CMP3205 Intelligent Systems

Period per Week			Contact Hour per Semester	Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment Mark	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
45	30	00	60	100	60	40	4

Rationale

Theory and implementation of a variety of techniques used to simulate intelligent behavior. Expert systems, fuzzy logic, neural networks, evolutionary computation, and two-player game-tree search will be covered in depth. Knowledge representation, pattern recognition, hybrid approaches, and handling uncertainty will also be discussed

Objective

By covering the course in Intelligent Systems, the student will be able to:

- Appreciate the concepts of Artificial Intelligence and the diversity of approaches and definitions with which it is associated.
- Develop an understanding of heuristic methods.
- Learn the underlying theory and practice of evolutionary computation, including genetic algorithms and genetic programming.

- Appreciate knowledge engineering, develop expert systems, and understand fuzzy expert systems.
- Develop an understanding of and implement artificial neural networks.
- Implement a two-player strategy game with optimized adversarial search.
- Implement, observe and evaluate alternative approaches to intelligent systems

Subject Content

1. Optimization Methods

- Gradient methods
- Linear Programming
- Constrained Problems and Lagrange Multiplier Method
- Search Method
- Ordinal Optimization
- Genetic Algorithms
- Applications

2. Fundamentals of Neural Networks

- Basic concepts
- Back-propagation algorithm
- Applications

3. Advanced Neural Networks

- Competitive learning
- Data clustering networks
- Application in hierarchical modeling for complex systems

4. Knowledge Representation Methods

- Linguistic knowledge representation
- Mathematical foundation: Random Sets
- Applications

5. Information Fusion Techniques

- Fusion of linguistic and stochastic information
- Application in intelligent segmentation
- Application in sensor fusion

Recommended and Reference Books

[1] Michael Negnevitsky, 2005. Artificial Intelligence: A Guide to Intelligent Systems. Addison-Wesley- ISBN 0321204662

[2] George F. Luger, Peder Johnson, Jean E. Newman, Carl Stern, Ronald Yeo - C*ognitive Science: The Science of Intelligent Systems.* Academic Press (1994) - ISBN 0124595707

[3] Jatinder N. D. Gupta, Guisseppi A. Forgionne, Manuel Mora. *Intelligent*

Decision-making Support Systems: Foundations, Applications and Challenges. Springer (2006)-ISBN 1846282284