1.	Title of the course	Power Semiconductor Devices
2.	Course number	EE564L
3.	Structure of credits (L-T-P-C)	3-0-0-3
4.	New course/modification to	New
5.	To be offered by	Electrical Engineering
6.	Prerequisite	CoT
7.	**Course Objective(s):** To discuss the operation and design of power semiconductor devices employed in power electronic circuits. To evaluate the performance of silicon and wide bandgap material-based technologies for high power devices.	
8.	**Course Content:** Introduction: necessity of power semiconductor devices for the growing energy demands, applications in power electronics; Review of semiconductor device physics: material properties, carrier transport mechanisms, carrier lifetime, specific on-resistance, breakdown voltage and edge termination techniques; Power devices to be discussed: Schottky diode, PiN diode, power MOSFET (Metal Oxide Semiconductor Field Effect Transistor), IGBT (Insulated Gate Bipolar Transistor), thyristor and super-junction devices; Topics to be covered under each device: device structure, terminal characteristics, physics of device operation under forward conduction and reverse blocking modes, breakdown voltage considerations, on-state losses, trade-off analysis and switching characteristics; Additional topics for specific devices: gate drives, device capacitances, safe operating area, thermal considerations, dV/dt capability, efficiency, reliability and packaging; Introduction to wide bandgap semiconductor devices: advantages over silicon for higher power applications, overview of SiC (Silicon Carbide) and GaN (Gallium Nitride) power devices, current trends and challenges.	
9.	**Textbook(s):** 1. Baliga B J, Fundamentals of Power Semiconductor Devices, 2nd edition, Springer (2019).	
10.	**Reference(s):** 1. Perret R, Power Electronic Semiconductor Devices, Wiley (2009). 2. Wellmann P, Ohtani N and Rupp R, Wide Bandgap Semiconductors for Power Electronics, Wiley (2022).	