INSTITUTE OF ELECTRICAL ELECTRONICS AND COMPUTER ENGINEERING
UNIVERSITY OF THE PUNJAB

Curriculum
for
B.Sc. (Engg.) Electrical Engineering
2024

COURSE OFFERING B.Sc. (Engg.) ELECTRICAL ENGINEERING

SEMESTER I					
Course Code	**Course Title**	**Pre-Requisites**	**Credit Hours**		
			Theory	**Lab**	**Total**
CS1101	Applications of Information & Communication Technologies		2	1	3
MD1102	Computer Hardware Engineering		3	0	3
EE1103	Linear Circuit Analysis		3	1	4
EE1104	Electrical Workshop Practice		0	1	1
NS1105	Calculus & Analytical Geometry		3	0	3
NS1106	Applied Physics		2	1	3
HS1107	Functional English		3	0	3
NS1108	Fundamentals of Chemistry*		0	0	0
	Total		**16**	**4**	**20**
SEMESTER II					
Course Code	**Course Title**	**Pre-Requisites**	**Credit Hours**		
			Theory	**Lab**	**Total**
EE1201	Electronic Devices and Circuits	EE1103	3	1	4
CS1202	Computer Programming	MD1102	3	1	4
EE1203	Engineering Drawing		0	1	1
NS1204	Complex Variables & Transforms		3	0	3
NS1205	Differential Equations		3	0	3
HS1206	Ideology and Construction of Pakistan		2	0	2
HQ4201	Translation of Holy Quran*		0	0	0
	Total		**14**	**3**	**17**
SEMESTER III					
Course Code	**Course Title**	**Pre-Requisites**	**Credit Hours**		
			Theory	**Lab**	**Total**
EE2101	Electrical Network Analysis	EE1103	3	1	4
EE2102	Digital Logic Design	MD1102	3	1	4
CS2103	Data Structures & Algorithms	CS1202	3	1	4
NS2104	Linear Algebra		3	0	3
HS2105	Communication and Presentation Skills	HS1107	2	0	2
	Total		**14**	**3**	**17**
SEMESTER IV					
Course Code	**Course Title**	**Pre-Requisites**	**Credit Hours**		
			Theory	**Lab**	**Total**
EE2201	Signals and Systems	NS1204	3	1	4
EE2202	Probability and Statistics for Engineers		3	0	3
EE2203	Electrical Machines	EE1103 NS1106	3	1	4
NS2204	Numerical Analysis	NS1105	3	0	3
HS2205	Engineering Economics		2	0	2
HQ4201	Translation of Holy Quran*		0	0	0
	Total		**14**	**2**	**16**

*Zero credit course only for ICS background students

SEMESTER V					
Course Code	Course Title	Pre-Requisites	Credit Hours		
			Theory	Lab	Total
EE3101	Electromagnetic Field Theory	NS1106 NS105	3	0	3
EE3102	Communication Systems	EE2201	3	1	4
EE3103	Linear Control Systems	NS1204 EE2201 EE2101	3	1	4
HS3104	Civics & Community Engagements		2	0	2
MS3105	Project Management		2	0	2
HS3106	Islamic Studies/ Ethics		2	0	2
Total			**15**	**2**	**17**
SEMESTER VI					
Course Code	Course Title	Pre-Requisites	Credit Hours		
			Theory	Lab	Total
EE3201	Power Distribution and Utilization	EE2101	3	1	4
EE3202	Microprocessors and Interfacing	MD1102 EE2102	3	1	4
MD3203	Occupational Health & Safety		1	0	1
EE32XX	Depth Elective (Core) - I		3	1	4
EE32XX	Flexible Elective – I**	EE2202	3	0	3
HQ4201	Translation of Holy Quran*		0	0	0
Total			**13**	**3**	**16**
SEMESTER VII					
Course Code	Course Title	Pre-Requisites	Credit Hours		
			Theory	Lab	Total
HS4101	Expository Writing	HS1107	3	0	3
MS4102	Entrepreneurship		2	0	2
EE4103	Final Year Design Project I		0	2	2
EE41XX	Depth Elective (Core) - II		3	1	4
EE41XX	Depth Elective - III		3	1	4
EE41XX	Depth Elective - IV		3	1	4
Total			**14**	**5**	**19**
SEMESTER VIII					
Course Code	Course Title	Pre-Requisites	Credit Hours		
			Theory	Lab	Total
EE4103***	Final Year Design Project II		0	4	4
HQ4201	Translation of Holy Quran*		0	1	1
EE42XX	Depth Elective - V		3	1	4
EE42XX	Flexible Elective – II**		3	1	4
EE42XX	Flexible Elective – III**		3	1	4
Total			**9**	**8**	**17**

*Theory course with one credit hour having three contact hours, offered in multiple semesters but credit count at the end of the degree
** Can be any course from the list of Electives from any domain.
*** Same course code but spread over two semesters.

Total Credit Hours = 139

LIST OF ELECTIVES

Code	Courses	Power	Telecom	Electronics	Computer*	EV**
EE3204	Power Generation	X				
EE3205	Artificial Intelligence	X	X	X	X	X
EE3206	Electronic Circuit Design		X	X		
EE3207	Operating Systems				X	
EE3208	Automotive Engineering					X
EE4104	Power System Analysis	X		X	X	
EE4105	Computer Communication Networks		X			
EE4106	Power Electronics	X		X		X
EE4107	EV Batteries and Ancillaries					X
EE4108	EV Charging Devices and Technologies					X
EE4109	Electrical Power Transmission	X				
EE4110	Database Management Systems				X	
EE4111	High Voltage Engineering	X				
EE4112	EV Software					X
EE4113	Digital Communications		X			
EE4114	Microwaves & Antenna Theory		X			
EE4115	Digital Systems Design				X	
EE4116	Analogue Integrated Electronics			X		
EE4117	Biomedical Instrumentation			X		
EE4118	Digital Signal Processing	X	X	X	X	X
EE4120	Industrial Electronics			X		
EE4121	Image Processing and Analysis				X	
EE4122	Data Communication				X	
EE4123	System and Network Security		X		X	X
EE4124	Computer Architecture and Organization				X	
EE4202	Power System Protection	X				
EE4203	Power System Operation & Control	X				
EE4204	Renewable Energy Systems	X				
EE4205	FACTS and HVDC Transmission	X				
EE4206	Smart Grid	X				
EE4207	Electrical Machine Design & Maintenance	X				
EE4208	Sensors and Actuators	X	X	X	X	X
EE4209	Internet of Things (IoT)	X	X	X	X	X
EE4210	Wireless and Mobile Communications		X			
EE4211	Optical Communications		X			
EE4212	Telecommunications Standards & Regulations		X			
EE4213	Network Management		X		X	
EE4214	Transmission & Switching System		X		X	
EE4215	FPGA Based Digital Design			X		
EE4216	VLSI Design			X		
EE4217	Optoelectronic			X		
EE4218	Digital Control Systems			X	X	X
EE4219	Nanotechnology			X		
EE4220	Micro Electromechanical Systems (MEMS)			X		
EE4221	Application Specific Integrated circuits (ASIC) Design			X		
EE4222	Embedded Systems	X	X	X	X	X
EE4223	Robotics			X	X	
EE4224	Unmanned Aerial Vehicles (UAVs)			X	X	
EE4225	High Performance Computing				X	
EE4226	Cloud and Distributed Computing				X	
EE4227	Geo-informatics				X	
EE4228	Satellite Communication		X			
EE4229	Connected and Autonomous Vehicles					X
EE4230	Radar & Navigation Systems		X			

* Not Available till date, case submitted in Pakistan Engineering Council

**Not Available

PROGRAM OBJECTIVES

1. Exhibit comprehensive competence in the field of electrical engineering, enabling graduates to achieve successful careers in both industry and higher education sectors.
2. Pursue research and innovation, providing effective industrial solutions through the adoption and integration of emerging technologies.
3. Capacity to lead or participate as an effective team member to provide environment-friendly, sustainable, and economical solutions with good communication skills and high moral values.

KNOWLEDGE AND ATTITUDE PROFILES

WK No.	Statement
WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
WK2	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
WK3	A systematic, theory-based formulation of engineering fundamentals required in the relevant engineering discipline.
WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
WK5	Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
WK7	Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development (Represented by the 17 UN Sustainable Development Goals (UN-SDG).
WK8	Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
WK9	Ethics, inclusive behavior and conduct; Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability, etc. with mutual understanding and respect, and of inclusive attitudes.

PROGRAM LEARNING OUTCOMES/ GRADUATE ATTRIBUTES

PLO No.	Statement
PLO-1	**Engineering Knowledge:** Apply knowledge of mathematics, natural science, engineering fundamentals and Engineering specialization to the solution of complex engineering problems (WK-1-WK-4).
PLO-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 (WK-1-WK-4).
PLO-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 consideration
PLO-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).
PLO-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).
PLO-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).
PLO-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).
PLO-8	**Individual and Collaborative Team Work:** 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).
PLO-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
PLO-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).
PLO-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).

PROFESSIONAL COMPETENCIES

EC1	Comprehend and apply universal knowledge: Comprehend and apply advanced Engineering knowledge of the widely-applied principles underpinning good practices.
EC2	Comprehend and apply local knowledge: Comprehend and apply advanced Engineering knowledge of the widely-applied principles underpinning good practice specific to the jurisdiction of practices.
EC3	Problem analysis: Define, investigate and analyze complex Engineering problems using data and information technologies where applicable.
EC4	Design and development of solutions: Design or develop solutions to complex Engineering problems considering a variety of perspectives and taking account of stakeholder views.
EC5	Evaluation: Evaluate the outcomes and impacts of complex Engineering activities.
EC6	Protection of society: Recognize the foreseeable economic, social, and environmental effects of complex Engineering activities and seek to achieve sustainable outcomes.
EC7	Legal, regulatory, and cultural: Meet all legal, regulatory, and cultural requirements and protect public health and safety in the course of all Engineering activities.
EC8	Ethics: Conduct Engineering activities ethically.
EC9	Manage engineering activities: Manage part or all of one or more complex Engineering activities.
EC10	Communication and Collaboration: Communicate and collaborate using multiple media clearly and inclusively with a broad range of stakeholders in the course of all Engineering activities.
EC11	Continuing Professional Development (CPD) and Lifelong learning: Undertake CPD activities to maintain and extend competences and enhance the ability to adapt to emerging technologies and the ever- changing nature of work.
EC12	Judgement: Recognize complexity and assess alternatives in light of competing requirements and incomplete knowledge. Exercise sound judgement in the course of all complex Engineering activities.
EC13	Responsibility for decisions: Be responsible for making decisions on part or all of the complex Engineering activities.

SUSTAINABLE DEVELOPMENT GOALS

Goal-1	No Poverty
Goal-2	Zero Hunger
Goal-3	Good Health and Well-being
Goal-4	Quality Education
Goal-5	Gender Equality
Goal-6	Clean Water and Sanitation
Goal-7	Affordable and Clean Energy
Goal-8	Decent Work and Economic Growth
Goal-9	Industrial Innovation and Infrastructure
Goal-10	Reduced Inequalities
Goal-11	Sustainable Cities and Communities
Goal-12	Responsible Consumption and Production
Goal-13	Climate Action
Goal-14	Life Below Water
Goal-15	Life on Land
Goal-16	Peace, Justice and Strong Institution
Goal-17	Partnerships for the Goals