

SIR SYED UNIVERSITY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

COURSE INFORMATION SHEET

(For

Theory Based Course)

Session:	Summer 2026
Course Title:	Power Electronics
Course Code:	EL-361T
Credit Hours:	3
Semester:	6th
Pre-Requisites:	Nil
Instructor Name:	Engr. Fawad Shaukat
Email and Contact Information:	fshaukat@ssuet.edu.pk and Contact No: 03233240821
WhatsApp Group	Power Electronics Summer 2026
Office Hours:	08:30 am to 05:00 pm
Mode of Teaching:	√Synchronous/Asynchronous/Hybrid (Blended)

Objectives

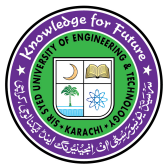
To provide basic understanding of the power electronics, to introduce and develop technical expertise in various components as applicable in Analog and Digital circuits.

Course outline

Power Semiconductor Devices, Power Diode, Thyristor and its triggering circuits, TRIAC, Gate Turn off Thyristor, Power BJT, Power MOSFET, Insulated Gate Bipolar Transistor (IGBT), Converters Circuits; ACDC Converters (Rectifying circuits), Circuit nomenclature, commutating diode. Single phase half wave (or single-way), Bi-phase half-wave (or single-way), Single phase Bridge (or double-way), Three-phase halfwave (or single-way), Three-phase bridge (or double-way) circuits. DC-DC Converters (Choppers): Principle of Switched Mode Power Supplies (SMPS), Step-down or buck (forward) converter, Step-up or boost (flyback) converter, and Buck-boost converter, High-frequency resonant converter. DC-AC Converters (Inverters), Single-phase half-bridge inverter, Single-phase bridge inverter, Three-phase inverters, Voltage control of inverters, AC-AC Converters, AC Voltage Controllers, converters, Principle of Operation, Single phase to single-phase Cyclo converter, Three-phase half wave Cyclo-converter. The course is designed to acquire theoretical as well as practical knowledge of Power Electronics Components, circuit design and effects/phenomenon.

Course Learning Outcomes (CLOs)

CLO'S	Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)	Bloom's Taxonomy Level
1		PLO_1 (Engineering)	C2 (Understand)



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	Comprehend the fundamentals of power semiconductor devices and their control in Power electronic circuits	Knowledge)	
2	Apply and understand the basic principles of AC-DC, DC-DC, DC-AC and AC-AC converters under different loading conditions.	PLO_2 (Problem Analysis)	C3 (Apply)
3	Analyze various characteristics of power electronic converter fed AC and DC Drives.	PLO_2 (Problem Analysis)	C4 (Analyze)

COMPLEX ENGINEERING PROBLEM:

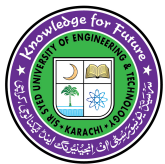
Complex Engineering Problem Details	Included: Yes Nature and details of Complex Engineering Problem (CEP): It will be given in Assignment # 02. CEP will be based on CLO2 “Apply and understand the basic principles of AC-DC, DC-DC, DC-AC and AC-AC converters under different loading conditions.”. To investigate the problem, students have to use in-depth knowledge related to the following concepts power electronics parameters Assessment in: Assignment # 02
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Relationship between Assessment Tools and CLOs:

Assessment tools	CLO_1(31)	CLO_2(41)	CLO_3(28)
Quizzes	9.6% (3)	7.3% (3)	14.2% (4)
Assignments	9.6% (3)	7.3% (3)	14.2% (4)
Midterm Exam	48.4% (15)	36.7 (15%)	---
Final Exam	32.4% (10)	48.8% (20)	71.6% (20)

Grading Policy:

Assessment Items	Marks
Assignment	10
Quizzes	10
Midterm Exam	30
Final Exam	50
Total	100 %



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Course Book

- [1]. Daniel. W. Hart, Power Electronics. New York: McGraw-Hill, 2011, 512 pp.
- [2]. Power Electronics Circuits Devices & Applications, 4th Edition, by, Muhammad H. Rashid, published by Prentice Hall, 2013, ISBN-10: 0133125904.

Reference Books

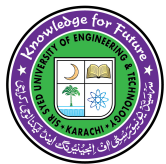
- [3]. Muhammad Hamid Rashid “power electronics handbook” 1st edition Academics Press, 2001

LECTURE/LESSON PLAN

Course Title: Power Electronics

Code: ELT-361T

Week No	Week Dates	Topics	Reading Required	Key Dates
Week 1	27.07.26 To 01.08.26	Power Semiconductor Devices: Power Diode, Thyristor and its triggering circuits, Power Diode, Thyristor triggering circuits TRIAC, Gate Turn off Thyristor Power BJT Power MOSFET	Chap 1 [1] Notes	
Week 2	03.08.26 To 08.08.26	Insulated Gate Bipolar Transistor (IGBT). Converters Circuits AC-DC Converters (Rectifying circuits): Circuit nomenclature, commutating diode.	Chap 2 [1] Notes	
Week 3	10.08.26 To 15.08.26	Power Semiconductor Devices: Power Diode, Thyristor and its triggering circuits, Single-phase half-wave (or single-way) Bi-phase half-wave (or single-way). Single-phase Bridge (or double-way). Three-phase half-wave (or single-way), and. Three-phase bridge (or double-way) circuits	Chap 3[1] notes	Quiz 1
Week 4	17.8.26 To 22.08.26	DC-DC Converters (Choppers) Principle of Switched Mode. Power Supplies (SMPS), Voltage control of inverters Step-down or buck (forward) converter	Chap 3 [1] notes	Assignment 1



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Week 5	MID-TERM EXAM 24.08.26			
Week 6	31.08.26 To 05.9.26	Triggering circuits Step-up or boost (fly-back) Converters, Buck-boost converter. High-frequency resonant converter. DC-AC Converters (Inverters) Single-phase half-bridge inverter.	Chap 4[1] Notes	
Week 7	07.09.26 To 12.09.26	Calculating power, voltage and current Study of voltage and current curve. Single-phase bridge inverter. Three-phase inverters Summary	Chap 5 [1] notes	
Week 8	14.09.26 19.09.26	Cyclo-converters: Principle of Operation Single-phase to single-phase cycloconverter. Exercise/ Problems practice. AC-AC Converters AC Voltage Controllers Three-phase half wave Cyclo-converter.	Chap 6 [1] notes	Quiz 2
Week 9	21.09.26 To 26.09.26	Regulation by tapped transformer. Single-phase regulation with resistive and Inductive loads. Exercise/ Problems practice	Chap 6 [2] notes	Assignment 2
	Final Exam			

Name & Signature: Date:

(Course Instructor): Fawad Shaukat

Name: & Signature: Dr. Muhammad Ibrar ul Haque

Date:

(Head of Department)