1.	Title of the course	Nanoelectronic Devices
2.	Course number	EE5038
3.	Status of the course	Elective
4.	Structure of credits	3-0-0-3
5.	Offered to	PG
6.	New course/modification to	New course
7.	To be offered by	Department of Electrical Engineering
8.	To take effect from	July 2020
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	**Course Objective(s):** To introduce concepts of electronic transport in nanoscale devices. To introduce nanoscale spintronic devices.	
12.	**Course Content:** Quantum mechanical tunneling with device applications: introductory quantum mechanics, tunneling, field emission, gate oxide tunneling and hot electron effects in MOSFETs, scanning tunneling microscopes, scattering matrices, resonant tunneling devices, quantum wells, wires and dot devices; Transport: band structure and density of states, graphene and CNTs, current flow through nanoscale devices, nano transistors, molecular transport, ballistic and diffusive transport, quantum transport, self-energy and Green's function, spectral function, correlation function, inflow/outflow and current calculations, Coulomb blockade and single electron transistor devices; Spintronics: Stern-Gerlach experiment, spin matrices and rotation, LLG equation, spin transfer torque, spin valves, magnetic tunnel junctions.	
13.	**Textbook(s):** 1. Datta S, *Lessons from Nanoelectronics: A New Perspective on Transport*, 2nd Edition, World Scientific Publishing Company (2018). 2. Datta S, *Quantum Transport: Atom to Transistor*, 2nd Edition, Cambridge University Press (2005).	
14.	**Reference(s):** 1. Griffiths D J, *Introduction to Quantum Mechanics*, 2nd Edition, Pearson Education (2015). 2. Hanson G W, *Fundamentals of Nanoelectronics*, 1st Edition, Pearson Education (2009).	