	National Institute of Technology Meghalaya An Institute of National Importance		CURRICULUM
Programme	**Bachelor of Technology in Computer Science and Engineering**	Academic Year of Regulation	**2018-19**
Department	**Computer Science and Engineering**	Semester	**VII**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
CS411	**Soft Computing**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes		
	This Course introduces the soft computing techniques		CO1	**Able to appraise Soft Computing applications**
	This course illustrates to design the fuzzy logic controller		CO2	**Able to appraise Fuzzy Logic and choose applications**
	This course develop an ability and skill to implement optimization techniques		CO3	**Able to Examine the single-objective and multi-objective optimization problems**
	This course illustrates to design the various neural networks		CO4	**Able to examine Neural Network and demonstrate the applications**
	This course familiarizes the application area of soft computing techniques		CO5	**Able to solve various real time problems in different application domains**

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	CO2	**2**	**2**	**1**	**1**	-	-	-	-	-	-	-	**1**	**3**	-	**1**
3	CO3	**2**	**1**	**1**	**1**	-	-	-	-	-	-	-	**1**	**2**	-	**1**
4	CO4	**2**	**2**	**2**	**2**	-	-	-	-	-	-	-	**1**	**3**	-	**1**
5	CO5	**2**	**2**	**1**	**2**	-	-	-	-	-	-	-	**1**	**3**	-	**1**

SYLLABUS

No.	Content	Hours	COs
I	**Introduction** **Characteristics of Soft Computing, Applications of Soft Computing.**	**02**	**CO1**
II	**Fuzzy Logic** **Fuzzy Sets And Membership Function, Set Operations on Fuzzy Sets, Fuzzy If-Then Rules, Fuzzy Reasoning, Fuzzification and Defuzzification, Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Fuzzy Logic Controller, Applications of Fuzzy Logic, Fuzzy–C-Means Clustering**	**12**	**CO2** **CO5**
III	**Genetic Algorithm and Optimization Techniques** **Genetic Algorithm: Encoding, Selection, Crossover, Mutation, Fitness Function, Convergence, Multi Objective Genetic Algorithm, Particle Swarm Optimization, Ant Colony Optimization**	**08**	**CO3** **CO5**
IV	**Neural Networks** **The McCullock-Pitts Neural Model, Perceptron, Neural Network Architectures, Activation Functions, Learning by Neural Networks, Hebb Net, Backpropagation: Multi-layer Feedforward Net, Generalized Delta Rule, Backpropagation Algorithm**	**11**	**CO4** **CO5**
V	**Hybrid Systems** **Integration of Neural Networks, Fuzzy Logic and Genetic Algorithms, Genetic Algorithms Based Neural Networks, Fuzzy Neural Networks, Fuzzy Logic Controlled Genetic Algorithms.** **Applications to Solve Real Life Problems.**	**03**	**CO5**
	Total Hours	**36**	

Essential Readings

1. J-S. R. Jang, C-T Sun, E. Mizutani, “Neuro–Fuzzy and Soft Computing”, 1st Edition, Pearson India Education, 2015.
2. S. N. Deepa and S. N. Sivanandam,” Principles of Soft Computing”, 2nd Edition, Wiley, 2011.
3. S. Rajasekaran, G. A. Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications”, 1st Edition, Prentice Hall of India, 2003

Supplementary Readings

1. Samir Roy, Udit Chakraborty, “Introduction to Soft Computing: Neuro-Fuzzy and Genetic Algorithms”, 1st Edition, Pearson India Education, 2013.
2. Kwang H Lee, “First Course on Fuzzy Theory and Applications”, 1st Edition, Springer-Verlag Berlin Heidelberg, 2005.
3. Andries P Engelbrecht, “Computational Intelligence An Introduction”, 2nd Edition, Wiley, 2018.
4. Goldberg, David E.” Genetic Algorithms in Search, Optimization & Machine Learning”, 1st Edition, Pearson Education, 1989.