



Birla Institute of Technology & Science, Pilani

Hyderabad Campus

FIRST SEMESTER 2021-2022

Course Handout Part II

Date: 20/8/2021

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No : CE F417
Course Title : **Applications of Artificial Intelligence in Civil Engineering**
Instructor-in-charge : **JAGADEESH ANMALA**

Scope and Objective of the course

The primary objective of the course is to explain the potentiality and applicability of Artificial Intelligence and relevant methodologies to various facets of Civil engineering. The recent developments in the field of neural networks (ANNs), fuzzy logic in decision making, expert systems, genetic algorithms (GAs), clustering, optimization, support vector machine (SVM) and linear programming etc. can be explained with case study examples which may increase the practical perspective.

Text Books

T1. S.N. Sivanandam, S.N. Deepa (2007), Principles of Soft Computing, Wiley India Pvt. Ltd, 3rd Edition, New Delhi

Reference Books and other sources of reference

- R1: Taha, H.A (2007), Operations Research, An introduction, Prentice-Hall of India Private Limited, New Delhi.
R2: Deb, K. (2003), Multiobjective optimization using Evolutionary Algorithms, John Wiley and Sons limited.
R3: Relevant ASCE Journal papers
R4. Patterson, D.W (1990), Introduction to Artificial Intelligence & Expert Systems, PHI.

Course Plan

Lect.	Learning Objective	Topics to be covered	Chapter in the
-------	--------------------	----------------------	----------------

No.			Text Book
1-3	Role of Artificial Intelligence in Civil Engineering; Brief overview of optimization techniques	Definitions of Artificial Intelligence, various perspectives, overview of civil engineering applications; An overview of traditional and nontraditional optimization techniques	CH-1(T1) CH-1 (R4) Class notes
4-7	Linear Programming	Basics of Linear Programming, Numerical examples; Various applications in Civil Engineering	CH-2(R1), R3 Class notes
8-18	Neural Networks and its application in functional mapping; flood forecasting	Introduction; Basics of Neural Networks; Learning Algorithms; Feed forward with back propagation, Radial basis functions; Self organizing feature maps; Numerical examples; Various applications of Neural Networks in Civil Engineering including flood forecasting;	CH-2,3 (T1) R3, Class notes
19-25	Fuzzy logic and its application in decision making	Introduction; Classical and Fuzzy Sets; Properties of membership functions; Fuzzification and defuzzification; Development of membership functions; Fuzzy Linear Programming; Numerical examples; Various applications of Fuzzy logic in Civil Engineering	CH- 7,8, 9,10,11,13(T1) R3, Class notes
26-31	Genetic Algorithms and its applications in problem solving and optimization	Introduction, Necessity of non-traditional optimization, Binary coding GA, real coding GA, Multiobjective GA; Various applications of Genetic Algorithms in Civil Engineering	CH-15 (T1) R2,R3, Class notes
32-34	Multi-Criterion Decision Making and Clustering	Multiobjective Optimization, Cluster Analysis, Various Applications in Civil Engineering	Class notes, R2, R3
35-37	Expert Systems	Basics of expert systems, demonstrative examples	CH-15 (R4) R3 Class Notes
38-42	Introduction to machine learning: Support Vector Machine; Remote Sensing	Support Vector Machine and Applications in Civil Engineering; Applications and case studies of Remote Sensing and Geographical Information Systems.	R3 Class Notes

Evaluation Scheme:

Component	Duration	Weightage	Date & Time	Venue	Nature of Component
Mid-term Test	90 Min	25	21/10/2021 3.30 -		OB

			5.00PM		
Term Paper		15			OB
Assignments		20			OB
Comprehensive	2 Hrs.	40	21/12 FN		OB

Chamber Consultation Hour: To be announced in the class.

Notices: Notices if any, concerning the course will be displayed on the CMS and Civil Engineering Group Notice Board only.

Make up policy: Makeup will be given only to the genuine cases with prior permission.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge
CE F417