

Degree Program: B.E Software Engineering

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B.E (Software Engineering)

MUET Vision

To become world class educational and research institute and contribute effectively towards building up indigenous and technological capabilities for sustainable socio-economic development.

MUET Mission

To equip our undergraduate, postgraduate, and doctoral students with advanced knowledge through collaborative opportunities that emerged from linkages with academia, industry, and government.

Department Vision

To become the center of excellence and the aspiration in the discipline of software engineering by producing highly skilled professionals, who, with their analytical capabilities and proficiencies, apply technical knowledge for socio-economic development.

Department Mission

To provide a technically sound ambiance of learning and realize the frequently changing traits of the software industry to pursue sustainable socio-economic growth with a sense of ethics, professionalism, and leadership to serve the community and humanity at large.

Program Education Objectives (PEOs):

A Software Engineering Graduate:

1. Performs his/her professional role in the Software Industry and related fields ^[PLO 1,2,3,4,5].
2. Adheres to professional responsibilities in multicultural environment with continual improvement ^[PLO 6, 7, 11].
3. Works effectively as a team lead or team member in challenging ventures ^[PLO 8, 10].
4. Communicates technical and managerial information efficiently in oral and written forms ^[PLO 1, 8, 9, 11].

PEOs Mapping with the University's and Department's Vision & Mission

	PEO 1	PEO 2	PEO 3	PEO 4
MUET vision	✓	✓	✓	✓
MUET Mission	✓	✓	✓	✓
Department Vision	✓	✓	✓	✓
Department Mission	✓	✓	✓	✓

Evaluation Sheets and Performance Indicators for PEOs

A minimum attainment level for each PEO has been defined along with its method of measurement. The key performance indicators for the attainment levels are given in the table below.

Program Educational Objectives (PEOs)	Key Performance Indicators (KPIs)	Measurement Tool
Engineering Knowledge A graduate who performs his/her professional role based on acquired fundamental engineering knowledge and analytical skills [PLO 1,2,3,4,5].	50% of the Alumni survey obtained from graduates (3-5 years after graduation) is satisfactory. 50% of the employers' survey received from employers is satisfactory.	Alumni Surveys, Employer Surveys
Ethical and Societal Responsibilities A graduate who adheres to professional responsibilities with societal aspects and ethical conduct in multicultural environment with continual improvement [PLO 6, 7, 11].	50% of the Alumni survey obtained from graduates (3-5 years after graduation) is satisfactory. 50% of the employers' survey received from employers is satisfactory.	Alumni Surveys, Employer Surveys
Leadership Qualities A graduate who works effectively as a team lead or team member in challenging ventures [PLO 8, 10].	50% of the Alumni survey obtained from graduates (3-5 years after graduation) is satisfactory. 50% of the employers' survey received from employers is satisfactory.	Alumni Surveys, Employer Surveys
Communication Skills A graduate who conveys technical and managerial information efficiently in oral and written communication [PLO 1, 8, 9, 11].	50% of the Alumni survey obtained from graduates (3-5 years after graduation) is satisfactory. employers' survey received from employers is satisfactory.	Alumni Surveys, Employer Surveys

Program Learning Objectives (PLOs):

The eleven graduate attributes provided by the PEC as per latest guideleins have been adopted by the Department of Software Engineering MUET, Jamshoro as the Program Learning Outcomes (PLOs) for its Bachelor's in Software Engineering Program.

Sr.#	PLO	Description
1.	Engineering Knowledge	Apply knowledge of mathematics, natural science, engineering fundamentals and Engineering specialization to the solution of complex engineering problems (WK1-WK4).
2.	Problem Analysis	Identify, formulate, conduct research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences (WK1-WK4).
3.	Design / Development of Solutions	An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations (WK-5).
4.	Investigation	Conduct investigation of complex Engineering problems using research-based knowledge and research methods, including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (WK-8).
5.	Tool Usage	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex Engineering problems, with an understanding of the limitations (WK-2 and WK-6).
6.	The Engineer and the World	Analyze and evaluate sustainable development impacts to society, the economy, sustainability, health and safety, legal frameworks, and the environment while solving complex engineering problems (WK-1, WK-5, and WK-7).
7.	Ethics	Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (WK-9).
8.	Individual and Collaborative Teamwork	Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (WK-9).
9.	Communication	Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, and make effective presentations, taking into account cultural, language, and learning differences (WK-1 and WK-9).
10.	Project Management and Finance	Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments (WK-2 and WK-5)
11.	Lifelong Learning	Recognize the need for and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (WK-8 and WK-9).

Mapping of PLOs to PEOs

The twelve Program Learning Outcomes (PLOs), defined for the Software engineering program, are mapped to the four Program Education Outcomes (PEOs). Mapping of the PLOs to PEOs is given in table below.

Program Learning Outcomes		PEO1	PEO2	PEO3	PEO 4
PLO1	Engineering Knowledge	✓			
PLO2	Problem Analysis	✓			
PLO3	Design / Development of Solutions	✓			
PLO4	Investigation	✓			
PLO5	Tool Usage	✓			
PLO6	The Engineer and the World		✓		
PLO7	Ethics		✓		
PLO8	Individual and Collaborative Teamwork			✓	
PLO9	Communication				✓
PLO10	Project Management and Finance			✓	
PLO11	Lifelong Learning		✓		

Course Scheme B.E Software Engineering

Subject Category	Sr. #	Course Code	Name of Subject	Marks	Credit Hours		
					Theory	Practical	Total
First Semester							
Physics/Maths Elective	1	MTH109	Applied Calculus	100	3	0	3
Core Breadth	2	SW112	Programming Fundamentals	150	3	1	4
ICT/AI/DS/CS	3	SW113	Introduction to Information & Communication Technologies	100	2	1	3
Language	4	ENG111	Functional English	100	3	0	3
Physics/Maths Elective	5	EL119	Applied Physics	100	3	0	3
Total				550	14	2	16
Second Semester							
Engineering Foundation	6	SW121	Object Oriented Programming	150	3	1	4
Professional Ethics	7	SW124	Professional Practices	50	2	0	2
Language	8	ENG201	Communication Skills	50	2	0	2
Maths	9	MTH102	Quantitative Reasoning-I	100	3	0	3
Core Breadth	10	SW125	Introduction to Software Engineering	100	3	0	3
Culture	11	PS106	Pakistan Studies	50	2	0	2
Culture	12	IS111 / SS104	Islamic Studies / Ethics	50	2	0	2
Total				550	17	1	18

Third Semester							
Engineering Foundation	12	SW212	Data Structures & Algorithms	150	3	1	4
Maths	13	MTH202	Quantitative Reasoning-II	100	3	0	3
Engineering Foundation	14	SW215	Database Systems	150	3	1	4
Professional Ethics	16	SW218	Software Economics & Management	50	2	0	2
Core Depth	17	SW219	Software Requirements Engineering	50	2	0	2
Humanities (Culture)	18	SS214/SS211	Understanding of Holy Quran-I/Comparative Moral Teachings-I	50	-	1	1
Total				550	13	3	16
Fourth Semester							
Engineering Foundation	19	SW226	Computer Networks	150	3	1	4
Core Breadth	20	SW227	Software Design & Architecture	100	2	1	3
Core Depth	21	SW228	Data Warehousing	100	3	0	3
Core Breadth	22	SW229	Human Computer Interaction	100	3	0	3
Maths	23	MTH125	Linear Algebra & Analytical Geometry	100	3	0	3
Culture	24	PS207	Ideology and Constitution of Pakistan	50	2	0	2
Humanities (Culture)	25	SS215/SS222	Understanding of Holy Quran-II/Comparative Moral Teachings-II	50	-	1	1
Total				650	16	3	19

Fifth Semester							
Core Breadth	26	SW315	Software Construction and Development	100	2	1	3
Maths	27	SW311	Operations Research	100	3	0	3
Core Breadth	28	SW316	Information Security	100	3	0	3
Language	29	ENG319	Technical & Business Writing	50	2	0	2
Core Depth	30	SW312	Artificial Intelligence	100	2	1	3
Core Depth	31	SW319	Web Engineering	150	3	1	4
Total				600	15	3	18
Sixth Semester							
Core Breadth	32	SW322	Software Project Management	100	3	0	3
General Education	33	SS406	Civics & Community Services	100	1	1	2
Core Depth	34	SW326	Data Science and Analytics	150	3	1	4
Core Depth	35	SW327	Mobile Application Development	150	3	1	4
Engineering Foundation	36	SW328	Operating Systems	150	3	1	4
Total				600	13	4	17
Seventh Semester							
Core Breadth	37	SW411	Cloud Computing	150	3	1	4
Core Depth	38	SW415	Software Re-engineering	100	3	0	3
Core Depth	39	SW419	Natural Language Processing	100	3	0	3
Multidisciplinary Engineering Course	40	SW414	Occupational Health & Safety	50	1	0	1
Industrial/Innovative/Creative Projects	41	SW498	FYDP-I	100	0	3	3
Total				500	10	4	14

Eighth Semester							
Core Breadth	42	SW426	Software Quality Engineering	150	3	1	4
Multidisciplinary Engineering Courses	43	SW424	Simulation & Modeling	100	3	0	3
Core Depth	44	SW427	Multimedia Communication	150	3	1	4
Multidisciplinary Engineering Courses	45	ENT401	Entrepreneurship	50	2	0	2
Industrial/Innovative/ Creative Projects	46	SW499	FYDP - II	100	0	3	3
Total				550	11	5	16
Grand Total				4550	110	24	134

Semester Vise Theory & Practical Credits

Semester	Theory Credits	Practical Credits	Total Credits
First	14	2	16
Second	17	1	18
Third	13	3	16
Fourth	16	3	19
Fifth	15	3	18
Sixth	13	4	17
Seventh	10	4	14
Eighth	11	5	16
Total	109	25	134

[illegible]

B.E Software Engineering Courses				Engineering Knowledge		D			The Engineer and the World	Ethics	Individual and Collaborative Teamwork		Project Management and Finance	
S. No		Course Code	Course Title	PL O 1	PL O 2	PL O 3	PL O 4	PL O 5	PL O 6	PL O 7	PLO 8	PLO 9	PLO 10	PL O 11
26.		SW315	Software Construction and Development		C2			P4	C3	A3	A3			
27.		SW311	Operations Research	C2	C4	C5								
28.		SW316	Information Security	C2			C4		C3					
29.		ENG301	Technical & Scientific Writing		C3							C3		
30.		SW312	Artificial Intelligence	C3	C4	C5		P4					A3	
31.		SW319	Web Engineering	C3		C5, A3		P5			P5			
32.		SW322	Software Project Management	C3	C6						C5		C5	
33.		ENT401	Entrepreneurship						C2	C2	C6			
34.		SW326	Data Science and Analytics	C3		C5	C4	P3		A3				
35.		SW327	Mobile Application Development	C3	C4	C5		P3						A2
36.		SW328	Operating Systems	C2			C3	P4		A4				
37.	7 th Semester	SW425	Cloud Computing	C2	C4			P4	A4				C5	
38.		SW415	Software Re-engineering	C3		C5	C6							
39.		SW419	Natural Language Processing	C2		C3	C5							
40.		SW414	Occupational Health & Safety						C3			A2		C2
41.		--	Civics & Community Services	C2					A3		P5			
42.		SW498	*Thesis/Project – I	C3	C4	C5, P5	C4	P5		A4	C4	A5		
43.	8 th Semester	SW426	Software Quality Engineering	C3	C4			P4		A4				
44.		SW424	Simulation & Modelling	C3		C6	C5							
45.		SW427	Multimedia Communication	C3	C4						A4	P5	A4	

46.	e m e s t e r	SW499	*Thesis/Project – II					P5	C4, P4	A4	C4	A5	C6	A4
TOTAL				38	15	16	9	17	11	13	12	8	8	8

Domain	PLO-1	PLO-2	PLO-3	PLO-4	PLO-5	PLO-6	PLO-7	PLO-8	PLO-9	PLO-10	PLO-11
Affective			A3-01			A3-01 A4-01	A3-05 A4-05	A2-01 A4-03	A2-01 A5-02	A3-01 A4-02	A2-01 A3-02 A4-01
Cognitive	C1-01 C2-17 C3-20	C2-02 C3-02 C4-10 C6-01	C3-02 C5-10 C6-01	C3-02 C4-04 C5-02 C6-01		C2-04 C3-03 C4-01	C2-03	C2-01 C4-02 C5-01 C6-01	C3-03 C4-01	C2-01 C4-01 C5-02 C6-01	C2-03 C3-01
Psychomotor			P3-01 P5-01		P3-06 P4-08 P5-03	P4-01		P4-01 P5-02	P5-01		