



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	B. Tech in Electrical and Electronics Engineering		
Course Title	MODERN CONTROL SYSTEMS		
Course Code	EEPE23	No. of Credits	3
Course Code of Pre-requisite subject(s)	EEPC20		
Session	January 2022	Section	III Year A&B
Name of Faculty	Dr. Naveen Yalla	Department	Electrical and Electronics Engineering
Official Email	naveenyalla@nitt.edu	Telephone No.	+91 9068693477
Name of Course Coordinator (if applicable)	- -		
Course Type	Programme Elective course (PE)		
SYLLABUS (approved in BoS)			
<p>Modelling of physical system in state space format- Definition of state- Basic properties of state- transition matrix - solution to vector differential equation.</p> <p>Concept of controllability and observability - Concept of stabilizability and detectability - Kalman decomposition.</p> <p>Pole placement design of controller - Observer design - Stability of controller design based on the observer using separation principle.</p> <p>Introduction to non-linear systems - Phase plane analysis - Multiple equilibrium points.</p> <p>Stability analysis of non-linear system using Lyapunov direct method - Instability theorem - Lasalle's invariance principle.</p> <p><i>Essential Readings / Reference:</i></p> <ol style="list-style-type: none"> 1. Chi-Tsong Chen, 'Linear System Theory and Design', Oxford University Press, 4th Edition, 2012. 2. Khalil H.K., 'Nonlinear Systems', Prentice Hall Publications, 3rd Edition, 2002. 3. Stanley M. Shiner, 'Modern Control System theory and Design', John Wiley and Sons Publications, 2nd Edition, 1998. 4. Ogata K. 'Modern Control Engineering', Prentice Hall Publications, 5th Edition, 2010. 			
COURSE OBJECTIVES			
Apply modern control techniques to electrical systems			
Course Outcomes Upon completion of the course, the students will be able to:		Aligned Programme Outcomes (PO)	

1. Understand the concepts of modern control theory using state-space approach.	1,7,8,12
2. Compare and analyse the classical control system with modern control system.	1, 2, 7
3. Develop advanced controllers to the existing system using modern control design techniques.	7,8,14

Course Plan – Part II

COURSE OVERVIEW

To understand the various power quality phenomenon, their origin and monitoring and mitigation methods, understand the effects of various power quality phenomenon in various equipment.

COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week/ Contact Hour	Topic	Mode of Delivery
1.	19 – 21 January 2022 (2 hours)	Introduction to course and state space analysis	Online lecture mode
2.	24 – 28 January 2022 (2 hours)	Modelling of physical system in state space format	
3.	31 – 4 February 2022 (3 hours)	Definition of state- Basic properties of state- transition matrix and solution to vector differential equation	Online lecture mode
4.	7 – 11 February 2022 (3 hours)	Concept of controllability and observability	
5.	14 - 18 February 2022 (3 hours)	Concept of stabilizability and detectability	
6.	21 - 25 February 2022 (3 hours)	Kalman decomposition	
ASSESSMENT – I			
7.	28 Feb – 4 March 2022 (3 hours)	Pole placement design of controller - Observer design	Online lecture mode
8.	7 – 11 March 2022 (3 hours)	Stability of controller design based on the observer using separation principle.	
9.	14 – 18 March 2022 (2 hours)	Introduction to non-linear systems Phase plane analysis - Multiple equilibrium points	
10.	21 – 25 March 2022 (1 hours)	Phase plane analysis - Multiple equilibrium points	Online lecture mode
11.	28 Mar – 1 April 2022 (3 hours)	Stability analysis of non-linear system using Lyapunov direct method	

12.	4 – 8 April 2022 (3 hours)	Stability analysis of non-linear system using Lyapunov direct method	
		ASSESSMENT – II	
13.	11 – 15 April 2022 (2 hours)	Instability theorem - Lasalle's invariance principle.	Online lecture mode
14.	18 – 22 April 2022 (3 hours)	Instability theorem - Lasalle's invariance principle	
15.	25 – 29 April 2022 (3 hours)	Compensation Assessment	
16.	05 – 18 May 2022 (150 minutes)	ASSESSMENT IV - End Semester Examination	

COURSE ASSESSMENT METHODS (Shall Range from 4 to 6)

S. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Assessment I	14 - 18 February 2022	1 hour	25%
2.	Assessment II	15 – 18 March 2022	1 hour	25%
3.	Continues evaluation	--	-	20%
CPA	Compensation test	25 – 26 April 2022	1 hour	25%
4.	End Semester Exam (entire syllabus)	05 – 18 May 2022	2 hours	30%

COURSE EXIT SURVEY

1. Students' feedback through class committee meetings
2. Feedback questionnaire from students – twice during the semester
3. Feedback from students on course outcomes shall be collected at the end of the semester

COURSE POLICY (preferred mode of correspondence with students, policy on attendance, compensation assessment, academic honesty and plagiarism etc.)

Mode of Correspondence

1. The faculty is available for consultation during the time intimated to the students then and there.
2. All correspondence will be sent to the NITT webmail of the students, if required.

Compensation Assessment Policy

1. Flexibility is given to the students to fix the date for each assessment convenient to majority of the students.
2. Only one instance of absence in internal assessment is permitted. Only one compensation assessment for absentees in internal assessments will be conducted.
3. The compensation assessment (CPA) is for entire syllabus and the weightage is 80% of the weightage of the internal assessments A1 or A2. In any case, CPA is not considered as an improvement test.

Attendance Policy

1. All the students are expected to attend all the contact hours. Students should maintain 75% minimum physical attendance by the end of the course to attend the end semester examination.
2. Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' Grade. Student have to REDO the course.
3. A maximum of 10% attendance shall be allowed under On Duty (OD) category. OD is allowed only for the students having minimum attendance of 65%.


Academic Honesty & Plagiarism

1. Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
2. The answer sheet of the student will not be evaluated and ZERO mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
3. The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

ADDITIONAL INFORMATION

The minimum marks for passing this course and grading pattern will adhere to the regulations of the institute.

FOR APPROVAL


Dr. Naveen Yalla AP/EEE
Course Faculty


CC-Chairperson

Approved By HOD
HoD, Dept. of EEE

Guidelines:

- a) The number of assessments for a course shall range from 4 to 6.
- b) Every course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in					P.G.
2019	2018	2017	2016	2015	
35% or class average/2 whichever is greater.			Peak/3 or class average/2 whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.