Subject Description Form

Subject Code	DSAI5205
Subject Title	Introduction to Artificial Intelligence
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objectives of this subject are to introduce: 1. the core ideas, foundational concepts, and essential methods of artificial intelligence; and 2. the practical applications of fundamental artificial intelligence methods and techniques.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. master the important searching strategies for problem solving; b. know how to represent knowledge and its application in inferences and reasoning; c. critically review and consolidate existing knowledge to design and develop knowledge based expert systems; d. understand the major concepts of machine learning models, deep learning architectures and algorithms; e. design basic machine learning techniques to solve different data analytic problems in various applications; f. able to incorporate advanced deep learning techniques in solving different complex tasks.
Subject Synopsis/ Indicative Syllabus	• **Search Strategies** Concepts relating to problem space, space graphs, instances, initial and goal states, breath-first, depth-first, bidirectional, uniform cost, heuristic, greedy best first, hill-climbing, local beam search, A* search. • **Knowledge Based Expert Systems** Knowledge acquisition, expert system shell, expert system architecture, inference engine, explanation facility. • **Machine Learning Basics:** Learning tasks: Regression, classification, etc. Supervised, unsupervised, semi-supervised and reinforcement learning. • **Deep Learning Architectures and Applications:** Neurons and artificial neural networks, multi-layer perceptron, CNNs and RNN concepts, graph neural networks, transformers, etc. • **Selected Advanced Topics:** Federated Learning, AI for Science, Large Language Models, etc.

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<tr><td>Teaching/Learning Methodology</td><td>This course explores the core artificial intelligence principles. It provides a comprehensive introduction to the problems and techniques of artificial intelligence. Theory and practice are both emphasized. To enhance the understanding of how conceptions and ideas in artificial intelligence are actually implemented, python will be used for programming exercises and projects. Lectures will be supplemented with video sessions to enhance student's learning. A fair portion of guided reading will also be provided.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td></tr>
<tr><td>1. Assignments, Tests</td><td>70</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Final Project/Assessment</td><td>30</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
39 hours of class activities including - lecture, tutorials and class/group discussions, seminar, laboratory works and student presentations. Additional reading of research papers will be assigned, whenever appropriate.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Class activities (lecture, tutorial, presentations)</td><td>39 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Assignments, Quizzes, Projects, Exams</td><td>66 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>105 Hrs.</td></tr>
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</td></tr>
<tr><td>Reading List and References</td><td>
Recommended Textbooks:
(1). Bratko, I., 2011, PROLOG, Programming for Artificial Intelligence, 4th edition, Pearson.
(2). Alpaydin, E., Intoduction to Machine Learning, 2nd Edition, MIT Press, 2010.
(3). Russell, S. and Norvig, P., 2020, Artificial Intelligence - A Modern Approach, 4th edition, Pearson.
Papers and articles selected from:

Artificial Intelligence AI Expert
AI Magazine Applied Intelligence
International Conference on Neural Information Processing
International Conference on Learning Representations
International Conference on Machine Learning

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