CENTRAL UNIVERSITY OF KERALA
DEPARTMENT OF COMPUTER SCIENCE
M.Sc. COMPUTER SCIENCE

CORE COURSE					
COURSE CODE	COURSE TITLE	CONTACT HRS/WEEK			CREDITS
		LEC	LAB	TUT	
CSC5105	Computational Intelligence Systems	2	2	1	4

Lec = Lecture, Tut = Tutorial, Lab = Practical

This is a participatory, experimental and problem solving **skill development course**.

Course Objective

The objective of the course is to provide theoretical and practical aspects of computational intelligence in representing real world problems and digitally modelling it.

By completing this course, students will obtain the following course/learning outcomes:

1. Knowledge gained:
   (i) fundamental concepts of computational intelligence (fuzzy, neural networks and genetic algorithms)
2. Skill gained:
   (ii) modelling and representation of real world problems using fuzzy logic and neural networks
   (iii) optimization of real world problems using genetic algorithms.
   (iv) Critical analyzing and logic skills in developing computationally intelligent algorithms.
3. Competency gained:
   (v) Development of Computational Intelligence system in a variety of real world problem

Prerequisites: Nil

Grading:

Lab experiments and implementation	– 12%
Participatory based group Project	– 10%
Mini project (individual)	– 8%
Class Test/Assignment/Quiz/presentation	– 10%
Final Exam	– 60%

CSC5105 - Computational Intelligence Systems

Module 1

Introduction to computational intelligence - relevance, advantages, components and applications of computational intelligence - ability of computational intelligence to handle uncertainty, vagueness, ambiguity.

Module 2

Introduction to fuzzy logic - applications of fuzzy logic - types of membership functions, fuzzy inference system - fuzzifier - defuzzifier - inference engine - rule base, fuzzy rules - mamdani type and Takagi-Sugeno type fuzzy rules.

Module 3

Introduction to Genetic Algorithm (GA) - applications of GA - concepts of genes, chromosomes, population and its initialization - fitness function – selection, crossover, mutation, reinsertion - steps of simple genetic algorithm

Module 4

Introduction to biological neurons - Introduction to artificial neurons - types of transfer functions - architecture of feedforward neural networks - backpropagation learning algorithm - applications of neural network

Module 5

Latest literature review and case studies.

Text Books

1. J.J. Buckley, Esfandiar Eslami, *An introduction to fuzzy logic and fuzzy sets*, Springer International edition, 2002
2. S.N. Sivanandam, S.N. Deepa, *Introduction to genetic algorithms*, Springer, 2008
3. S. Sivanandam, S. Sumathi, *Introduction to Neural Networks using Matlab* 6.0, The McGraw-Hill, 2005

Reference

1. Yen & Langari, *Fuzzy Logic: Intelligence, Control, and Information*, 1/E, Prentice Hall, 1999.
2. Timothy J. Ross, *Fuzzy logic with engineering applications*, 3rd ed, Wiley India, 2010