



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF CHEMICAL ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	B. Tech and Chemical Engineering		
Course Title	Soft-computing Techniques		
Course Code	CLOE19	No. of Credits	3
Course Code of Pre-requisite subject(s)	None		
Session	July 2022	Section (if, applicable)	7 th Semester.
Name of Faculty	N. Rajasekhar Muttu Pandian P	Department	Chemical Engineering
Official Email	<u>402120003@nitt.edu</u> <u>402121001@nitt.edu</u>	Telephone No.	+91 - 431 - 2503143
Name of Course Coordinator(s) (if, applicable)	Dr. P. Kalaichelvi		
Official E-mail	kalai@nitt.edu	Telephone No.	+91 - 431 - 2503109
Course Type (please tick appropriately)	Open Elective (OE)		
Syllabus (approved in BoS)			
Introduction of soft computing, various types of soft computing techniques, Introduction to Neural Networks:			
Artificial Neural Networks: Basic properties of Neurons, Neuron Models, activation functions, single layer and multilayer Feedforward networks. McCullochPitts neuron model-perceptron model-, learning methods, Computational complexity of ANNs. Case study Imprecision, Ambiguity,			
Uncertainty, Fuzziness and certainty, Fuzzy sets and crisp sets. Fuzzy Properties, Mathematical operations on fuzzy sets, Fuzzy Inference system, fuzzification, rules, defuzzification, different methods of defuzzification Case study Introduction to artificial neuro-fuzzy inference system.			
The basic concept of Genetic algorithm and detail algorithmic steps-GA Application to optimization problems.			



REFERENCE BOOKS

1. Kosco B, *Neural Networks and Fuzzy Systems: A Dynamic Approach to Machine Intelligence*, Prentice Hall of India, 1992.
2. S. N. Sivanandam, S.N. Deepa, *Principles of Soft Computing*, John Wiley & Sons, 2007.

COURSE OBJECTIVES

The course aims to learn the students the concepts and principles of soft computing techniques including Artificial neural networks, and Introduction to learning methods such as supervisory, an supervisory, and reinforcement learning. Understanding the concepts of fuzzy inference systems and mathematical operations involved in them. Explains Genetic Algorithms and steps, and finally GA applications to the Neural network domain.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Students will understand the basic areas of Soft Computing including Artificial Neural Networks, Fuzzy Logic and Genetic Algorithms.	1,2,3,4,5,11
2. Provide the mathematical background for carrying out the optimization associated with neural network learning	1,2,3,4,5,11

COURSE PLAN – PART II

COURSE OVERVIEW

The brief introduction of soft computing, various types of soft computing techniques, neural Networks- Artificial Neural Networks- Basic properties of Neurons, Neuron Models, activation functions, single layer and multilayer Feedforward networks. McCullochPitts neuron model-perceptron model-, learning methods, Computational complexity of ANNs. the detailed study of fuzzy sets and crisp sets and properties of fuzzy sets, and different membership functions, basic fuzzy terminology, and finally study of fuzzy logic controllers which involves fuzzification, fuzzy inference system, defuzzification, and different methods of defuzzification, The effective utilization of algorithms for modelling and control application with optimization method viz., genetic algorithm



COURSE TEACHING AND LEARNING ACTIVITIES			
			(Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1	Introduction of soft computing	Chalk and talk
2	Week 2	Various types of soft computing techniques, Introduction of neural networks	Chalk and talk
3	Week 3	Basic properties of neurons, neuron models activation functions	Chalk and talk
4	Week 4	Single layer and multi-layer feedforward networks	Chalk and talk
5	Week 5	McCullochPitts neuron, model - perceptron model	Chalk and talk
6	Week 6	Learning methods, computational complexity of ANNs, Case study (seminar)	Chalk and talk, PPT
7	Week 7	Case study (seminar), Imprecision, ambiguity, uncertainty, fuzziness and certainty	Chalk and talk
8	Week 8	Fuzzy sets, crisp sets, fuzzy properties, mathematical operations on fuzzy sets	Chalk and talk
9	Week 9	Fuzzy inference systems, fuzzification, rules, defuzzification	Chalk and talk
10	Week 10	Fuzzy inference systems, fuzzification, rules, defuzzification, different methods of defuzzification, Case study (seminar)	Chalk and talk, PPT
11	Week 11	Basic concepts of Genetic algorithm, and steps of GA	Chalk and talk
12	Week 12	Application of optimization problems	Chalk and talk



COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assesment I	Week 5	1 hour	25
2	Assessment II (Seminar)	Week 6	--	10
3	Assesment III	Week 8	1 hour	25
4	Assesment IV (seminar)	Week 9	--	10
CPA	Compensation Assessment*	Week 11	1 hour	25
5	Final Assessment *	Week 13	2 hour	30

***mandatory; refer to guidelines on page 6**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

Students indirect feedback will be collected twice during the course: one in the mid of the course and one at the end of the course on course contents, delivery etc. The academic performance of the students will be assessed based on 2 cycle tests (each 25 marks), one final examination (30 marks) and assignments (20 marks).

COURSE POLICY (including compensation assessment to be specified)

The course syllabus can be covered within 12 weeks. There are 5 assessments will be conducted to evaluate the student performance. Compensation assessment can be conducted before the final exam date.

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.



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, or 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

N. Rajasekhar *N. Rajasekhar*
Muttu Pandian P *M. Muttu Pandian P*
22-08-22

Course Faculty

CC-Chairperson:

(Dr. Tyoti Sahu)

Palich
HOD



Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory 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.
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.