



## DEPARTMENT OF MECHANICAL ENGINEERING

## COURSE PLAN – PART I

Name of the programme and specialization	<b>B.TECH – Mechanical Engineering</b>		
Course Code & Title	<b>MEPE26 – Mechatronics</b>	No. of Credits	<b>3</b>
Course Code of Pre-requisite	MEPC13		
Session	<b>JULY 2021</b>	Section	-
Name of Faculty	<b>Dr.A.GOPIKRISHNAN</b>	Department	<b>ICE</b>
Name of Course Coordinator(s)	-		
E-mail	<b>gopia@nitt.edu</b>	Telephone No.	<b>+91 94434 40802</b>
Course Type	<input type="checkbox"/> <b>Core course</b>	<input checked="" type="checkbox"/> <b>Elective course</b>	

**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**

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

**COURSE OUTCOMES (CO)**

<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>
On completion of this course, the students will be able to	
1. To employ the basic mathematical skills needed to solve routine engineering problems	1,2,5,11
2. To demonstrate knowledge of electrical circuits and logic design.	3,4,6,12
3. To implement engineering solutions and techniques to solve design problems	1,2,6,7
4. To design mechatronic components and systems.	5,7,8,10
5. To apply spreadsheets, computer-based modeling and other computer-based methods to solve mechatronic problems	1,2,9,12



6. To communicate through writing with others in the field of mechatronics	7,9,11
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**COURSE PLAN – PART II**

**COURSE TEACHING AND LEARNING ACTIVITIES**

S.No.	Week	Topic	Mode of Delivery
1	1 <sup>st</sup> Week	Introduction to mechatronics- Historical perspective	Online MS team
2	2 <sup>nd</sup> Week	Key elements of a mechatronic system p- Examples	Online MS team
3	3 <sup>rd</sup> Week	Sensors and Transducers – Signal conditioning - DAS	Online MS team
4	4 <sup>th</sup> Week	Actuation systems– Pneumatic and Hydraulic system	Online MS team
5	5 <sup>th</sup> Week	Mechanical and electrical actuation system	Online MS team
6	6 <sup>th</sup> Week	Smart materials and Systems – Piezoelectric actuators	Online MS team
7	7 <sup>th</sup> Week	Shape memory alloy (SMA) actuators,	Online MS team
8	8 <sup>th</sup> Week	Magneto rheological and Electro rheological Fluids	Online MS team
9	9 <sup>th</sup> Week	Applications - Dampers, Clutch, Valves	Online MS team
10	10 <sup>th</sup> Week	System models – Rotational translational systems	Online MS team
11	11 <sup>th</sup> Week	Electromechanical – Hydraulic mechanical systems	Online MS team
12	12 <sup>th</sup> Week	Dynamic responses of systems - Frequency response	Online MS team
13	13 <sup>th</sup> Week	Microcontrollers and microprocessors Interfacing	Online MS team
14	14 <sup>th</sup> Week	Microcontrollers with sensors and actuators	Online MS team
15	15 <sup>th</sup> Week	Introduction to PLC - Case Studies of mechatronic systems	Online MS team

**COURSE ASSESSMENT METHODS**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assesment – 1 (Cycle Test – I)	6 <sup>th</sup> Week	1 hour*	25
2	Assesment – 2 (Cycle Test – II)	10 <sup>th</sup> Week	1 hour*	25
3	Assignment/Seminar/Viva	-		20
4	Final Assessment	15 <sup>th</sup> Week	2 hours	30
5	Compensation Assesment (CT)	12 <sup>th</sup> Week	1 hour*	25

(\* Assessment time duration will be more than 1 hour for mode of test 1,2 and 5)

**ESSENTIAL READINGS : Textbooks & Reference books:**

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

**COURSE EXIT SURVEY**

- Feedback from the students during class committee meetings.
- Anonymous 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 come to the class regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/any other information regarding this course) will be intimated in the Class only.

**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, 2 and 5 only) due to genuine reason, student is permitted to attend the compensation assessment (CPA) with % weightage equal to maximum of the CAs. However, maximum of the % weightage among the assessments for which the student was absent will be considered for computing marks for CA.
- 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.

**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**

- Possessing a mobile phone, carrying bits of paper, talking to other students, 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([gopia@nitt.edu](mailto:gopia@nitt.edu))

**FOR APPROVAL**

 Course Faculty <u>04.08.2021</u> <b>Dr.A.Gopikrishnan</b>	 CC-Chairperson <u>05-08-2021</u> <b>Dr.P.Kaushik</b>	 HOD <u>05/08/2021</u> <b>Dr.AR. Veerappan</b>
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