INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE DESCRIPTOR

Course Title	**SOFT COMPUTING LABORATORY**					
Course Code	BCSB12					
Programme	M.Tech					
Semester	II	CSE				
Course Type	Core					
Regulation	IARE - R18					
Course Structure	**Theory**			**Practical**		
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**	
	-	-	-	4	2	
Course Faculty	Ms. K. Saisaranya, Assistant Professor, CSE.					

I. COURSE OVERVIEW:

The course introduces the concepts of neural networks, Evolutionary algorithms and fuzzy Logic. Moreover the course pays a special attention to solve typical uncertainty problems which are primarily explored by fuzzy logic concepts. The principle aim of the course is to help students to find out more about appropriate computing techniques and use it for their problem of choice.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
PG	BCSB10	I	Data Science Laboratory	2

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Soft Computing Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✔	LCD / PPT	✔	Student viva	✔	Mini Project	✘	Videos
✔	Open Ended Experiments						

V. METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	**Laboratory**		**Total Marks**
Type of Assessment	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):
One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	**Performance**	**Calculations and Graph**	**Results and Error Analysis**	**Viva**	**Total**
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES AREASSESSED:

Program Outcomes (POs)		**Strength**	**Proficiency assessed by**
PO 1	An ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution.	3	Laboratory practices, student viva
PO 2	Solve complex heterogeneous data intensive analytical based problems of real time scenario using state of the art hardware/software tools	3	Laboratory practices, student viva
PO 7	To engage in life-long learning and professional development through self-study, continuing education, Professional and doctoral level studies.	3	Laboratory practices, Mini project

3 = High; 2 = Medium; 1 = Low

VII. COURSE OBJECTIVES(COs):

The course should enable the students to:	
I	Explore methods that implements neural network techniques.
II	Practice the fuzzy set relations using different operations.
III	Design Regression techniques for a set of data points.
IV	Capture an appropriate classification model for analytical tasks.

VIII. COURSE LEARNING OUTCOMES(CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength Of Mapping
BCSB12.1	CLO 1	Demonstrate the Conceptual model of Increment learning algorithm.	PO 1	3
BCSB12.2	CLO 2	Identify and understand the methods used in neural networks.	PO 1	3
BCSB12.3	CLO 3	Analyze and understand the operations on fuzzy sets	PO 2	2
BCSB12.4	CLO 4	Creation of Fuzzy relation by Cartesian product and their implementation on fuzzy sets	PO 2	3
BCSB12.5	CLO 5	Explore the applications of Genetic algorithms.	PO 7	3
BCSB12.6	CLO 6	Analyze and understand a basic statistics approach to analyze quantitative data.	PO 1,PO 2	2
BCSB12.7	CLO 7	Demonstrate Crisp partition and their modeling techniques	PO 1	2
BCSB12.8	CLO 8	Analyze delta rule which are required for strengthening weights between neuron networks	PO 1	3
BCSB12.9	CLO 9	Illustrate the use of logic gates and their modeling techniques.	PO 2	2
BCSB12.10	CLO 10	Identify and analyze appropriate classification techniques for analytical task.	PO 2	3

3 = High; 2 = Medium; 1 = Low

IX. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFICOUTCOMES:

Course Learning Outcomes (CLOs)	PO1	PO2	PO7
CLO 1	3		
CLO 2	3		
CLO 3		2	
CLO 4		3	
CLO 5			3
CLO 6	2	3	
CLO 7	2		
CLO 8	3		
CLO 9		2	
CLO 10		3	

3 = High; 2 = Medium; 1 = Low

X. ASSESSMENT METHODOLOGIES –DIRECT

CIE Exams	PO 1, PO 2, PO 7	SEE Exams	PO 1, PO 2, PO 7	Laboratory Practices	PO 1, PO 2, PO 7	Student Viva	PO 1, PO 2
Mini Project	PO7						

XI. ASSESSMENT METHODOLOGIES -INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XII. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	**PERCEPTRON**
Create a perceptron with appropriate number of inputs and outputs. Train it using fixed increment learning algorithm until no change in weights is required. Output the final weights	
Week-2	**ARTIFICIAL NEAURAL NETWORKS**
Write a program to implement artificial neural network without back propagation. Write a program to implement artificial neural network with back propagation.	
Week-3	**FUZZY SETS**
Implement Union, Intersection, Complement and Difference operations on fuzzy sets. Also create fuzzy relation by Cartesian product of any two fuzzy sets and perform max-min composition on any two fuzzy relations	
Week-4	**GENETIC ALGORITHMS**
Implement travelling sales person problem (TSP) using genetic algorithms.	
Week-5	**COVARIANCE**
Plot the correlation plot on dataset and visualize giving an overview of relationships among data on soya bins data. Analysis of covariance: variance (ANOVA), if data have categorical variables on iris data.	
Week-6	**DATA FITTING BY REGRESSION**
Implement linear regression and multi-regression for a set of data points.	
Week-7	**CRISP MODEL**
Implement crisp partitions for real-life iris dataset.	
Week-8	**PERCEPTRON RULE**
Write a program to implement Hebb's rule Write a program to implement Delta rule.	
Week-9	**LOGIC GATES**
Write a program to implement logic gates.	
Week-10	**CLASSIFICATION**
Implement SVM classification by Fuzzy concepts.	
Text Books:	
1. J. S. R. Jang, C. T. Sun, E. Mizutani, Neuro, "Fuzzy and Soft Computing", PHI, Pearson Education, 1stEdition, 2004. 2. S. N. Sivanandan, S. N. Deepa, "Principles of Soft Computing", Wiley India, 2nd Edition, 2007.	
Reference Books:	
1. D.K Prathikar, "Soft Computing", Narosa Publishing House, New Delhi, 2008.	

Web References:
1. https://ldrp.ac.in/images/syllabus/BEComputer/8023%20soft%20computing.pdfhttp://itmgoi.in/download/CSE%20&%20IT/Soft%20Computing%20IT%2 0(IT-802).pdf. 2. http://mirlab.org/jang/book/
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 60 STUDENTS: **HARDWARE:**18 numbers of Intel Desktop Computers with 4 GB RAM. **SOFTWARE:** Python

XIII. COURSEPLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week No.	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Perceptron	CLO 1	T1:1.1
2	Artificial neural networks	CLO 1, CLO 2	T1:2.3
3	Fuzzy sets	CLO 3, CLO 4	T1:4.1
4	Genetic algorithrms	CLO 5	T1:5.1
5	Covariance	CLO 6	T1:6.1
6	Data fitting by regression	CLO 6	T1:7.1.1
7	Crisp model	CLO 7	T1:12.5
8	Perceptron rule	CLO 1,CLO 2, CLO 8	T1:15.1
9	Logic gates	CLO 9	T1:20.5
10	Classification	CLO 10	T1:20.8

Prepared by:
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