



DEPARTMENT OF MECHANICAL ENGINEERING

COURSE PLAN – PART I

Name of the Programme and Specialization	B.Tech., / Mechanical Engineering		
Course Title	MECHATRONICS		
Course Code	MEPE26	No. of Credits	3
Course Code of Pre-requisite subject(s)	MEPC13 - APPLIED ELECTRICAL AND ELECTRONICS ENGINEERING		
Session	July 2022	Section (if, applicable)	A & B
Name of Faculty	Mr. Ram Kumar	Department	Instrumentation and Control Engineering
Name of Course Coordinator(s) (if, applicable)	-		
E-mail	410120052@nitt.edu	Telephone No.	9108642983
Course Type	Elective course		

Syllabus

Introduction to mechatronics: Historical perspective- Key elements of a mechatronic system- Examples of mechatronic systems.

Sensors and Transducers: Signal conditioning and Data acquisition systems.

Actuation systems: Pneumatic and Hydraulic system, mechanical and electrical actuation systems.

Smart materials and Systems: Piezoelectric actuators, Shape memory alloy (SMA) actuators, Magneto rheological and Electro Rheological Fluids and its applications; Dampers, Clutch, Valves etc.

System models: Engineering systems, Rotational translational systems, Electromechanical systems, Hydraulic mechanical systems, Dynamic responses of systems, Frequency response, Closed loop controllers.

Introduction to microcontrollers and microprocessors: Interfacing microcontrollers with sensors and actuators.

Introduction to Programmable logic controllers (PLC): Case Studies of mechatronic systems



COURSE OBJECTIVES

1. Apply mechanical engineering and electrical engineering knowledge and skills to problems and challenges in the areas of mechatronic engineering.
2. Integrate and use systems or devices incorporating modern microelectronics, information technologies and modern engineering tools for product design, development and manufacturing.
3. Engage in lifelong learning in their profession and practice professional and ethical responsibility.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
Upon completion of this course, the students will be able to:	
1. Employ the basic mathematical skills needed to solve routine engineering problems.	1, 2, 7, 11
2. Demonstrate knowledge of electrical circuits and logic design.	1, 3, 5, 7,11
3. Implement engineering solutions and techniques to solve design problems	1, 2, 3, 5
4. Design mechatronic components and systems	1, 2, 3, 4, 5, 11
5. Apply spreadsheets, computer-based modeling and other computer-based methods to solve mechatronic problems	1, 2, 3, 5, 7, 11
6. To communicate through writing with others in the field of mechatronics	1, 8, 9,1 2

COURSE PLAN – PART II

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1	1 st Week	Introduction to mechatronics, Historical perspective-	Offline Mode PPT/Virtual WhiteBoard
2	2 nd Week	Key elements of a mechatronic system, Examples of mechatronic systems.	
3	3 rd Week	Sensors and Transducers Types, Classifications and Applications	
4	4 th Week	Signal conditioning and Data acquisition systems	
5	5 th Week	Smart materials and Systems, Piezoelectric actuators, Shape memory alloy (SMA) actuators	
6	6 th Week	Magneto rheological and Electro rheological Fluids and its applications; Dampers, Clutch, Valves etc.	
7	7 th Week	System models, Engineering systems, Rotational translational systems	
8	8 th Week	Electromechanical systems, Hydraulic mechanical systems, Dynamic responses of systems	
9	9 th Week	Frequency response, Closed loop controllers.	



10	10 th Week	Introduction to microcontrollers and microprocessors	
11	11 th Week	Interfacing microcontrollers with sensors and actuators	
12	12 th Week	Introduction to Programmable logic controllers (PLC)	
13	13 th Week	Case Studies of mechatronic systems.	
14	14 th Week	Doubt clarification and revision	

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Class Test-I	7 th Week	1 hour 30 mins	30
2	Cycle Test-II	11 th Week	1 hour 30 mins	30
3	Assignments/ Seminars & Attendance	-	-	10
CPA	Compensation Assessment	as per academic schedule	-	30
4	Final Assessment	as per academic schedule	3 hours	30

ESSENTIAL READINGS: Textbooks & Reference books:

1. Godfrey Onwubolu, Mechatronics – Principles and Applications, Butterworth – Heinemann, 2005
2. David G. Alciatore, Michael B. Hstand, David Alciatore, Introduction to Mechatronics and Measurement Sytems, McGraw Hill; second edition, 2002
3. W. Bolton, Mechatronics- Electronic control systems in Mechanical and Electrical Engineering, second edition, Pearson Education, 2001.
4. Robert H Bishop, The Mechatronics Handbook CRC Press, 2002

COURSE EXIT

- Feedback from the students during class committee meetings.
- End semester feedback through questionnaire and unknown formats.

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



MODE OF CORRESPONDENCE (email/ phone)

All the students are advised to attend the classes regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/any other information regarding this course) will be intimated only in the class.

ASSESSMENTS:

- Attending all the assessments are MANDATORY for every student.
- If any student is not able to attend any of the continuous assessments (CAs: 1 and 2 only) due to genuine reason, student is permitted to attend the compensation assessment (CPA) with % weightage equal to maximum of the CAs.
- At any case, CPA will not be considered as an improvement test.
- The minimum marks for passing this course and grading pattern will adhere to the regulations of the Institute.

Note:

- A student must score a minimum of 20% in the final assessment.
- The passing minimum shall be 35% or Class Average/2, whichever is maximum

ATTENDANCE

- At least 75 % attendance in each course is mandatory.
- A maximum of 10 % shall be allowed under On Duty (OD) category.
- Students with less than 65 % of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC HONESTY & PLAGIARISM

- Copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- 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 faculty is available for consultation at times as per the intimation given by the faculty.
- Queries (if required) to the course teacher shall only be emailed to the email id specified by the teacher (410120052@nitt.edu)

FOR APPROVAL

Ram Kumar

Course Faculty

CC-Chairperson

HOD