



Course Title : Elementary Soft Computing
Course Code : SPAC413
Credit Units : 03
Course Level : UG

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
2	1	0	--	03

Course Objectives:

To understand the advanced concept of soft computing, revised the artificial neural networks, fuzzy systems, neuro fuzzy modeling and genetic algorithm.

Pre-requisites:

- Engineering Mathematics : Vector Analysis, and Differential Equations. Fuzzy Mathematics
- MATLAB knowledge

Course Contents/Syllabus:

	Weightage (%)
Module I : Introduction to Soft Computing	
Soft Computing Introduction , Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, , Applications of Artificial Neural Networks. Adaptive networks based Fuzzy interface systems - Neuro-Fuzzy controls – Evolutionary computation. Artificial Intelligence and expert systems , rule based expert based , inference mechanisms.	40%
Module II Evolutionary : Optimization Tech.	
Simulated Annealing , Concept and Applications ,Genetic Algorithm Survival of the Fittest - Fitness Computations - Cross over - Mutation - Reproduction – Rank Method. Example of genetic algorithm : aircraft yaw controller ,	35%
Module III: Particle Swarm Optimization	
PSO algorithm Application in Aerospace Systems- PID algorithm, ,Application in aerospace , PSO Variants . Ant Bee colony optimization. Case Study	25%

Student Learning Outcomes:

On completion of the course the student will be able to:

- To identify and implement relevant soft computing techniques in a aerospace design.
- An ability to use the relevant tools necessary for system design.

Pedagogy for Course Delivery: The course pedagogy will include lectures & tutorials having rigorous application to aerospace engineering and MAtLAB codes .

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
100	0%	100

Theory Assessment (L&T):

	Continuous Assessment/Internal Assessment				
Components	Class Test	Viva-Voce	Home Assignment	Attendance	End Term Exam
Weightage (%)	10	8	7	5	70

Text & References:

- Sivanandam, Deepa, “Principles of Soft Computing”, Wiley
- Jang J.S.R, Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", Prentice Hall
- Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill
- Laurene Fausett, "Fundamentals of Neural Networks", Prentice Hall