Introduction to Artificial Intelligence

1. **Course Code**:   COM07043

   Curricular hours: 48   Credits: 3

2. **For Major**:   Computer Science and Technology

3. **Pre-course**:   Discrete Mathematics, Data Structure

4. **Course Objective and Task**:

   This course is a selected course for students of computer major, with the contents of core concepts, methods and technology in Artificial Intelligence.

   Purpose: Students can have a general view of Artificial Intelligence and make a good preparation for future study and work in this area.

   Task:

   1) Study the basic idea of symbolic artificial intelligence，especially the problem-solving methods, searching techniques, knowledge representation methods, and classical logic reasoning methods.

   2) Study the basic ideas in connectionism，especially the topological structures and learning algorithms of artificial neural network.

   3) Study the concepts and main methods in machine learning, especially the main supervised learning methods and unsupervised learning methods.

   4) Study basic ideas and main methods in nouvelle AI, evolutionary computation and swarm intelligence, including agents, reinforcement

learning, evolutionary algorithms, and swarm optimization algorithms.

5) Develop the students' abilities of solving problems and introducing innovations by using ideas, methods and techniques in artificial intelligence.

5. Teachings and Arrangements:

(1) Introduction   4 hours

    1.1 Basic concepts of artificial intelligence

    1.2 AI research objectives, research and application fields

    1.3 Solutions of Artificial Intelligence

(2) Search and problem solving   5 hours

    2.1 Problem representation

    2.2 Graph search techniques

    2.3 Game search techniques

(3) Knowledge and Reasoning   4 hours

    3.1 Basic concepts of knowledge

    3.2 Symbolic knowledge representation

    3.3 Basic concepts of reasoning

    3.4 Classical logic reasoning

(4) Artificial Neural Networks   8 hours

    4.1 Basic concepts of artificial neural networks

    4.2 Network topological structures

    4.3 Network learning approaches

4.4 Artificial neural network models

(5) Machine Learning   8 hours

　　5.1 Basic concepts of machine learning

　　5.2 Classification of machine learning methods

　　5.3 Supervision learning

　　5.4 Unsupervised learning

(6) Nouvelle AI   4 hours

　　6.1 Intelligence without representation and reasoning

　　6.2 Intelligent agents

　　6.3 Reinforcement learning

(7) Evolutionary Computation   6 hours

　　7.1 The concepts of evolutionary computation

　　7.2 Genetic algorithm

　　7.3 Evolutionary programming

　　7.4 Evolutionary strategy

(8) Swarm Intelligence   6 hours

　　8.1 The concepts of swarm intelligence

　　8.2 Ant colony optimization algorithm

　　8.3 Particle swarm optimization algorithm

　(9) Course Summary   3 hours

6. Assessment and Grading:

Final Exams   50%

Project Exercises   45%

Participation in the class   5%

The full score is 100.

7. Textbook and Reference Book:

Selected Textbook：

［1］ Stuart J. Russell, Peter Norvig. **Artificial Intelligence: A Modern Approach (third edition)** [M], Beijing: Tsinghua Univ. Press, 2011.

Syllabus Designer: Xiabi Liu

Professor in Charge (Signature):

Dean (Signature):