同济大学 TONGJI UNIVERSITY
CEIE Academic Mobility Program

2080016 Artificial Intelligence

Course Code	2080016		**Course Name**	Artificial Intelligence	
Instructor	Professor Cairong Zhao		**Other Teachers**	TBA	
Course delivery	Lectures	Seminars	Guest Speakers	Group Activities	Field Trip(s)
	√	√		√	√
	Tutorials	Projects	Pitch(es)	Presentations	Outreach Workshop
	√	√		√	Optional
Total Hours	54 in-class contact hours + Self Study Hours This course is worth 6 ECTS points.				

Course Description

In this course, students will be gaining new insights into Artificial intelligence, which machines and their computer systems exhibit intelligence. Students will be introduced to the concepts applied in Artificial intelligence such as intelligent agents, logic agents, first-order logic, knowledge representation, machine learning, game playing, robotics as well as planning and search techniques. Its application is wide and broad, reaching in to advance a vast number of industries including education, healthcare, finance, transportation and manufacturing. A company tour will be arranged to enhance students' understanding of the applications of Artificial intelligence.

Upon completion of the course, students should be able to make practical application of strategies needed to build intelligent systems. Students will also be constructing software modules which are able to adapt to unpredictable and changing environments. This enables them to navigate through many likely scenarios which include navigation, coordination and complex systems.

Brief Schedule and Topics

1. Introduction to Artificial intelligence
2. Intelligent systems
3. Solving problems
4. Search
5. Logical agents
6. Application of AI
7. Learning from examples
8. Well-known Entrepreneurs Lecture
9. Games
10. Robotics

Learning Objective

By the end of this course you should be able to:

- Describe the roles of various search techniques in AI and apply the appropriate tools for implementing these techniques;
- Construct a basic conversational agent through using the necessary tools and AI techniques;
- Identify the evolutionary algorithms in AI and examine each of their respective roles;
- Understand how uncertainty is a necessary component of AI and form the ability to create sound reasoning of various uncertain knowledge;
- Gain competence in the Prolog programming language through practical application and testing to understand the processes involved in creating a functional AI system.
- Understand and explain research questions and provide possible solutions.
- Effectively employ oral communication as a tool for evaluation of research groups or peers in a professional setting.
- Locate, identify, select and synthesise key information regarding artificial intelligence
- Form expert knowledge in a chosen area of research, appreciate the basis of your chosen area of research and keep informed of trends relating to that area.
- Explain the relevance of artificial intelligence and its role in providing solutions to contemporary issues.
- Discuss research questions and the development of artificial intelligence.

Requirements

Advanced mathematics and knowledge of basic programming concepts are prerequisites to this course. The course is open for postgraduate engineering students or undergraduate engineering students at their final or pre-ultimate year.

The course is open for students who would like to get an insight into Artificial intelligence and its applications. Students will be introduced to more advanced technologies in the field of artificial intelligence.

At the end of this course, students will be given a programming project they must complete to successfully complete this course.

Reference Books

Russell, S. and Norvig, P. (2011). *Artificial intelligence: A Modern Approach*.

Course materials (including lecture notes, supplementary readings and solutions to assignment questions) are handed out during the class.

Assessments

Assessments in this course include:

Assignments (25%) + (35%):

Assignment 1: Experiment on Eight Digital Problem (25%)
Assignment 2: Min-Max algorithm Experiment (35%)
Individual research reports are to be developed, more details are to be announced in class. Students will be completing their own individual research and presenting it in a research report format. The word limit is 1500 words. Requirements are as follow:

- 5 pages maximum in A4,
- 12 point Times New Roman font
- Single line spacing
- Late submission will attract a penalty of 10% of the total weighting of the assessment task. A 10% deduction applies for EACH late day and the assessment will not be accepted after 5 working days. Extensions will only be granted upon the basis that there is reasonable medical evidence of illness or any other extreme circumstances that the university may place under consideration. Under no circumstances will extensions be granted for work or any other commitments. A request for an extension must formally be submitted to the lecturer in writing prior to the due date, in accordance with the university's assessment policies. Medical certificates or other evidence of extreme misfortune must be submitted through a special consideration form and must contain information that justifies the extension sought.

Final project submission and Group presentation (40%):

A programming project must be completed and presented to the class to successfully complete this course.

Detailed Daily Schedule (TBC)

Topic (tentative)	Activities
Introduction to Artificial intelligence • Origins & History • Brain vs Computer systems	Introduction; Lecture/seminar; Case Study Development and Communication
Intelligent systems • "Agents" • Perceptions • Representation	Lecture/seminar; Case Studies ; In-Class Activities

• Thinking and rational behaviour	
Solving problems • Finding solutions • Applying strategies • Constraint satisfaction problems • Uninformed search	Lecture/seminar; Case Studies ; In-Class Activities
Search • For single agents • FInding the “optimal” sequence of states between the current state and goal state • Adversarial Search	Lecture/seminar; Case Studies ; In-Class Activities ; **Assignment: Experiment on Eight Digital Problem (25%)**
Logical agents • Knowledge-based agents • First order logic • Simple logic	Lecture/seminar; Case Studies ; In-Class Activities;
Application of AI • Education • Healthcare • finance • Logistics • Gaming	Lecture/seminar; Case Studies ; In Class Activities ; **Assignment: Min-Max algorithm Experiment (35%)**
Learning from examples • Case studies • Practical reviews and analysis • Using learning decision trees	Lecture/seminar; Case Studies ; In-Class Activities
Well-known Entrepreneurs Lecture	
Uncertainty • Reasoning with uncertain information • Probability and uncertainty • Inferences	Lecture/seminar; Case Studies ; In-Class Activities
Games • Game theory • Symbolic reasoning • Games with hidden information • Algorithms for playing and solving games	Lecture/seminar; Case Studies ; In-Class Activities
Robotics • Robotic software design • Perceptions	Lecture/seminar; Case Studies ; In-Class Activities
Machine Learning	Lecture/seminar; Case Studies ; In-Class Activities; **Project submission and Group Presentation (40%)**

Content is subject to change.

Academic Integrity and Policies

Tongji University Academic Policy for international students makes reference to the Academic Policy for Undergraduates (Issuing on 20th, June 2005) and Academic Policy for Postgraduates.

Academic Integrity

Students are expected to uphold the university's academic honesty principles, which are an integral part of the university's core values and principles. If a student fails to observe the acceptable standards of academic honesty, they could attract penalties and even disqualification from the course in more serious circumstances. Students are responsible for knowing and observing accepted principles of research, writing and any other task which they are required to complete.

Academic dishonesty or cheating includes acts of plagiarism, misrepresentation, fabrication, failure to reference materials used properly and forgery. These may include, but are not limited to: claiming the work of others as your own, deliberately applying false and inaccurate information, copying the work of others in part or whole, allowing others in the course to copy your work in part or whole, failing to appropriately acknowledge the work of other scholars/authors through acceptable referencing standards, purchasing papers or writing papers for other students and submitting the same paper twice for the same subject.

This Academic Integrity policy applies to all students of the Tongji University in all programmes of study, including non-graduating students. It is to reinforce the University's commitment to maintaining integrity and honesty in all academic activities of the University community.

Policy

- The foundation of good academic work is honesty. Maintaining academic integrity upholds the standards of the University.
- The responsibility for maintaining integrity in all the activities of the academic community lies with the students as well as the faculty and the University. Everyone in this community must work together to ensure that the values of truth, trust and justice are upheld.
- Academic dishonesty affects the University's reputation and devalues the degrees offered.
- The University will impose serious penalties on students who are found to have violated this Policy. The following penalties may be imposed:

- Expulsion;
- Suspension;
- Zero marks/ fail grade;
- Marking down;
- Re-doing/re-submitting of assignments or reports; and
- Verbal or written warning.