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	认知科学导论 Introduction to Cognitive Science
2.	授课院系 Originating Department	计算机科学与工程系 Department of Computer Science and Engineering
3.	课程编号 Course Code	CS106
4.	课程学分 Credit Value	2
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）	宋轩，副教授，计算机科学与工程系，songx@sustech.edu.cn Xuan Song, Associate Professor, Department of Computer Science and Engineering, songx@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）	

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
	学时数 Credit Hours	32				32

12.	先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	NA		
13.	后续课程、其它学习规划 Courses for which this course is a pre-requisite	CS303	人工智能	Artificial Intelligence
		CS308	计算机视觉	Computer Vision
		CS324	深度学习	Deep Learning
		CS401	智能机器人	Intelligent Robots
		CS405	机器学习	Machine Learning
14.	其它要求修读本课程的学系 Cross-listing Dept.			

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

认知科学是一门研究信息如何在大脑中形成以及转录的跨领域交叉学科。它研究何为认知，认知有何用途以及它如何工作；研究信息如何表现为感觉、语言、注意、推理和情感。其研究领域包括人工智能，心理学、哲学、神经科学、学习、语言学、人类学、社会学和教育学等。

本课程将介绍认知科学的基本概念、假设、模型、方法、挑战以及各类应用。此外，本课程将从认知科学，神经脑科学以及人工智能的角度探讨认知和智能的本质：大脑如何认知和产生智能，并如何将它们在机器中复现。在此基础上，本课程将介绍人工智能和机器感知的产生和基本原理。

Cognitive science is the interdisciplinary, scientific study of the mind and its processes. It examines the nature, the tasks, and the functions of cognition (in a broad sense). Cognitive scientists study intelligence and behavior, with a focus on how nervous systems represent, process, and transform information. Mental faculties of concern to cognitive scientists include language, perception, memory, attention, reasoning, and emotion; to understand these faculties, cognitive scientists borrow from fields such as artificial intelligence，linguistics, psychology, philosophy, neuroscience, and anthropology.

The objectives of the course are to introduce the basic concepts hypotheses, models, methods, issues, and applications in cognitive science. The course will cover the main information-processing paradigms in cognitive science as well as the main critiques of the paradigms. In addition, this course will explore the nature of intelligence from cognitive science and artificial intelligence view: how it is produced by the brain and how it could be replicated in machines—using an approach that integrates cognitive science, which studies the mind; neuroscience, which studies the brain; and computer science and artificial intelligence, which study the computations needed to develop intelligent machines. Lastly, we will introduce the basic concepts of artificial intelligence and machine perception.

16. 预达学习成果 Learning Outcomes

通过本课程的学习，学生掌握认知科学和人工智能的基本概念，原理，方法和模型，并在此基础上可以修习计算机科学与技术专业和智能科学与技术专业的其它高级类课程。此外，在此课程上学习的认知科学和人工智能的相关知识可以帮助学生理解与认知机理和机器智能相关的更多高级应用：如计算机视觉，机器学习，深度学习，人机交互，信息系统，智能机器人等。

By the end of the course, the students should know enough knowledges on cognitive science and artificial intelligence that the student can take advanced courses in computer science as well as the artificial intelligence specialization. Further, the knowledge and understanding acquired through this course should inform student's subsequent work on any application related to cognitive science and artificial intelligence, including computer vision, Machine Learning, Deep Learning, human–computer interaction, information system design, intelligent robots, etc.

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.)

第一周：认知科学简介以及基本概念

第二周：脑与认知科学

第三周：认知科学的计算模型

第四周：学习过程和记忆

第五周：前沿文献阅读、讨论和报告

第六周：视觉和颜色感知

第七周：推理和决策

第八周：期中考试（项目中期报告）

第九周：人脑 vs 计算机

第十周：机器学习和神经网络

第十一周：机器感知

第十二周：前沿文献阅读、讨论和报告

第十三周：智能系统设计和前沿应用 1

第十四周：智能系统设计和前沿应用 2

第十五周：项目最终报告和答辩

第十六周：期末总结、复习和期末考试（开卷）

Week 1: Introduction and Basic Concepts of Cognitive Science

Week 2: The Brain and Cognitive Science

Week 3: The Computational Model of Cognitive Science

Week 4: Learning Process and Memory

Week 5: Paper Reading, Discussion and Presentation

Week 6: Visual and Color Perception
Week 7: Reasoning and Decision Making
Week 8: Mid-term test (Mid-term Project Presentation)
Week 9: Human Brain vs. Computer
Week 10: Machine Learning and Neural Networks
Week 11: Machine Perception
Week 12: Paper Reading, Discussion and Presentation
Week 13: Intelligent System Development and Application 1
Week 14: Intelligent System Development and Application 2
Week 15: Final Project Presentation
Week 16: Summary & Review & Final Test (open-book exam)

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

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				
课堂表现 Class Performance		10%		随机随堂测验 Radom in-class quizzes
小测验 Quiz				
课程项目 Projects		25%		两次前沿文献讨论和报告 Paper Reading, Discussion and Presentation (two times)
平时作业 Assignments				
期中考试 Mid-Term Test		15%		项目中期报告和答辩 Mid-term Project Presentation
期末考试 Final Exam		20%		开卷考试 Open-book exam
期末报告 Final		30%		项目最终报告和答辩 Final Project Presentation

Presentation 其它（可根据需要改写以上评估方式） **Others (The above may be modified as necessary)**		5	

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**

<div align="center">

课程审批 REVIEW AND APPROVAL

</div>

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