1.	Title of the course	Modeling and Control of Cyber-Physical Systems
2.	Course number	EE519L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To EE5032/9
6.	To be offered by	Department of Electrical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	CoT
9.	**Course Objective(s):** To understand the core principles behind cyber-physical system modeling, simulation and control of smart grids, to develop models and controls with security specifications and other critical properties, to verify the closed loop operation of smart grid of appropriate scale, to demonstrate the principles and algorithms considering various use cases in a Smart Grid.	
10.	**Course Content:** Introduction to Cyber-physical systems dynamical systems, differential equations and domains, synchronous models, asynchronous models, liveliness requirements; Introduction to smart power grid operation and control, SCADA and cyber infrastructure in a power grid, integrated cyber-power system model, introduction to dynamic modeling of power grid, modeling and simulation of network and cyber model, formulation of DAE models for cyber-physical smart grids, closed loop control of smart grids, basic concepts on cyber-physical security of smart grids, use cases.	
11.	**Textbook(s):** 1. Alur R, *Principles of Cyber-Physical Systems*, MIT Press (2015). 2. Khaitan S K, McCalley J D and Liu C C, *Cyber Physical System Approach to Smart Electric Power Grid*, Springer (2015).	
12.	**Reference(s):** 1. Borrell F, Bemporad A and Morari M, *Predictive control for Linear and Hybrid Systems*, Cambridge University Press (2017). 2. Lee E A and Seshia S A, *Embedded Systems: A Cyber-Physical Systems Approach*, MIT Press (2017). 3. Li H, *Communications and Controls in Cyber Physical Systems: Theory, Design and Applications in Smart Grids*, Elsevier (2016).	