



DEPARTMENT OF ELECTRICAL AND ELECTRONICS  
ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	III Year B.Tech, EEE		
Course Title	FUZZY SYSTEMS AND GENETIC ALGORITHMS		
Course Code	EEPE13	No. of Credits	03
Session	July 2023	Section (if, applicable)	BTech EEE A & B
Name of Faculty	Dr. Aneesa Farhan M A	Department	EEE
Email	<a href="mailto:aneesa@nitt.edu">aneesa@nitt.edu</a> <a href="mailto:aneesafma@gmail.com">aneesafma@gmail.com</a>	Telephone No.	7598164452 8015877137
Name of Course Coordinator(s) (if, applicable)	N A		
Course Type (please tick appropriately)	<input type="checkbox"/> Elective		
<b>Syllabus (approved in BoS)</b>			
<p>Different faces of imprecision – inexactness, ambiguity, undecidability, Fuzziness and certainty, Fuzzy sets and crisp sets.</p> <p>Intersection of Fuzzy sets, Union of Fuzzy sets - the complement of Fuzzy sets-Fuzzy reasoning.</p> <p>Linguistic variables, Fuzzy propositions, Fuzzy compositional rules of inference- Methods of decompositions and defuzzification.</p> <p>Methodology of fuzzy design- Direct &amp; Indirect methods with single and multiple experts, Applications– Fuzzy controllers – Control and Estimation.</p> <p>Genetic Algorithms- basic structure-coding steps of GA, convergence characteristics, applications.</p> <p><b>Text Books:</b></p> <ol style="list-style-type: none"><li>1. Zimmermann H.J., 'Fuzzy Set Theory - and its Applications', Springer Netherlands, 2nd Edition, Illustrated, 2014.</li><li>2. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', John Wiley &amp; Sons Ltd Publications, 3rd Edition, 2011Generators', CRC press.</li><li>3. M. Mitchell, 'Introduction to Genetic Algorithms", Indian Reprint, MIT press Cambridge, 2nd Edition, 2014</li></ol> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"><li>1. John Yen, Reza Langari, 'Fuzzy Logic, Intelligence, Control &amp; Information', Pearson Education Inc., India, 2007.</li><li>2. Zdenko Kovacic, Stjepan Bogdan, 'Fuzzy Controller Design Theory and Applications', CRC Press, 1 st Edition, 2006.</li><li>3. Riza C. Berkaan, Sheldon L. Trubatch, 'Fuzzy Systems Design Principles – Building Fuzzy IF THEN Rule Based', IEEE Press, 1997</li></ol>			



## NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

### COURSE OBJECTIVES

- This course aims to expose students to the fundamental principles of fuzzy logic systems.
- Enable the students to apply fuzzy logic concepts to existing and new applications.

### MAPPING OF COs with Pos

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)			
	PO/CO	CO1	CO2	CO3
Upon completion of the course, the students will be able to	PO1	L	H	H
1. Understand the fundamentals of Fuzzy logic theory	PO2	H	M	M
	PO3	L	L	H
2. Employ fuzzy logic principles to existing engineering applications and compare the results with existing methods.	PO4	L	L	L
	PO5	NA	NA	NA
3. Design Fuzzy logic Systems for engineering applications.	PO6	NA	NA	NA
	PO7	NA	NA	NA
	PO8	NA	NA	NA
	PO9	L	L	L
	PO10	NA	H	L
	PO11	NA	H	NA
	PO12	M	M	M

### COURSE PLAN – PART II

### COURSE OVERVIEW

This course aims to expose students to the fundamental principles of fuzzy logic systems and enable the students to apply fuzzy logic concepts to existing and new applications.

### COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1 July 31st-4 August	Course plan, Different faces of imprecision	<b>Chalk&amp;Talk</b>
2	Week 2 7 August – 11 August	Different faces of imprecision – inexactness, ambiguity, undecidability,	<b>Chalk&amp;Talk</b>
3	Week 3 14 August -18 August	Fuzziness and certainty Crisp Sets	<b>Chalk&amp;Talk</b>
4	Week 4 21 Aug –25 August	Fuzzy sets, Intersection of Fuzzy sets	<b>Chalk&amp;Talk</b>
5	Week 5 28 Aug -1st September	Union of Fuzzy sets - the complement of Fuzzy sets	<b>Chalk&amp;Talk</b>



6	Week 6 04 <sup>h</sup> -08 <sup>th</sup> September	Fuzzy reasoning. <b>Assessment 1</b>	Chalk&Talk
7	Week 7 11 <sup>th</sup> -15 <sup>th</sup> September	Linguistic variables, Fuzzy propositions,	Chalk&Talk
8	Week 8 18 <sup>th</sup> -22 <sup>th</sup> September	Fuzzy compositional rules of inference <b>Assessment III</b>	Chalk&Talk
9	Week 9 25 <sup>th</sup> -29 <sup>th</sup> September	Methods of decompositions and defuzzification.	Chalk&Talk
10	Week 10 02 <sup>th</sup> -06 <sup>th</sup> October	Methodology of fuzzy design-	Chalk&Talk
11	Week 11 09 <sup>th</sup> to 13 October	<b>Assessment 2</b>	Chalk&Talk
		Direct & Indirect methods with single and multiple experts,	
13	Week 12 16 <sup>th</sup> to 20 October	Application Fuzzy controllers	Chalk&Talk
14	Week 13 23 <sup>th</sup> to 27 October	Application Fuzzy controllers— Control and Estimation.	Chalk&Talk
15	Week 14 30 <sup>th</sup> October to 03 November	Genetic Algorithms basic structure-coding steps of GA. Convergence characteristics, Convergence applications.	Chalk&Talk
16	Week 14 06 <sup>th</sup> -10 <sup>th</sup> November	<b>Assessment III Discussion</b>	Chalk&Talk



17	Week 15 13-17 November	Compensation Assessments	Chalk&Talk
----	---------------------------	--------------------------	------------

**COURSE ASSESSMENT METHODS**

S.No.	Mode of Assessment	Type of assessment	Duration	% Weightage
1.	Assessment I	Quiz	1hr	20%
2.	Assessment II	Quiz	1hr	20%
CPA	Compensation Assesment (entire syllabus)	Quiz	1 hr	80% of A1 and A2
3.	Assessment III Simulation/Group Task/surprise test	Assignment		20%
4	Assessment IV Final sem(entire syllabus)	End Semester Examination	3 hrs	40%

**COURSE EXIT SURVEY**

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

**COURSE POLICY**

1. Attending all the assessments mandatory for every student
2. One compensation assessment will be conducted for those students who are being physically absent for the assessment 1 and/or 2, only for a valid reason. And will have a weightage of 80% of Assessment 1 or Assesment2
3. At any case CPA will not be considered as an improvement test.
4. Absolute/Relative grading will be adopted for the course.

**ATTENDANCE POLICY** (A uniform attendance policy as specified below shall be followed)

- 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 DISHONESTY & 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.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

FOR APPROVAL

Course Faculty

*Dr. Ameesh Forhan*

CC- Chairperson

*[Signature]*

HOD

*[Signature]*  
14/08/23