NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

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 / EEOE11	No. of Credits	03
Session	July 2022	Section (if, applicable)	BTech EEE A & B
Name of Faculty	Dr. Aneesa Farhan M A	Department	EEE
Email	aneesa@nitt.edu aneesafma@gmail.com	Telephone No.	7598164452 8015877137

Name of Course Coordinator(s) (if, applicable)	N A
Course Type (please tick appropriately)	☑ Elective

Syllabus (approved in BoS)

Different faces of imprecision – inexactness, ambiguity, undecidability, Fuzziness and certainty, Fuzzy sets and crisp sets.

Intersection of Fuzzy sets, Union of Fuzzy sets - the complement of Fuzzy sets-Fuzzy reasoning.

Linguistic variables, Fuzzy propositions, Fuzzy compositional rules of inference- Methods of decompositions and defuzzification.

Methodology of fuzzy design- Direct & Indirect methods with single and multiple experts, Applications– Fuzzy controllers – Control and Estimation.

Genetic Algorithms- basic structure-coding steps of GA, convergence characteristics, applications.

Text Books:

1. Zimmermann H.J., 'Fuzzy Set Theory - and its Applications', Springer Netherlands, 2nd Edition, Illustrated, 2014.
2. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', John Wiley & Sons Ltd Publications, 3rd Edition, 2011*Generators', CRC press.*
3. M. Mitchell, 'Introduction to Genetic Algorithms", Indian Reprint, MIT press Cambridge, 2nd Edition, 2014

Reference Books:

1. John Yen, Reza Langari, 'Fuzzy Logic, Intelligence, Control & Information', Pearson Education Inc., India, 2007.
2. Zdenko Kovacic, Stjepan Bogdan, 'Fuzzy Controller Design Theory and Applications', CRC Press, 1 st Edition, 2006.
3. Riza C. Berkaan, Sheldon L. Trubatch, 'Fuzzy Systems Design Principles – Building Fuzzy IF THEN Rule Based', IEEE Press, 1997

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)
Upon completion of the course, the students will be able to	
1. Understand the fundamentals of Fuzzy logic theory	1,10,11,12,13,
2. Employ fuzzy logic principles to existing engineering applications and compare the results with existing methods.	1,10,11,12,13
3. Design Fuzzy logic Systems for engineering applications.	1 ,10,11,12,13,

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 10 August-12 August	Course plan, Different faces of imprecision	Chalk&Talk
2	Week 2 15 August – 19 August	Different faces of imprecision – inexactness, ambiguity, undecidability,	Chalk&Talk
3	Week 3 22 August -26 August	Fuzziness and certainty Crisp Sets	Chalk&Talk
4	Week 4 29 Aug –2 september	Fuzzy sets , Intersection of Fuzzy sets	Chalk&Talk
5	Week 5 5th -9th September	Union of Fuzzy sets - the complement of Fuzzy sets	Chalk&Talk
6	Week 6 12th -16th September	Fuzzy reasoning.	Chalk&Talk
7	Week 7 19th -23th September	Linguistic variables, Fuzzy propositions,	Chalk&Talk

		Assessment 1	
8	Week 8 26th -30th September	Fuzzy compositional rules of inference **Assessment III**	**Chalk&Talk**
9	Week 9 3th -7th October	Methods of decompositions and defuzzification.	**Chalk&Talk**
10	Week 10 10 th -14 th October	Methodology of fuzzy design-	**Chalk&Talk**
11	Week 11 17 th to 21 October	**Assessment 2** Direct & Indirect methods with single and multiple experts,	**Chalk&Talk**
13	Week 12 24 th to 28 October	Application Fuzzy controllers	**Chalk&Talk**
14	Week 13 01 th to 04 November	Application Fuzzy controllers— Control and Estimation.	**Chalk&Talk**
15	Week 14 07 th to 11 November	Genetic Algorithms basic structure- coding steps of GA	**Chalk&Talk**
16	Week 14 14 th -18 th November	Convergence characteristics, Convergence applications.	**Chalk&Talk**
17	Week 15 21-25 November	**Assessment III Discussion**	**Chalk&Talk**
18	Week 16. 28 to 30 November	**Compensation Assessment**	

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Type of assessment	Duration	% Weightage
1.	Assessment I	Quiz	60 min	25%
2.	Assessment II	Quiz	60 min	25%
CPA	Compensation Assesment (entire syllubus)	Quiz	60 min	80% of A1 and A2
3.	Assessment III Simulation/Group Task/surprise test	Assignment		20%
4	Assessment IV Final sem(entire syllabus)	Quiz	120 min	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 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 Asssesment2
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 _____   **CC- Chairperson** _____ 24/08/24   **HOD** _____