**CMP3205 Intelligent Systems**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 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

***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*