



# SWARNANDHRA

## COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3.32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956, Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kakinada Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

### DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

#### TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
16CS5E04	SOFT COMPUTING	V	CSE A,B,Shift	5	2020-21	
<b>COURSE OUTCOMES:</b>						
1	Identify the difference between Hard Computing and Soft Computing and Know the importance of soft computing. ( K1,K2)					
2	Identify the difference between learning and programming and explore practical Applications of Neural Networks (K2)					
3	Analyze and appraise the applications which can use fuzzy logic.(K4)					
4	Explain the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network. (K2)					
5	Explain derivative based and derivative free optimization techniques.(K2)					
6	Analyze various applications of Genetic Algorithms. (K4)					
Unit No.	Out Comes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Cont act Hour	Delivery Method
<b>UNIT-I: Introduction to Soft Computing</b>						
		1.1	Introduction to Soft Computing	T2	1	Chalk,talk
I	CO1: Identify the difference between Hard Computing and Soft Computing and Know the importance of soft computing. ( K1,K2)	1.2	Soft computing Constituents -Neural Networks - Fuzzy set theory - Approximate reasoning - Derivative-free optimization	T2	2	PPT
		1.3	Characteristics of Neuro Computing and Soft Computing - Human expertise (fuzzy if-then rules) - Biologically inspired computing models (NN) - New optimization techniques (GA, SA, RA) - Numerical computation (no symbolic AI, only numerical)	T2	2	Chalk,talk



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		1.4	Difference between Hard Computing and Soft Computing	T2	1	Web Resources
		1.5	Concepts of Learning and Adaptation.	T2	2	NPTEL video
	Content beyond Syllabus (if needed)		OPTIMIZATION in soft computing		1	PPT
<b>Total</b>					<b>09</b>	
<b>UNIT-II: Neural Networks</b>						
II	CO2: Identify the difference between learning and programming and explore practical Applications of Neural Networks (K2)	2.1.1	<b>Neural Networks:</b> Basics of Neural Networks: Introduction to Neural Networks	T3, R1	1	Chalk ,talk
		2.1.2	Biological Neural Networks	T3, R1	1	Web Resources
		2.1.3	McCulloch Pitt model	T3, R1	1	Chalk , talk
		2.2.1	<b>Supervised Learning algorithms:</b> Perceptron (Single Layer, Multi layer)	T3, R1	1	Chalk ,talk
		2.2.2	Linear separability	T3, R1	1	Web Resources
		2.2.3	Delta learning rule	T3, R1	1	Web Resources
		2.2.4	Back Propagation algorithm	T3, R1	1	Chalk ,talk, ppt
		2.3.1	<b>Un-Supervised Learning algorithms:</b> Hebbian Learning	T3, R1	1	PPT
		2.3.2	Winner take all	T3, R1	1	Web Resources
		2.3.3	Self Organizing Maps	T3, R1	1	Chalk ,talk
	Content beyond Syllabus (if needed)		Convolutional Neural Networks		1	Chalk ,talk
<b>Total</b>					<b>12</b>	
<b>UNIT-III: Fuzzy Set Theory</b>						
III	CO3: Analyze and appraise the applications which can use fuzzy logic.(K4)	3.1	<b>3.1.1 Fuzzy Set Theory:</b> Classical Sets	T1,T4	2	Chalk ,talk
			3.1.2 Fuzzy Sets			
		3.2	3.2.1 Classical Relations	T1,T4	2	Chalk ,talk,
			3.2.2 Fuzzy Relations			
		3.3	Properties of membership function	T1,R2	1	NPTEL video
		3.4	Fuzzy extension principle	T1,R2	1	PPT
		3.5	Fuzzy Systems-	T1,T4	1	PPT
3.5.1 fuzzification						
	3.5.2 defuzzification	T1,T4	1	PPT		



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	Content beyond Syllabus (if needed)		Image Processing		1	Chalk ,talk
<b>Total</b>					<b>10</b>	
<b>UNIT-IV: Hybrid systems</b>						
<b>IV</b>	CO4: Explain the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network. (K2)	4.1	Hybrid systems: Introduction to Hybrid Systems	T1,T2	2	PPT
			Importance of Hybrid systems			
		4.2	reasons to study hybrid systems	T1,T2	1	Chalk ,talk
			4.2.1 the design of technological systems	T1,T2	1	PPT
			4.2.2 networked control systems	T1,T2	1	Chalk ,talk
			4.2.3 physical processes exhibiting non-smooth behavior.	T1,T2	1	Web Resources
		4.3	Adaptive Neuro Fuzzy Inference System (ANFIS)	T1,T2	1	Web Resources
			4.3.1 ANFIS architecture	T1,T2, R2	1	Chalk ,talk
	4.3.2 Fuzzification layer	T1,R2	1	PPT		
	Content beyond Syllabus (if needed)		Recurrent Neural Network		1	Chalk ,talk, ppt
<b>Total</b>					<b>10</b>	
<b>UNIT-V: Introduction to Optimization Techniques</b>						
<b>V</b>	CO5: Explain derivative based and derivative free optimization techniques.(K2)	5.1	Introduction to Optimization Techniques: Derivative based optimization	T1,T2,T5	1	Web Resources
		5.2	Steepest Descent	T1,R2,T5	1	Web Resources,
			Example of Steepest Descent	T1,R2,T5	1	PPT
		5.3	Newton method	T1,R3,T5	1	Chalk ,talk, ppt
			Example of Newton method	T1,R3,T5	1	PPT
		5.4	5.2 Derivative free optimization:	T5,R1	1	PPT
		5.5	Introduction to Evolutionary Concepts	T1,R1,T5	1	Web Resources
		5.7	Bayesian optimization	T5,R1	1	Chalk ,talk
5.8	Genetic algorithms	T5,R3	1	Web Resources		



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			Exaample of Genetic algorithms	T1,T5	1	NPTEL video
	Content beyond Syllabus (if needed)		Deep learning		1	Chalk ,talk, PPT
<b>Total</b>					<b>11</b>	
<b>Unit-VI: Genetic Algorithms and its applications</b>						
VI	CO6: Analyze various applications of Genetic Algorithms. (K4)	6.1	<b>Genetic Algorithms and its applications:</b> Inheritance Operators	T3,T4	1	Web Resources,
		6.2	Cross over types	T3,T4	1	Chalk ,talk, ppt
		6.3	inversion and Deletion	T3,T4	1	PPT
		6.4	Mutation Operator	T3,T4	1	Web Resources
		6.5	Bit-wise Operators	T3,T4	1	Chalk ,talk
		6.6	Convergence of GA	T3,T4	1	Web Resources
		6.7	Applications of GA	T3,T4	1	Chalk ,talk, ppt
	Content beyond Syllabus (if needed)		genetic algorithm optimization		1	PPT
<b>Total</b>					<b>8</b>	
<b>CUMULATIVE PROPOSED PERIODS</b>					<b>60</b>	
<b>Text Books:</b>						
<b>S.No.</b>	<b>AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION</b>					
1	Timothy J.Ross "Fuzzy Logic With Engineering Applications" 3 <sup>rd</sup> edition Wiley					
2	S.N.Sivanandam, S.N.Deepa "Principles of Soft Computing" Second Edition, Wiley Publication.					
3	S.Rajasekaran and G.A.Vijayalakshmi Pai "Neural Networks, Fuzzy Logic and Genetic Algorithms" PHI Learning.					
4	J.-S.R.Jang "Neuro-Fuzzy and Soft Computing" PHI 2003.					
5	Jacek.M.Zurada "Introduction to Artificial Neural Sytems" Jaico Publishing House.					
<b>Reference Books:</b>						
<b>S.No.</b>	<b>AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION</b>					
1	Satish Kumar "Neural Networks A Classroom Approach" Tata McGrawHill					
2	Zimmermann H.S "Fuzzy Set Theory and its Applications" Kluwer Academic Publishers.					
3	Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989					
4	Hagan, Demuth, Beale, "Neural Network Design" CENGAGE Learning, India Edition					
<b>Web Details</b>						
1	<a href="https://www.tutorialspoint.com/">https://www.tutorialspoint.com/</a>					



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2	<a href="https://towardsdatascience.com/">https://towardsdatascience.com/</a>
3	<a href="https://www.geeksforgeeks.org/">https://www.geeksforgeeks.org/</a>

		Name	Signature with Date
i.	Faculty	Mrs. K. Haritha Rani	
ii.	Course Coordinator	Mrs. K. Haritha Rani	
iii.	Programme Coordinator	Dr.P.Srinivasulu	

**Principal**