Course Code	ECE571
Course Name	Optimal Control Systems
Credits	4
Course Offered to	UG/PG
Course Description	Optimal control systems is a topic that is widely used in several fields' like transportation, aerospace bio-informatics and economics. The goal of this course is to provide advanced knowledge in formulating an optimal control problem, analyzing its properties and then solving the problem using various linear and nonlinear optimization based techniques. The course is theoretical but has implementation and problem solving components.

Pre-requisites

Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite(other)
None		

Post Conditions

CO1	**CO2**	**CO3**	**CO4**
Formulate an optimal control problem for different performance indices	Analyze the optimal control problem using variational approach and Pontryagin minimum principal	Solve optimal control problems using various open source solvers	

Weekly Lecture Plan

Week Number	**Lecture Topic**	**COs Met**	**Assignment/Labs/Tutorial**
1	Introduction – optimization, optimal control performance index	CO1	Assignment
2 and 3	Calculus of variation and optimal control	CO2	Assignment
4 and 5	Linear quadratic optimal control systems - I	CO2, CO3	Assignment
6 and 7	Pontryagin Minimum principle	CO2,CO3	Assignment
8	Constrained optimal control systems	CO2,CO3	Assignment
9 to 11	Model predictive control	CO1,CO3	Assignment
12 and 13	Solving optimal control problems from different domains	CO1, CO3	Assignment

Assessment Plan

Type of Evaluation	**% Contribution in Grade**
Homework	20
Mid-sem	40
End-sem	40

Resource Material

Type	**Title**
Textbook	Optimal control systems by Desinenu Subbram Naidu, CRC Press, 2009.
Reference	Optimal control theory: An introduction, Donald E. Kirk
Reference	Applied optimal control, A.E. Bryson and Y. Ho
Reference	Optimal control, F.L. Lewis
Reference	Model-Based Predictive Control: A Practical Approach (Control Series) by by J.A. Rossiter
Reference	Model Predictive Control System Design and Implementation Using MATLAB® (Advances in Industrial Control) by Liuping Wang