**EE698L: ARTIFICIAL INTELLIGENCE, MACHINE LEARNING & ITS APPLICATIONS**

**Course Instructor: Nishchal K. Verma**

1. **Objectives:** The course is designed to provide the link between artificial intelligence and real time processes in various practical applications. It provides the basic concepts of machine learning with examples for linkage with automation based industrial procedures. The level of the course is chosen to be such that all students aspiring to be a part of artificial intelligence directly or indirectly in near future should get these concepts.
2. **Course Contents:**

Artificial Intelligence (AI): Introduction, History, and Evolution

Agents of Artificial Intelligence

Introduction to Fuzzy System (FS), Artificial Neural Network (ANN), Evolutionary Computing (EC), Genetic Algorithm (GA), Simulated Annealing (SA), Particle Swarm Algorithm (PSO), etc.

Machine Learning: Unsupervised Learning, Supervised Learning, Semi supervised Learning, Reinforcement Learning

Clustering and Biclustering: K-means, Fuzzy c-means (FCM), Self-organizing maps (SOM), and other Clustering Algorithms

Classification: Support Vector Machines (SVM), K Nearest Neighbour (KNN), ANN, Fuzzy Rule Based, and other Classifiers

Curve fitting, Regression models, Prediction/Forecasting: ANN and Fuzzy Rule Based Regression Models

Performance Measures for Clustering, Biclustering, Classification, and Regression Algorithms

Deep Learning and Transfer Learning: Deep Neural Networks (DNN), Fuzzy Neural Networks (FNN), etc.

Case studies in the areas of signal processing, computer vision, intelligent control, transportation, prognosis and health management, bioinformatics, etc.

1. **Lecture, Tutorial & Lab Schedule & Venue:**

*Course Instructor:* Nishchal K Verma, PhD (nishchal@iitk.ac.in)

*Course TA(s):* Mayank Pandey (pandeym@iitk.ac.in), Mohammed Aquib (aquib@iitk.ac.in)

*Lecture Schedule:* Wednesday, Thursday and Friday (11:00 AM to 12:00 Noon)

1. **Mode of Contact:** All Notices for the course will be sent by email to the course email list.
2. **Evaluation Components & Policies:** The grading policy and marks distribution for the course is as follows:

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| Journal/Research Paper Analysis/Course Project | 45% |
| Class Performance (Attendance, Surprise Quizzes/Assignments etc.) | 10 % |
| Mid Semester | 15 % |
| End Semester | 30 % |
| **Total** | **100 %** |

**Exams and Quizzes:** Examination will be held during the prescribed examination period. There may be random quizzes during the regular class hour.

**Assignments:** At the end of every topic, assignments will be given. The students are strongly recommended to solve and send the assignments by due date.

1. **Books & References:** This being a PG course there is no prescribed text. However, the following book is recommended:
* Stuart Russell and Peter Norvig. "Artificial intelligence: a modern approach." (2002).