing knowledge in key areas of study. Research centers offer opportunities for hands-on research experience, mentorship from faculty experts, and access to cutting-edge facilities and equipment in the field of software engineering.

5.4. Student Organizations Related to Software Engineering

For students interested in Software Engineering, a variety of student organizations and clubs dedicated to exploring this dynamic field are offered. These organizations provide opportunities for networking, professional development, and hands-on learning experiences. Whether you are a novice looking to learn the basics or an experienced practitioner seeking to deepen your expertise, software engineering related student organizations offer a supportive community where you can connect with like-minded peers and engage in activities such as workshops, competitions, and guest lectures.

5.5. Transportation Services

At UPM, the importance of ensuring equal access and opportunities for all students across UPM campuses is recognized. Certain courses may require male students to visit the female campus, and vice versa, to attend various classes or events on different campuses. To facilitate seamless movement and accessibility, reliable transportation services between the male and female campuses is provided.

Our transportation services are designed to support students in their academic pursuits and extracurricular activities. By offering convenient transportation options, we aim to eliminate barriers to participation and promote inclusivity across both campuses. Whether students are attending classes, engaging in research, or participating in campus events, they can rely on the transportation services to navigate between campuses efficiently.

UPM is committed to creating an environment where all students can thrive academically and personally. By providing accessible transportation services, UPM ensures that every student has the opportunity to fully engage in the rich academic and extracurricular experiences available at the institution. Students are invited to take advantage of these resources and explore the diverse opportunities for learning, growth, and enrichment that the campuses have to offer.

6. Internship and Career Opportunities

Success in software engineering goes beyond academics. The program provides guidance on internships, co-op placements, and career services to help students gain real-world experience. The program also offers support in pursuing industry-recognized certifications to enhance students' professional profile and career readiness.

6.1. Finding Internships and Co-op Opportunities

UPM provides guidance and support to help students find internships and co-op opportunities that align with their interests and career goals. Through workshops, networking events, and career fairs, students are connected with potential employers and industry partners seeking talented individuals to join their teams. Additionally, career advisors offer personalized assistance, helping students polish their resumes, prepare for interviews, and navigate the internship application process.

6.2. Career Placement Services

Career placement services are designed to support students in securing employment upon graduation. Whether seeking full-time positions, part-time opportunities, or entry-level roles in software engineering, career advisors provide help. From resume building to interview preparation, advisors provide the tools and resources that students need to stand out in the job market and land their dream job.

6.3. Industry Certifications

Beyond academic coursework, earning industry certifications can significantly strengthen students' careers in software engineering. The program offers support and resources to help students develop the skills needed to pursue recognized certifications such as Certified Software Development Professional (CSDP), Professional Scrum Master (PSM), AWS Certified Developer, and ISTQB Certified Tester. These credentials demonstrate students' expertise in areas like software design, agile development, cloud computing, and software testing boosting their credibility and employability in the field.

The SE Program is committed to providing students with the opportunities and support they need to succeed in their software engineering careers. Whether seeking internships, co-op opportunities, or full-time employment, career services team is dedicated to helping students achieve their goals. By taking advantage of the resources, guidance, and industry connections, students will be well-equipped to embark on a successful career path in software engineering.

7. Appendices

In this section, additional resources and supplementary information may be found that may be helpful to students pursuing a Bachelor of Science in Software Engineering.

7.1. Sample Degree Plan

The following table represents a sample degree plan outlining the suggested course sequence for completing a Bachelor of Science in software engineering. The degree plan provides a roadmap for students to follow, ensuring that they fulfill all major requirements and prerequisites in a timely manner.

First Year: First Semester (Freshman)				
Course Code	Course Title	Credit Hours	Requisite	
			Pre-	Co-
MATH 101	Calculus I	4		
PHYS 101	General Physics I	4		
CS 111	Introduction to Computing and Programming	4		
ENGL 101	First Year Composition	3		
GIAS 101	Islamic Culture	3		
	Total	**18**		

First Year: Second Semester (Freshman)				
Course Code	Course Title	Credit Hours	Requisite	
			Pre-	Co-
MATH 102	Calculus II	4	MATH 101	
PHYS 102	General Physics II	4	PHYS 101	
ENGL 102	Introduction to Report Writing	3	ENGL 101	
CS 112	Object-Oriented Programming	4	CS 111	
GIAS 102	Arabic Language Skills	3		
	Total	**18**		

Second Year: First Semester (Sophomore)				
Course Code	Course Title	Credit Hours	Requisite	
			Pre-	Co-
ENGL 201	Technical Writing	3	ENGL 102	
CS 351	Fundamentals of Database Systems	4	CS 112	
CS 201	Introduction to Discrete Systems	3	CS 112	
CS 211	Data Structures and Algorithms	4	CS 112	
MATH 202	Calculus III	3	MATH 102	
	Total	**17**		

Second Year: Second Semester (Sophomore)				
Course Code	Course Title	Credit Hours	Requisite	
			Pre-	Co-
STAT 232	Probability and Statistics	3	MATH 102	
CS 224	Computer Architecture and Organization	3	CS 201	
SE 262	Software Engineering	3		CS 112
MATH 201	Differential Equations	3	MATH 102	
GHAL XXX	Humanities, Arts and Languages	3		
	Total	**15**		

Third Year: First Semester (Junior)				
Course Code	Course Title	Credit Hours	Requisite	
			Pre-	Co-
MATH 204	Linear Algebra	3	MATH 102	
CS 221	Fundamentals of Operating Systems	4	CS 112	
SE 464	Software Project Management	3	SE 262	
SE 311	Software Requirements Engineering	3	SE 262	
SE 323	Software Process and Modeling	4	SE 262	
	Total	**17**		

Third Year: Second Semester (Junior)				
Course Code	Course Title	Credit Hours	Requisite	
			Pre-	Co-
SE 342	Software Architecture and Design	3	SE 323	
CS 232	Computer Networks	4	CS 111	
SE 463	Software Testing and Validation	3	SE 311	
SE 324	Software Construction	3	SE 323	
SE 372	Ethics and Professionalism	3		
	Total	**16**		

		SE 394	**Practical Training**	**1 Credit**

Fourth Year: First Semester (Senior)				
Course Code	Course Title	Credit Hours	Requisite	
			Pre-	Co-
SE 491	Capstone Project I	3	SE 464,SE 342, SE 463	
SE 431	Software Maintenance and Evolution	3	SE 262	
GSOS xxx	Social Sciences	3		
SE xxx	Professional Elective I	3		
SE xxx	Professional Elective II	3		
	Total	**15**		

Fourth Year: Second Semester (Senior)				
Course Code	Course Title	Credit Hours	Requisite	
			Pre-	Co-
SE 492	Capstone Project II	3	SE 491	
GIAS xxx	Islamic Studies	3		
SE 472	Software Security	3	CS 232	
SE xxx	Professional Elective III	3		
SE xxx	Professional Elective IV	3		
	Total	**15**		

Total Credit Hours Required	**132**

	General Compulsory Courses		Program Compulsory Courses
	General Elective Courses		Program Elective Courses
	College Compulsory Courses		Field Experience/ Internship

7.2. Faculty Contact Information

For students seeking additional assistance or guidance, the following table includes contact information for faculty members within the Software engineering program. Whether students have questions about course content, need academic advice, or want to discuss research opportunities, faculty members provide support to the students. They may be reached via email or by scheduling office hours for appointments for one-to-one discussions.

Name	Title	Email	Ext.
Dr. Jarallah Alghamdi	Dean of the College of Computer and Cyber Sciences	dcoc@upm.edu.sa	1153
Dr. Abdurazzag Almiladi	Head of Software Engineering Department	se.hod@upm.edu.sa	1141
Dr. Basit Shahzad	Associate Professor	b.shahzad@upm.edu.sa	1195
Dr. Abdurazzag Almiladi	Assistant Professor	a.almiladi@upm.edu.sa	1066
Dr. Osama Qaed	Assistant Professor	o.qaed@upm.edu.sa	1265
Dr. Hazrina Binti Sofian	Assistant Professor	h.sofian@upm.edu.sa	3078
Mr. Khaled Boukesra	Lecturer	k.boukesra@upm.edu.sa	1308