Course Code Course Title
COMP 2211 **Exploring Artificial Intelligence**

Course Description

This course aims to give a gentle introduction to the basic elements of artificial intelligence (AI) through understanding examples from various applications and hands-on experimentation using AI software tools. In addition to covering the technical aspect of AI through such topics as search and problem solving, knowledge representation, probabilistic reasoning, machine learning, computer vision and image processing, speech and language processing, and robotics, this course will also study the historical perspective, social and ethical implications, as well as potential and limitations of AI.

List of Topics

1. Brief history of AI
2. Search and problem solving
3. Knowledge representation
4. Probabilistic reasoning
5. Machine learning
6. Computer vision and image processing
7. Speech and language processing
8. Robotics
9. Social and ethical implications of AI
10. Potential and limitations

Keyword Syllabus

1. A brief history of AI
2. Advanced Python for AI
3. Naïve Bayes classifier
4. K-nearest neighbors classifier
5. K-means clustering
6. Perceptron and multi-layer perceptron
7. Fundamentals of image processing
8. Convolutional neural networks
9. Minimax and alpha-beta pruning
10. Artificial intelligence ethics

Reference books

Hadelin de Ponteves. **AI Crash Course**: A fun and hands-on introduction to machine learning, reinforcement learning, deep learning, and artificial intelligence with Python. Packt Publishing. 2019.

Denis Rothman, Matthew Lamons, Rahul Kumar, Abhishek Nagaraja, Amir Ziai, and Ankit Dixit. **Python: Beginner's Guide to Artificial Intelligence**: Build applications to intelligently interact with the world around you using Python. Packt Publishing. 2018.

Prateek Joshi, **Artificial Intelligence with Python**: Build real-world artificial intelligence applications with Python to intelligently interact with the world around you. Packt Publishing. 2017.

Sandipan Dey, **Python Image Processing Cookbook**. Packt Publishing. 2020.

Grading Scheme

Laboratory exercises	10%
Programming assignments	30%
Midterm examination	20%
Final examination	40%
Total	100%

Course Intended Learning Outcomes

1. Demonstrate general understanding of the historical perspective and development of artificial intelligence (AI)
2. Demonstrate fundamental understanding of the basic elements of AI thinking
3. Demonstrate proficiency in applying basic principles and techniques of AI and using AI software tools to solve problems in a range of applications
4. Demonstrate awareness of the social and ethical implications as well as potential and limitations of AI

Assessment rubrics

Course Learning Outcome	**Exemplary**	**Competent**	**Needs Work**	**Unsatisfactory**
1. Demonstrate understanding of the historical perspective and development of artificial intelligence (AI)	Demonstrate thorough understanding of the historical perspective and development of artificial intelligence (AI).	Demonstrate sufficient understanding of the historical perspective and development of artificial intelligence (AI).	Demonstrate insufficient understanding of the historical perspective and development of artificial intelligence (AI).	Is unable to understand the historical perspective and development of artificial intelligence (AI).
2. Demonstrate understanding of the basic elements of AI thinking.	Demonstrate thorough understanding of the basic elements of AI thinking.	Demonstrate sufficient understanding of the basic elements of AI thinking.	Demonstrate insufficient understanding of the basic elements of AI thinking.	Is unable to understand the basic elements of AI thinking.
3. Demonstrate proficiency in applying basic principles and techniques of AI and using AI software tools to solve problems in a range of applications.	Demonstrate thorough understanding of the basic principles and techniques of AI. Is able to use AI software to solve problems in a wide range of applications.	Demonstrate sufficient understanding of the basic principles and techniques of AI. Is able use AI software to solve problems in standard applications.	Demonstrate marginal understanding of the basic principles and techniques of AI. Is able to use AI software to solve simple applications.	Demonstrate little understanding of the basic principles and techniques of AI. Have great difficulty in using AI software even in simple applications.
4. Demonstrate awareness of the social and ethical implications as well as potential and limitations of AI.	Demonstrates a comprehensive awareness of the social and ethical implications as well as potential and limitations of AI.	Demonstrates a thorough awareness of the social and ethical implications as well as potential and limitations of AI.	Demonstrates a basic awareness of the social and ethical implications as well as potential and limitations of AI.	Demonstrates a lack of awareness of the social and ethical implications as well as potential and limitations of AI.