

课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 Course Title	人工智能边界 Foundation of AI-NOT
2.	授课院系 Originating Department	系统设计与智能制造学院 School of System Design and Intelligent Manufacturing
3.	课程编号 Course Code	SDM476
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业选修课 Major Elective Courses
6.	授课学期 Semester	秋季 Fall
7.	授课语言 Teaching Language	中英双语 English & Chinese
8.	授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	马兆远, 教授 系统设计与智能制造学院 MA Zhaoyuan, Professor, School of System Design and Intelligent Manufacturing mazy@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	待公布 To be announced
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	待公布 To be announced

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
	48	0	0	0	48
学时数 Credit Hours					
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无 NIL				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	无 NIL				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无 NIL				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

This course is to broaden the view students with the development in physics, math and engineering. Through this one term course, we expect students to understand the structure of modern sciences, the concept of computing theory and quantum computing. It is a course of modern sciences from the view of artificial intelligent. The main target group of this course is Year 3 students.

本课程通过向学生介绍现代科学框架和认知工具，以研究人工智能边界为导向性问题，通过一个学期的课程教授学生关于现代科学基础，尤其是数学、物理和工程的逻辑工具型知识。本课程以高年级学生为主要对象。

16. 预达学习成果 Learning Outcomes

After passing this course, the student should be able to:

- 1) Understand the basic concept of Logic.
- 2) Understand the basic knowledge of computing theory.
- 3) Understand the basic knowledge of Big Data, quantum computing and industry 4.0.
- 4) Begin to think of the limitation and boundary of Artificial Intelligent and be able to design NP-Hard Games

课程结束后，学生将掌握以下知识：

- 1) 理解数理结构和科学知识体系的逻辑架构；
- 2) 理解计算机基本原理；
- 3) 了解与人工智能相关的大数据、量子计算和智能制造新技术基本原理。
- 4) 了解 AI 极限并能够设计 NP 复杂类游戏。

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

Week	Lecture Title	h		h
1	Introduction 导论	2	Logic I: Classical Logic 人工智能的数理逻辑基础 1	2
2	Logic II: Classical Logic 人工智能的数理逻辑基础 2	2		

3	Logic and Set Theory I 数学的集合论 1	2	Logic and Set Theory II 数学的集合论 2	2
4	Logic and maths 数学的逻辑悖论	2		
5	Physics foundation of computing 计算设备的物理基础	2	Beyond physics III: Computing and chaos 计算数学与混沌	2
6	Beyond physics IV: 熵和信息论	2		
7	Crisis of Maths 数学的第三次危机	2	Gödel theorem, 哥德尔不完备	2
8	Midterm review 期中复习	2		
9	Turing machine 图灵机	2	Life game 生命游戏	2
10	Complexity I: 3-SAT problems 计算复杂性	2		
11	Game theory I 游戏复杂性 1	2	Game theory II 游戏复杂性 2	2
12	Philosophical meaning of Ai-Not 不可计算问题	2		
13	Fundamental AI I: Deep learning 人工智能基础 1 深度学习	2	Fundamental AI II: reinforce learning 人工智能基础 2 强化学习	2
14	Fundamental AI III: big data 人工智能基础 3 大数据	2		
15	AI with Industry 4.0 and metaverse 人工智能应用 1: 元宇宙与智能制造	2	AI with Quantum computing 人工智能应用 2: 量子计算	
16	Final Review 期末复习	2		

18. 教材及其它参考资料 Textbook and Supplementary Readings

1. Being Logical, D. McInerney
2. The book of why, Judea Pearl
3. AI-NOT, Zhaoyuan Ma

课程评估 ASSESSMENT

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance	1-16 周 Week 1-16	10	NIL	
课堂表现 Class Performance	1-16 周 Week 1-16	30	NIL	
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments	1-16 周 Week 1-16	40 (8 次每次 5 分)	NIL	
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation		30		
其它 (可根据需要 改写以上评估方 式) Others (The above may be modified as necessary)				

20. 记分方式 GRADING SYSTEM

- A. 十三级等级制 Letter Grading
 B. 二级记分制 (通过/不通过) Pass/Fail Grading



课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过
 This Course has been approved by the following person or committee of authority