

Department of Mechatronics Engineering			
Control Systems I (67471)			
Total Credits	3		
major compulsory			
Prerequisites	P1 : Engineering Mathematics (21202) OR Electrical Cirucits (63292) OR Electrical Circuits (69231) OR Electrical Machines (67316) OR Electrical Circuits (67212) OR Electrical and Electronic Circuits (63291) P2 : Differential Equations (21203) OR Mechanical Vibrations (67414) OR Mechanical Vibrations (67422)		
Course Contents			
Open and closed loops (feedback) control systems. Modeling of physical systems: electrical, Mechanical, hydraulic and pneumatic systems. Linearization of nonlinear systems. System representations: System block diagrams and signal flow graphs. State variable models. Feedback control system characteristics, Performance of feedback control systems. Routh-Hurwitz stability. Steady state error coefficient. Rout locus Method. Introduction to frequency response.			
Intended Learning Outcomes (ILO's)		Student Outcomes (SO's)	Contribution
1	Model physical linear and nonlinear systems, and linearize nonlinear systems using different linearization methods.	A	25 %
2	Distinguish open and closed loops (feedback) control systems, and use block diagrams and signal flow graphs to represent different systems.	C	25 %
3	Analysis different systems using state-space representations and studies the characteristics and performance analysis of feedback control systems.	E	30 %
4	Perform stability analysis using Routh-Hurwitz, and Rout locus methods.	K	20 %
Textbook and/ or References			
Richard C. Dorf, and Robert H. Bishop (2008). Modern Control Systems, Eleventh Edition, Prentice-Hall, InC.			
Assessment Criteria		Percent (%)	
First Exam		20 %	
Second Exam		20 %	
Quizzes		10 %	
Final Exam		50 %	
Course Plan			
Week	Topic		
1	Introduction to Control Systems.		
2-4	Mathematical Models of Systems.		
5-6	State Variable Models.		
6	Midterm Exam I		
7-8	Feedback Control System Characteristics.		
9-10	The Performance of Feedback Control Systems. Midterm Exam II		
11-12	The Stability of Linear Feedback Systems.		
13-14	The Root Locus Method. Final Exam		