目录

0010094 离散数学

课程编码：0010094

课程名称：离散数学

英文名称：Discrete Mathematics

课程类型：学科基础必修课

学分： 3.5 **总学时：** 56

面向对象：人工智能专业本科生

先修课程：高等数学，线性代数

考核形式：平时成绩+考试

撰写人： 孙艳丰

课程简介：（250-300 字）

离散数学是研究离散结构和离散数量关系的数学分支的统称，是信息学部为人工智能专业本科生开设的学科基础必修课。课程主要内容包括：集合和关系、图论、数理逻辑、代数结构等。课程的主要任务，一方面关注于离散对象的数学结构及其证明、演算与推理理论研究，为基于二进制编码的计算机相关学科提供理论研究基础；另一方面，将基础数学与应用数学的多个不同分支集成，承担起了理论模型向实用模型转化的纽带功能，因而对培养学生分析、建模、解决问题能力的培养具有重要作用。对于人工智能专业的本科生而言，通过该课程的学习，将有助于学生深入洞察应用问题的本质属性，并可进一步选择恰当的离散结构对问题进行模型的表达及求解。

推荐教材或主要参考书：

[1] 邵学才，邓米克，离散数学. 中国铁道出版社，2012 年 8 月

[2] 耿素云，屈婉玲，张立昂. 离散数学（第五版）. 清华大学出版社，2013 年 7 月

[3] 牛连强. 工科离散数学. 电子工业出版社，2017 年 2 月

[4] 肯尼思 H 罗森著，徐六通等译，离散数学及其应用，机械工业出版社，2021 年 1 月

0010094 Discrete Mathematics

Course Number: 0010094

Course Title: Discrete Mathematics

Course Type: Fundamental and compulsory course for subject

Credit: 3.5 **Total Credit Hours:** 56

Students: Undergraduate students majoring in Artificial intelligence

Prerequisites: Advanced Mathematics, Linear Algebra

Evaluation Method: Course participation + written exams

Writer：Sun Yanfeng

Course Description:

Discrete Mathematics is one of the basis courses of compulsory subjects for undergraduate students Major in AI. The main target of this course is to clarify the theories related to the discrete topologies and discrete quantitative relationship. Focus of this course is that on the one hand, the mathematical structure of discrete objects and its proof, calculus and reasoning theory, which is the theoretical research basis of computer related disciplines based on binary coding; on the other hand, integrating with many different branches of basic mathematics and applied mathematics, as a result undertaking the link function of transforming theoretical model into practical model, which plays an important role in cultivating students' ability of analysis, modeling and problem solving. The teaching contents are mainly covered by the following aspects: set and relation, graph theory, mathematical logic, algebraic structure. For the undergraduates majoring in AI, the study of this course will help them to have a deep insight into the essential attributes of application problems, and further select the appropriate discrete structure to model and solve the problems.

Recommended Textbooks/References:

1. Shao Xuecai, Deng Mike, Discrete Mathematics. China Railway Press, August 2012 (in chinese)
2. Geng Suyun, Qu Wanling, Zhang Liang. Discrete Mathematics (Fifth Edition). Tsinghua University Press, July 2013 (in chinese)
3. Niu Lianqiang. Discrete mathematics of engineering. Electronic Industry Press, February 2017 (in chinese)
4. Kenneth h. Rosen, translated by Xu Liutong, et al. Discrete mathematics and its application, China Machine Press, January 2021 (in chinese)

0010721 电子技术

课程编码：0010721

课程名称：电子技术

英文名称： The Electronic Technology

课程类型：学科基础必修课

学分： 3 **总学时：** 48

面向对象：人工智能类本科生

先修课程：高等数学、大学物理、电路分析基础-1

考核形式： 平时成绩+实验成绩+考试

撰写人：奥顿

课程简介：（250-300 字）

本课程是信息学部为人工智能本科生开设的学科基础必修课。本课程的任务是使学生获得电子技术的基本理论、基本知识和基本技能，了解电子技术的应用和发展情况，为学习后续课程以及从事与本专业有关的工程技术工作打下一定基础。教学内容重点：半导体器件、基本放大电路、集成运算放大电路、负反馈放大电路、直流稳压电源、门电路和组合逻辑电路、触发器和时序逻辑电路等。教学内容的难点：基本放大电路、集成运算放大电路、触发器和时序逻辑电路。

本课程理论严谨，系统性、逻辑性强，对培养学生的辨证思维能力，树立理论联系实际的科学观点和提高学生分析问题、解决问题的能力有着重要的作用，是培养复合型人才的重要组成部分。

推荐教材或主要参考书：

[1] 秦曾煌主编，电工学（下册）（第七版），高等教育出版社，2009 年 6 月

[2] 杨福生主编，电子技术（电工学Ⅱ），高等教育出版社，1989 年 5 月

[3] 王鸿明主编，电工技术与电子技术（下册），清华大学出版社，2000 年 9 月

[4] 姚海彬主编，电子技术(电工学Ⅱ)，高等教育出版社，1999 年 9 月

[5] 孙景琪，雷飞，闫慧兰，模拟电子技术基础，高等教育出版社，2016 年 7 月

[6] 阎石主编，数字电子技术基础（第五版），高等教育出版社，2006 年 5 月

0010721 The Electronic Technology

Course Number: 0010721

Course Title: The Electronic Technology

Course Type: Compulsory course for subject foundation

Credit: 3 **Total Credit Hours:**48

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Advanced mathematics,General Physics, Circuit analysis element-I

Evaluation Method: Course participation + Program design reports+written exams

Writer：Ao Dun

Course Description:

This course is one of the compulsory course for undergraduate students Major in artificial intelligence . The main target of this course is to clarify the basic theories, knowledge, and skills of electronic technology, and make students to understand the application and development of electronic technology, and lay a certain foundation for students to learn subsequent courses and engaging in engineering and technical work related to this major. This course is focus on semiconductor devices, basic amplification circuits, integrated operational amplification circuits, negative feedback amplification circuits, DC stabilized power supplies, gate circuits and combinational logic circuits, triggers and sequential logic circuits, etc. The difficulties of teaching contents are described as followings: basic amplification circuits, integrated operational amplification circuits, triggers, and sequential logic circuits.

This course is rigorous in theory, systematic, and logical. It plays an important role in cultivating students' dialectical thinking ability, establishing a scientific perspective of integrating theory with practice, and improving their ability to analyze and solve problems. It is an important component of cultivating versatile talents.

Recommended Textbooks/References:

1.Qin Zenghuang，Electrical Engineering (Volume 2) (Seventh Edition), Higher Education Press, June 2009

2.Yang Fusheng，Electronic Technology (Electrical Engineering II), Higher Education Press, May 1989

3.Qang Hongming，Electrical and Electronic Technology (Volume 2), Tsinghua University Press, September 2000

4.Yao Haibin，Electronic Technology (Electrical Engineering II), Higher Education Press, September 1999

5.Sun Jingqi, Lei Fei, Yan Huilan, Fundamentals of Analog Electronic Technology, Higher Education Press, July 2016Yan Shi，Fundamentals of Digital Electronic Technology (Fifth Edition), Higher Education Press, May 2006

0010722 最优化理论与方法

课程编码：0010722

课程名称：最优化理论与方法

英文名称：Optimization Theory and Methods

课程类型：学科基础必修课

学分：2.0　**总学时：**32

面向对象：人工智能专业本科生(大二上学期)

先修课程：高等数学、线性代数

考核形式：平时成绩+期末成绩

撰写人：王鼎

课程简介：（250-300 字）

最优化理论与方法是面向人工智能专业本科生开设的学科基础必修课，主要讲授最优化的设计基础和实现方法。本课程的任务是介绍基本的最优化理论、计算方法及 MATLAB 实现，包括经典优化理论与方法，例如最优性条件、梯度法、牛顿法、最小二乘法、线性规划与约束优化等，以及一些先进的智能优化方法简介，例如人工神经网络、神经动态规划等。教学内容的重点是最优化基本方法的介绍，难点是优化理论及算法特性分析。本课程将讨论这些算法的基本思想、设计步骤以及 MATLAB 应用实例，为解决人工智能与自动化领域的复杂科学与工程问题提供有效的方法指导，也是进行信息科学研究与技术开发的关键环节。

推荐教材或主要参考书：

[1] Amir Beck. Introduction to Nonlinear Optimization: Theory, Algorithms, and Applications with MATLAB. SIAM, 2014

[2] 李元科. 工程最优化设计(第 2 版). 清华大学出版社, 2019

[3] 孙志强, 白圣建, 郑永斌, 刘伟. 最优化导论(第四版). 电子工业出版社, 2015. 译自 Edwin K. P. Chong, Stanislaw H. Zak. An Introduction to Optimization (Fourth edition)

[4] 许国根, 赵后随, 黄智勇. 最优化方法及其 MATLAB 实现. 北京航空航天大学出版社, 2018

[5] 王鼎. 不确定动态系统智能评判学习与控制. 科学出版社, 2020

0010722 Optimization Theory and Methods

Course Number: 0010722

Course Title: Optimization Theory and Methods

Course Type: Required course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Advanced Mathematics, Linear Algebra

Evaluation Method: Course participation + Final grade

Writer： Wang Ding

Course Description:

The course ‘‘Optimization Theory and Methods’’, which includes the design bases and implementation approaches of optimization, is one of the required courses for undergraduate students major in Artificial Intelligence. The main target of this course is to clarify the basic optimization theory, computational methods, and MATLAB examples, involving the classical optimization theory and schemes, such as optimality conditions, the gradient method, the Newton method, the least square method, linear programming, constrained optimization, etc. and several advanced intelligent optimization strategies, such as artificial neural networks and neural dynamic programming, etc. This course focuses on introducing the basic methods of optimization, while the main difficulties are optimization theory and algorithm property analysis. In addition, the basic idea, design steps, and MATLAB examples are displayed, respectively. By studying this course, it is helpful to provide guides for solving complex science and technology problems in artificial intelligence and automation. In addition, it can be regarded as a core of conducting information science research and technology development.

Recommended Textbooks/References:

1．Amir Beck. Introduction to Nonlinear Optimization: Theory, Algorithms, and Applications with MATLAB. SIAM, 2014

2．Yuanke Li. Optimization Principles and Techniques for Engineering Design (Second edition). Tsinghua University Press, 2019

3．Zhiqiang Sun, Shengjian Bai, Yongbin Zheng, Wei Liu. An Introduction to Optimization (Fourth edition). Publishing House of Electronics Industry, 2015. Translate from: Edwin K. P. Chong, Stanislaw H. Zak. An Introduction to Optimization (Fourth edition)

4．Guogen Xu, Housui Zhao, Zhiyong Huang. Optimization Methods with MATLAB Implementation. Beihang University Press, 2018

5．Ding Wang. Intelligent Critic Learning and Control for Uncertain Dynamic Systems. Science Press, January 2020

0010089 复变函数

课程编码：0010089

课程名称：复变函数

英文名称：Function of the Complex Variable

课程类型：学科基础必修课

学分： 2.0 **总学时：** 36

面向对象：人工智能专业本科生

先修课程：高等数学（工）、线性代数（工）

考核形式：平时成绩+考试

撰写人：任明荣

课程简介：（250-300 字）

复变函数是人工智能与自动化学院为自动化专业本科生开设的学科基础必修课，为人工智能专业本科生开设的公共基础必修课。复变函数的理论和方法在数学、自然科学和工程技术中有着广泛应用，是解决诸如电磁学、流体力学、弹性理论中平面问题的有力工具，其基础内容已成为理工科很多专业的必修课程。本课程的教学过程中采用启发式、理论联系实际等教学方式，使学生掌握复变函数的基本理论，掌握傅里叶变换的主要性质。通过本课程的教学，学生的数学抽象思维，逻辑推理能力和计算能力进一步得到提高。

推荐教材或主要参考书：

[1] 西安交通大学高等数学教研室编. 工程数学-复变函数（第四版）. 高等教育出版社，1996 年 5 月

[2] 钟玉泉编. 复变函数论（第五版）. 高等教育出版社，2021 年 3 月

[3] 孙妍，刘向丽，解文龙，黄静静. 复变函数与积分变换. 机械工业出版社，2016 年 1 月

自主查阅和论坛内容相关的学术文献。

0010089 Function of the Complex Variable

Course Number: 0010089

Course Title: Function of the Complex Variable

Course Type: Discipline-based compulsory course

Credit: 2.0 **Total Credit Hours:** 36

Students: Undergraduate students majoring in Artificial Intelligence.

Prerequisites: Advanced mathematics, Linear algebra

Evaluation Method: Course participation + exam

Course Description:

Function of the Complex Variable is a basic course for undergraduate majoring in Artificial Intelligence in the College of artificial intelligence and automation. The theory and method of complex function is widely used in mathematics, natural science and engineering technology. It is a powerful tool to solve plane problems such as electromagnetics, fluid mechanics and elastic theory. Its basic content has become a compulsory course for many majors of science and engineering. In the teaching process of this course, heuristic, theory with practice and other teaching methods are adopted to enable students to master the basic theory of complex function and the main properties of Fourier transform. Through the teaching of this course, students' mathematical abstract thinking, logical reasoning ability and computing ability are further improved.

Recommended Textbooks/References:

1. Department of advanced mathematics, Xi'an Jiaotong University. Engineering mathematics complex variable function (Fourth Edition). *Higher education press*, May 1996
2. Zhong Yuquan. Theory of complex function (5th Edition). *Higher education press*, March 2021
3. Sun Yan, Liu Xiangli, Xie Wenlong, Huang Jingjing. Complex variable function and integral transformation. *China Machine Press*, January 2016

0010686 微机原理与接口技术

课程编号：0010686

课程名称：微机原理与接口技术

英文名称：Computer Principles and Interface technology

课程类型：学科基础必修课

学分：3.5　**学时：**56

面向对象：人工智能专业本科生

先修课程：电子技术、电路分析基础、高级语言程序设计

考核形式：笔试

撰写人：许红霞

课程简介：（200-300 字）

微机原理和接口技术是计算机技术发展的重要组成部分之一，弄清楚微机原理是如何实现的，掌握优化接口技术的方法，可以更好地理解和应用计算机技术，提升计算机技术水平。本课程是信息类本科生的专业基础课程，通过本课程的学习，使学生掌握微型计算机的硬件组成、工作原理和汇编语言程序设计的相关知识。课程的主要内容包括微型计算机系统的构成和工作原理；微处理器的指令系统、内部结构和工作原理；汇编程序设计；存储器设计；计算机接口的概念与数据交换、智能接口电路的设计与编程。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1]余春暄，左国玉等，80x86/Pentium 微机原理及接口技术(第 3 版)，机械工业出版社，2015。

[2]彭虎，周佩玲等，微机原理及接口技术(第 4 版)，电子工业出版社，2016。

0010686 Computer Principles and Interface technology

Course Number: 0010686

Course Title: Computer Principles and Interface Technology

Course Type: Discipline-based compulsory course

Credit: 3.5 **Total Credit Hours:** 56

Students: Undergraduate students Major in Artificial Intelligence

Prerequisites: Electronic Technique, Fundamentals of Circuit Analysis, High Level Language Programming

Evaluation Method: Written Exam

Course Description:

It is one of the important components of the development of computer technology. Understanding how microcomputer principles are implemented and mastering the methods of optimizing interface technology can better understand and apply computer technology, and improve the level of computer technology. This course is a fundamental course for the undergraduates major in AI. It is an introductory course for the undergraduates to learn and master the knowledge of computer hardware as well as assembler language design. The students will master the related knowledge of computer principles by means of learning the computer internal structure and working principles. The corresponding topics include the basic principles and components of computer, the structure and working principles of the microprocessor, the instruction set, the assembler language design, the memory and its interface circuit design, the concept of computer interface, data transmission, and some simple intelligent interface circuit design and software programming.

Recommended Textbooks/References:

1. YU Chunxuan, ZUO Guoyu etc,80X86/Pentium Microcomputer Principle and Interface Technology (Third Edition). Machinery Industry Press, 2015

2.Peng hu, Zhou Peiling etc, Microcomputer Principle and Interface Technology (Four Edition). Electronic Industry Press, 2016

0010723 数据结构

课程编码：0010723

课程名称：数据结构

英文名称： Data Structure

课程类型：学科基础必修课

学分： 3 **总学时：** 48

面向对象：人工智能专业本科生

先修课程：离散数学

考核形式： 平时成绩+考试

撰写人：牟伦田

课程简介：

本课程是计算机等相关专业的一门重要的专业基础课程。本课程主要介绍和讨论数据的逻辑结构和基于结构的数据各种操作的实现及分析。数据结构的不仅是程序设计的基础，也是设计和实现编译程序、操作系统、数据系统及其它系统程序以及各种大型应用程序的重要基础。本课程以 C 语言作为算法的描述工具，使学生在软件设计的过程中，能够正确分析数据的结构、并合理地选择数据的存储方式，设计科学操作算法，从而提高软件整体质量。本课程的学习将为后续课程的学习以及软件设计水平的提高打下良好的基础。

推荐教材或主要参考书：

[1] 严蔚敏, 李冬梅, 吴伟民. 数据结构(C 语言版). 清华大学出版社. 2018.6

[2] 霍罗威茨(美). 数据结构(C 语言版). 机械工业出版社. 2006.7

0010723 Data Structure

Course Number: 0009352

Course Title: Data Structure

Course Type: Basic compulsory courses

Credit: 3 **Total Credit Hours:** 48

Students: Undergraduate students majoring in Engineering majors

Prerequisites: Discrete mathematics,

Evaluation Method: Course participation + exam

撰写人：Mou Luntian

Course Description:

This course is an essential professional foundation course for computer and other related majors. This course mainly introduces and discusses the logical structure of data and the realization and analysis of various operations on structure-based data. The data structure is the basis of program design and an essential foundation for designing and implementing compilers, operating systems, data systems, other system programs, and various large-scale applications. This course uses C language as the algorithm description tool to correctly analyze the structure of the data, choose the storage method of the data reasonably, and design the scientific operation algorithm during the software design process, thereby improving the overall quality of the data software. The study of this course will lay a good foundation for the study of subsequent courses and the improvement of software design level.

Recommended Textbooks/References:

1．Yan Weimin, Li Dongmei, Wu Weimin. Data structure (C language edition). Tsinghua University Press. 2018.6

2．Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed. Data structure (C language edition). Machinery Industry Press. 2006.7

0010724 数据库原理

课程编码：0010724

课程名称：数据库原理

英文名称：Principles of Database System

课程类型：学科基础必修课

学分： 2 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：高级语言程序设计（Python，或 Java，或 C++）

考核形式：平时成绩+考试

撰写人：马楠

课程简介：（250-300 字）

《数据库原理》是关于数据管理的课程，是信息科学的重要分支。它为信息类专业、工程类专业、管理专业等众多学科提供利用计算技术进行数据管理的基本理论知识。本课程系统讲述数据库系统的基础理论、基本技术和基本方法。《数据库原理》课程将从基础、设计与应用开发、系统和新技术四个方面展开，以前三个方面为主体，并适当涉及新技术的介绍。内容包括：数据库系统的基本概念、数据模型、关系数据库及其标准语言 SQL、数据库安全性和完整性的概念和方法、关系规范化理论、数据库设计方法和步骤、数据库编程、关系查询处理和查询优化、数据库恢复和并发控制、数据库管理系统、数据库新技术等。

推荐教材或主要参考书：

[1] 王珊、萨师煊，数据库系统概论，高等教育出版社，第 5 版，2014；

[2] Abraham Silberschatz，Henry F. Korth，S. Sudarshan, 数据库系统概念（Database System Concepts），机械工业出版社，英文精编版第 6 版，2012；

[3] MySQL 8 参考手册，https://dev.mysql.com/doc/refman/8.0/en/。

0010724 Principles of Database System

Course Number: 0010724

Course Title: Principles of Database System

Course Type: Compulsory Common Basic Courses

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Advanced Language Programming (Python, or Java, or C++)

Evaluation Method: Course participation + written exams

Writer：Ma Nan

Course Description:

Principles of Database System is a course for data management, which is an important branch of information science. It provides basic principles of data management empowered by computing technologies for many disciplines such as information, engineering and management. This course will introduce systematically the basic concepts, methods, and techniques of database system, from the four aspects of basic concepts, design and application development, system, and new techniques. The teaching contents are mainly covered by the following topics: basic concepts of database system, data model, relational database and SQL, database security and integrity, relational normalization theory, database design methods and processes, database programming, relational query processing and query optimization, database recovery and concurrency control, database management system, new database technologies, etc.

Recommended Textbooks/References:

1.Wang Shan, Sa Shixuan, Introduction to Database System, Higher Education Press, Version 5, 2014.

2.Abraham Silberschatz，Henry F. Korth，S. Sudarshan， Database System Concepts），Mechanical Industry Press, Version 6, 2012.

3.MySQL 8 Reference Manual，https://dev.mysql.com/doc/refman/8.0/en/.

0002610 自动控制原理 I

课程编码：0002610

课程名称：自动控制原理 I

英文名称：Automatic Control Theory I

课程类型：学科基础必修课

学分：3.0　**总学时：** 48

面向对象：人工智能专业本科生

先修课程：复变函数，电路分析基础-1，电子技术

考核形式： 平时成绩+考试

撰写人：杨金福

课程简介：（250-300 字）

自动控制原理是人工智能与自动化学院为人工智能专业本科生开设的学科基础选修课。本课程的任务是通过讲述自动控制系统数学描述、时域分析、频率分析及校正方法，向学生传授自动控制原理理论知识和解决问题的办法，使学生掌握人工智能领域控制系统的建模与分析、校正方法。教学内容重点：自动控制、闭环控制的基本概念；典型物理对象系统的传递函数及动态结构图；时域中系统稳定性、稳态误差以及动态性能的分析方法；频域稳定性判据以及基于开环频率特性的系统性能分析；采用超前、滞后校正装置以及参考模型法进行控制系统校正的方法；离散控制系统分析方法。教学内容难点：掌握反馈控制思想方法；一般物理对象系统传递函数的求取；理解高阶线性定常系统的分析方法及思路；时域、频域的对应关系；系统固有特性、校正装置特性。

推荐教材或主要参考书：

[1] 孙亮，《自动控制原理》第三版，高等教育出版社，2011 年 6 月

[2] 胡寿松，《自动控制原理》第七版，科学出版社，2019 年 1 月

[3] Richard C., Robert H. Modern Control Systems 13th, Prentice Hall, 2018 年 7 月

0002610 Automatic Control Theory

Course Number: 0002610

Course Title: Principles of Automatic Control I

Course Type: Discipline-based compulsory course

Credit: 3.0 **Total Credit Hours:** 48

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Complex Functions, Circuit Theory 1, Electronics Technique

Evaluation Method: Course participation + written exams

Writer： Yang Jinfu

Course Description:

Automatic Control Theory is one of the discipline-based compulsory courses for undergraduate students Major in Artificial Intelligence. The main target of this course is to clarify the knowledge of automatic control theory by the discussion of automatic control system mathematical description, time domain analysis, frequency analysis and correction methods, such that the students are able to solve engineering problem and design model. This course is focus on the basic concepts of control theory and closed-loop control; the transfer function and dynamic structure diagram of typical object systems; the analytical methods of stability criterion, the steady-state error and dynamic property in the time domain; the frequency domain stability criterion and open-loop frequency characteristic analysis; the correction of controlled networks by advance and lag network and reference model method; the discrete control system analysis. The difficulties of teaching contents are described as followings: the application of feedback control methods, the performing of transfer functions of general physical systems, the analysis of linear high-order stationary systems, the relationship between time and frequency domains, as well as the characteristics of inherent system and correction device.

Recommended Textbooks/References:

1. Sun Liang, Automatic Control Theory 3th, *Beijing: Higher Education Press*, June-2011
2. Hu Shousong, The Principles of Automatic Control 7th. *Beijing: Science Press*, January-2019
3. Richard C, Robert H. Modern Control Systems 13th, *Prentice Hall*, July-2018

0010725 图像处理

课程编码：0010725

课程名称：图像处理

英文名称：Image Processing

课程类型：学科基础必修课

学分： 3 **总学时：** 48

面向对象：人工智能专业本科生

先修课程：高等数学，线性代数，高级语言程序设计，数据结构

考核形式：平时成绩+考试

撰写人：李敬华

课程简介：（250-300 字）

图像处理是信息学部为人工智能专业本科生开设的学科基础必修课。本课程的任务是使学生掌握图像处理的基本概念、基本知识和基本方法，学会在计算机上编程实现图像处理的基本算法，并具有采用数字图像处理技术分析和解决实际应用问题的创新意识和设计能力。为从事数字图像处理、计算机视觉、人工智能等相关领域的工作和研究奠定基础。教学内容重点：图像处理基础知识（图像数字化、图像基本运算、图像处理系统）、图像变换（傅里叶变换）、图像增强（空域增强、频域增强）、图像分割和特征提取、图像编码。教学内容的难点：图像处理算法的思想、数学建模过程、算法影响因素分析以及在实际中的具体应用。

推荐教材或主要参考书：

[1]. 冈萨雷斯著，阮秋琦等译，数字图像处理（第三版），电子工业出版社，2017 年 5 月

[2]. 章毓晋，图像处理和分析教程（微课版 第 3 版），人民邮电出版社，2020 年 9 月

0010725 Image Processing

Course Number: 0010725

Course Title: Image Processing

Course Type: fundamental and compulsory course for subject

Credit: 3.0 **Total Credit Hours:** 48

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Advanced mathematics, Linear algebra, Advanced Language Programming, data structure

Evaluation Method: Course participation + written exams

Writer：Li Jinghua

Course Description:

Image processing is one of the fundamental and compulsory course for subject for undergraduate students Major in artificial intelligence. The main target of this course is to clarify basic concept, basic principle and basic method of digital image processing, and enables the students to implement the basic algorithms. This course also aims to cultivate the creative and design ability for solving the practical problems, which are the foundations of the future work and research. The teaching contents are mainly covered by the following aspects: the basic of digital image processing (image digitization, image basic computation, image processing system), image transformation (Fourier transformation), image enhancement (spatial and frequency domain), image segmentation and feature extraction, image coding. The difficulties of teaching contents are described as followings: the idea, mathematical modeling process, factors analysis influencing performance and practical application for each method.

Recommended Textbooks/References:

1.Rafael C.Gonzalez et al, Digital image processing (third edition), Electronics industry Press, 2017.05.

2.Zhang yujin, image processing and analysis (micro lecture, third edition), Posts and Telecommunications Press, 2020.09.

0008336 人工智能导论

课程编码：0008336

课程名称：人工智能导论

英文名称：Introduction to Artificial Intelligence

课程类型：学科基础必修课

学分：2.0　　**总学时：**32

面向对象：人工智能专业本科生

先修课程：高等数学、概率论与数理统计、离散数学、高级语言程序设计

考核形式：平时成绩+考试

撰写人：王立春

课程简介：（250-300 字）

人工智能导论是信息学部为人工智能专业本科生开设的公共基础必修课。本课程的任务是使学生初步掌握人工智能的一般性原理和主要技术，包括知识表示、搜索、推理和分布式人工智能，为进一步设计和实现智能应用系统提供必要的知识基础。教学内容重点有：人工智能的定义与主 要技术流派；图灵测试；状态空间表示；问题归约表示；谓词逻辑表示；A*算法；AO*算法；α-β剪枝搜索算法；局部优先搜索算法；归结原理的基本概念和方法；一阶谓词逻辑公式化成子句集；置换与合一；归结原理；Agent 要素和特性；Agent 结构；多 Agent 系统。教学内容难点有：图灵测试；谓词逻辑表示；A*算法；α-β剪枝搜索算法；局部优先搜索算法；置换概念和合一算法；Agent 结构。

推荐教材或主要参考书：

[1] 王万良编著，《人工智能导论》（第 5 版），高等教育出版社，2020.11.

[2] 马少平、朱小燕著，《人工智能》， 清华大学出版社，2004.8.

[3] Stuart Russel，Peter Norvig 著，《人工智能：一种现代的方法》(影印版，第 3 版)， 清华大学出版社，2011.7.

[4] Stephen Lucci，Danny Kopec 著，《人工智能》(第 2 版)， 林赐译，中国工信出版集团，人民邮电出版社，2018.10.

0008336 Introduction to Artificial Intelligence

Course Number: 0008336

Course Title: Introduction to Artificial Intelligence

Course Type: Compulsory Common Basic Course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Advanced Mathematics, Probability Theory and Mathematical Statistics, Discrete Mathematics, Programming with Advanced Language

Evaluation Method: Course participation + written exams

Writer: Wang Lichun

Course Description:

Introduction to Artificial Intelligence Technology is a compulsory common basic course for the undergraduate students majored in artificial intelligence, which is offered by the faculty of information technology. The main target of this course is to clarify general principles and important techniques of artificial intelligence, including knowledge representation, searching, inference and distributed intelligence，which helps to provide basis for designing and implementing intelligent application system. The teaching contents are mainly covered by the following aspects: definition and major technical schools of artificial intelligence, Turing test, state space representation, problem reduction representation, predicate logical representation, A* algorithm, AO* algorithm, α-β pruning searching, local first search algorithm, concept and method of resolution principle, translating first order predicate logical formulas into a set of clauses, substitution and union, elements and characteristics of Agent, structure of Agent, Multiple Agent System. The difficulties of teaching contents are described as followings: Turing test, predicate logical representation, A* algorithm, α-β pruning searching, local first search algorithm, substitution and union, structure of Agent.

Recommended Textbooks/References:

1.Wang Wanliang, Introduction to Artificial Intelligence (Fifth Edition), High Education Press, 2020.11.

2.Ma Shaoping, Zhu Xiaoyan, Artificial Intelligence: Principles & Applications (Fifth Edition), Tsinghua University Press, 2004.8.

3.Stuart Russel，Peter Norvig, Artificial Intelligence: a Modern Approach (Third Edition), translated by Yin Jianping, Zhu En, and Liu Yue etc., Tsinghua University Press, 2013.11.

4.Stephen Lucci，Danny Kopec, Artificial Intelligence (Second Edition), translated by Lin Ci, China Industry and Information Publishing Group, People's Post and Telecommunications Press, 2018.10.

0002368 模式识别II

课程编码：002368

课程名称：模式识别 II

英文名称：Pattern Recognition II

课程类型：学科基础必修课

学分： 3 **总学时：** 48

面向对象：人工智能专业本科生

先修课程：高等数学，线性代数，概率论与数理统计，高级语言程序设计

考核形式：平时成绩+实验+闭卷考试

撰写人：庞俊彪

课程简介：（250-300 字）

模式识别是信息学部为人工智能专业本科生开设的专业必修课程。本课程的任务是以理论为基础，以工程应用为目标，充分培养学生理论与实际相结合的能力、分析问题、解决问题和编程实践的能力。通过本课程的学习，将使学生掌握模式识别的基本概念、基本原理和基本方法，特别是分类、聚类、特征表示等常用算法的主要思想和应用方法。教学内容重点：支持向量机、决策树、贝叶斯分类器、K 均值聚类、神经网络、主成分分析与降维的原理和应用。教学内容的难点：对算法思想的理解、算法的数学模型建模、参数求解及性能分析。

推荐教材或主要参考书：

[1] 统计学习要素：机器学习中的数据挖掘、推断与预测（第 2 版）， 特雷弗•哈斯蒂，[美]罗伯特•提布施拉 著,张军平译, 2020 年.

[2] Cristopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006 年.

[3] Aurelien Geron. Hands-On Machine Learning with Scikit-Learn & TensorFlow, Oreilly 2019 年 9 月.

0002368 Pattern Recognition II

Course Number: 002368

Course Title: Pattern RecognitionII

Course Type: Mandatory Module

Credit: 3 **Total Credit Hours:** 46

Students: Undergraduate students majoring in automation

Prerequisites: Advanced mathematics, Linear algebra, Probability and statistics, Advanced Language Programming

Evaluation Method: Course participation + experiments + closed exams

Writer： Pang Junbiao

Course Description:

Pattern recognition is a compulsory course for the undergraduates majoring in artificial intelligence. The task of this course is to take theory as the basis and engineering application as the goal, fully cultivate students' ability of combining theory with practice, analyzing problems, solving problems and programming practice. Through the study of this course, students will master the basic concepts, principles and methods of pattern recognition, especially the main ideas and application methods of common algorithms such as classification, clustering and feature representation. Teaching content: Bayesian classifier, boosting. The difficulties of teaching content are: the understanding of algorithm thought, mathematical model modeling, parameter solving and performance analysis.

Recommended Textbooks/References:

1． Statistical learning elements: data mining, inference and prediction in machine learning (2nd Edition), written by Trevor hasty, Robert tibushra, translated by Zhang Junping, 2020

2． Christopher M. bishop, pattern recognition and machine learning, Springer, 2006

3． Aurelian Geron. Hands on machine learning with science learning & tensorflow, oreilly, September 2019

0010726 机器学习

课程编码：0010726

课程名称：机器学习

英文名称：Machine Learning

课程类型：学科基础必修课

学分： 3.5 **总学时：** 56

面向对象：人工智能专业本科生

先修课程：高等数学，线性代数，概率论与数理统计，高级语言程序设计

考核形式： 平时成绩+考试

撰写人：施云惠

课程简介：（250-300 字）

机器学习是信息学部为人工智能专业本科生开设的专业核心课程。本课程的任务是使学生掌握经典机器学习方法的基本思想和实现相关算法的基本步骤，了解机器学习的基本理论。通过编程练习和经典方法的应用加深学生对机器学习理论与方法的理解，培养学生在人工智能工程应用中分析问题和解决问题的能力。教学内容重点：线性回归、聚类、神经网络、贝叶斯分类器、支撑向量机、降维、以及稀疏学习。教学内容的难点：各种方法的数学模型建模过程、模型参数的求解算法及模型的性能分析。

推荐教材或主要参考书：

[1]. 周志华，机器学习，清华大学出版社，2016 年 1 月

[2]. Cristopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006

[3]. Aurelien Geron. Hands-On Machine Learning with Scikit-Learn & TensorFlow, Oreilly, 2017

0010726 Machine Learning

Course Number: 0010726

Course Title: Machine Learning

Course Type: Basic required courses

Credit: 3.5 **Total Credit Hours:** 56

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Advanced mathematics, Linear algebra, Probability and statistics, Advanced Language Programming

Evaluation Method: Course participation + written exams

Writer：Shi Yunhui

Course Description:

Machine Learning is one of the basic required courses for undergraduate students major in artificial intelligence. The main target of this course is to clarify basic concept, basic foundation and basic method of Machine Learning for engineering application, especially the main idea and applications of commonly used methods including regression, classification, and clustering which are useful for cultivating the students' ability of analyzing and solving problems for engineering application. The teaching contents are mainly covered by the following aspects: linear regression, clustering, neural network, Bayes classifier, support vector machine, dimension reduction, and sparse representation. The difficulties of teaching contents are described as followings: the idea, mathematical modeling process, parameters solution and performance analysis for each method.

Recommended Textbooks/References:

1.Zhou zhihua, Machine Learning, Tsinghua University Press, 1-2016.

2.Cristopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.

3.Aurelien Geron. Hands-On Machine Learning with Scikit-Learn & TensorFlow, Oreilly, 2017.

0003484 数据挖掘

课程编码：0003484

课程名称：数据挖掘

英文名称： Data Mining

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：数据结构，机器学习，概率论与数理统计

考核形式：平时成绩+考试

撰写人：王博岳

课程简介：（250-300 字）

数据挖掘旨在从海量数据中发现有价值的知识，融合了统计学、机器学习、数据库管理和数据分析等多个领域的知识和技术，是信息学部为人工智能专业本科生开设的学科基础必修课程。本课程主要内容包括：数据获取、数据预处理、数据仓库、关联规则、分类聚类和可视化等。课程的主要任务：教授学生如何有效地探索和分析数据，以发现隐藏在其中的模式、关联和趋势，从而支持决策制定和预测。通过本课程的学习和相关实验训练，学生可以掌握数据预处理技术和数据仓库技术和数据分析技术的原理和算法，对培养学生分析、建模、解决问题能力的培养具有重要作用，为从事人工研究和应用打下基础。

推荐教材或主要参考书：

[1] 徐华. 数据挖掘：方法与应用（第 2 版）.清华大学出版社，2022.

[2] Jiawei Han, Micheline Kamber. 数据挖掘概念与技术. 孟小峰, 译. 2 版. 北京：机械工业出版社, 2012

[3] Aggarwal, Charu C. Data Mining: The Textbook [M]. Springer, 2015.

0003484 Data Mining

Course Number: 0003484

Course Title: Data Mining

Course Type: Subject Foundation Compulsory Course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in artificial intelligence, Machine learning, Probability and Mathematical Statistics

Prerequisites: Data Structures, probability and stochastic process

Evaluation Method: Course participation + written exams

Writer： Wang Boyue

Course Description:

Data mining aims to discover the valuable knowledge from massive datasets, integrating the knowledge from various fields, including statistics, machine learning, database management and data analysis. It is a basic compulsory course for undergraduate students Major in Artificial Intelligence. The main topics covered in this course include data acquisition, data preprocessing, data warehousing, association rules, classification, clustering, and visualization. The primary goal of this course is to teach students how to effectively explore and analyze data, uncover hidden patterns, associations, and trends, thus supporting decision-making and prediction. Through the study of this course and related laboratory exercises, students can gain a comprehensive understanding of principles and algorithms in data preprocessing, data warehousing, and data analysis. This course plays a significant role in nurturing students' analytical, modeling, and problem-solving abilities, laying the foundation for their future research and applications in the field of artificial intelligence.

Recommended Textbooks/References:

1.Jiawei Han, Micheline Kamber. Data mining concepts and techniques [J]. The Morgan Kaufmann Series in Data Management Systems, 2011, 5(4): 83-124.

2.Aggarwal, Charu C. Data Mining: The Textbook [M]. Springer, 2015.

0010727 物联网技术基础

课程编码：0010727

课程名称：物联网技术基础

英文名称：Technology foundation of Internet of things

课程类型：学科基础必修课

学分： 2 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：Python 编程实践、人工智能导论

考核形式： 平时成绩+考试

撰写人：常鹏

课程简介：（250-300 字）

本课程是人工智能、电子信息工程、计算机科学与技术、自动化及相关专业的一门重要的专业必修课程，也是人工智能、机器学习领域重要技术基础课。本课程着重于培养学生对物联网基础、面向对象的编程思想、掌握从事本专业工作所需的数学（特别是离散数学）、自然科学知识、学科基础和专业知识，能够用于解决复杂人工智能系统设计、开发和应用中的问题。主要任务是学习物联网是物与物、人与物之间的信息传递与控制，并能应用这些基本方法设计实现简单的物联网应用案例，掌握包括计算思维在内的适应解决人工智能工程问题的基本思维方法和研究方法，具有良好的学科素养和工程意识，能够识别和表达复杂人工智能系统设计、开发和应用中的问题。

推荐教材或主要参考书：

[1] 李联宁 (著)，物联网基础教程， 清华大学出版社，2019-11-01

[2] 马飒飒，王伟明，张磊，张勇 (著) 袁国忠(译)，物联网基础技术及应用， 西安电子科技大学出版社，2018-01-01

[3] 张冀，王晓霞，宋亚奇，庞春江，李天 (著) 物联网技术与应用,, 清华大学出版社, 2017-08-01

0010727 Technology foundation of Internet of things

Course Number: 0010727

Course Title: Technology foundation of Internet of things

Course Type: Basic required courses

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduates majoring in artificial intelligence, electronic information engineering, computer science and technology, automation and related majors

Prerequisites: Python programming, introduction to artificial intelligence

Evaluation Method: Usual results + exams

Writer： Chang Peng

Course Description:

This course is an important professional compulsory course for artificial intelligence, electronic information engineering, computer science and technology, automation and related majors, and also an important technical basic course in the field of artificial intelligence and machine learning. This course focuses on cultivating students' basic knowledge of the Internet of things, object-oriented programming ideas, and mastering the mathematics (especially Discrete Mathematics), natural science knowledge, discipline basis and professional knowledge required for their professional work, which can be used to solve the problems in the design, development and application of complex artificial intelligence system. The main task is to learn that the Internet of things is the information transmission and control between things, people and things, and to be able to apply these basic methods to design and implement simple application cases of the Internet of things, master the basic thinking methods and research methods including computational thinking to solve artificial intelligence engineering problems, and have good discipline literacy and engineering consciousness, It can identify and express the problems in the design, development and application of complex artificial intelligence system.

Recommended Textbooks/References:

1． Li lianning, basic course of Internet of things, Tsinghua University Press, November 1, 2019

2． Ma Sasa, Wang Weiming, Zhang Lei, Zhang Yong, Yuan Guozhong, basic technology and application of Internet of things, Xi'an University of Electronic Science and Technology Press, January 1, 2018

3． Zhang Ji, Wang Xiaoxia, song Yaqi, Pang Chunjiang, Li Tian, Internet of things technology and application, Tsinghua University Press, August 1, 2017

0010728 Python 编程实践

课程编码：0010728

课程名称：Python 编程实践

英文名称：Python Programming

课程类型：实践环节必修课

学分： 1 **总学时：** 30

面向对象：人工智能专业本科生

先修课程：高级语言程序设计

考核形式：平时成绩+考试

撰写人：王博岳

课程简介：（250-300 字）

Python 编程实践是信息学部人工智能与自动化学院为人工智能专业本科生开设的实践环节必修课。本课程的任务是使学生掌握 python 程序的编写方法，具备 python 基础编程能力，为后续数据挖掘、机器学习、模式识别、计算时是觉得的深入学习打下良好代码基础。在学习 Python 基础语法的基础上，以学生感兴趣的案例驱动方式开展教学，实验案例由易至难覆盖各个知识点，主要包括开发环境安装、组合类型及猜单词游戏、函数及万年历、图形界面万年历、成绩分布柱状图、文件及公交查询系统、面向对象及学生管理系统、数据库及智力问答系统、API 调用及在线翻译器、电影推荐系统、数据清洗及量化炒股、抓取百度图片、搜索引擎。

推荐教材或主要参考书：

[1] 嵩天等，Python 语言程序设计基础（第 2 版），高等教育出版社，2017 年 2 月

[2] [美]埃里克·马瑟斯，Python 编程 从入门到实践，人民邮电出版社，2016 年 7

0010728 Python Programming

Course Number: 0010728

Course Title: Python Programming

Course Type: Practical Compulsory Courses

Credit: 1.0 **Total Credit Hours:** 30

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: advanced language programming

Evaluation Method: Course participation + written exams

Writer： Wang Boyue

Course Description:

Python Programming is one of the practical compulsory courses for undergraduate students major in artificial intelligence. The objective of this course is to equip students with the coding skills and establish a strong foundation in Python programming. This foundation will serve as a solid basis for in-depth learning in subsequent areas such as data mining, machine learning, pattern recognition, and computational intelligence. Building upon a grasp of Python's basic syntax, this course is taught in a case-driven approach based on topics that interest the students. The lab exercises range from simple to complex and cover various aspects, including installation of development environments, data structure and guessing word game, functions and perpetual calendar, graphical user interface-based perpetual calendar, distribution bar chart, file and bus inquiry system, object-oriented programming and student management system, databases and intelligent Q&A system, API calls and online translator, movie recommendation system, data cleaning and quantitative stock trading, image scraping, and search engine implementation.

Recommended Textbooks/References:

1.Song tian et al., Python programming language foundation (second edition), *Higher Education Press*, 2-2017.

2.Eric Matthes, Python programming: from introduction to practice, the Posts and Telecommunications Press, 7-2016.

0010729 数据库基础实践

课程编码：0010729

课程名称：数据库基础实践

英文名称： Basic Practice of Database System

课程类型：实践环节必修课

学分： 1 **总学时：** 30

面向对象：人工智能专业本科生

先修课程：高级语言程序设计（Python，或 Java，或 C++）

考核形式：源代码演示+答辩+实验报告

撰写人：马楠

课程简介：（250-300 字）

该课程是数据库能力提升的最后一环，考核学生的综合素质。实践待解决的问题来自真实应用场景需求。学生们需要充分沟通了解需求，了解数据背后所隐藏的涵义，需要设计数据库来解决数据管理问题。同时，学生需要分组合作，考验团队合作与沟通协作能力。该课程将让学生面向实际应用，结合所学的理论知识，完成需求分析、概念结构设计、逻辑结构设计、数据库编程各个环节完整的实践训练。通过该课程学习，学生将具备直接解决实际问题的动手能力。

推荐教材或主要参考书：

无。

0010729 Basic Practice of Database System

Course Number: 0010729

Course Title: Basic Practice of Database System

Course Type: Compulsory Common Basic Courses

Credit: 1 **Total Credit Hours:** 30

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Advanced Language Programming (Python, or Java, or C++)

Evaluation Method: Source code demonstration + Defense + Written report

Writer： Ma Nan

Course Description:

This course is the last phase for improving the mastering of database, and verifying the overall ability of students. The problems to solve rise from the requirements of real application scenarios. The students must have a sound understanding of the requirements, the meaning of the data, and then design databases to solve problems of data management. Meanwhile, students need to teamwork with other students, testing their cooperation and communication ability. The students need to accomplish the tasks of requirement analysis, conceptual structure design, logic structure design, and database programming. They will acquire the ability of solving practical problems directly. The experimental contents are as follows:

Recommended Textbooks/References:

None.

0010730 模式识别与图像处理基础实验

课程编码：0010730

课程名称：模式识别与图像处理实验

英文名称：Practice of Pattern Recognition and Image Processing

课程类型：实践环节必修课

学分：1.5　　**总学时：**48

面向对象：人工智能专业本科生

先修课程：高等数学，线性代数，概率论与数理统计，高级语言程序设计

考核形式：报告+演示

撰写人：李敬华

课程简介：（250-300 字）

本课程是与图像处理和模式识别理论课相配套的独立开课的必修实践课，是人工智能专业学生学习并掌握图像处理和模式识别方法的基础实践类课程。本实验课以图像处理和模式识别的基本理论和基本知识为基础，以培养学生理解、掌握并运用图像处理和模式识别经典方法为目标，通过具体的应用实例，在实践教学过程中帮助学生巩固所学图像处理和模式识别的理论知识，培养学生系统分析、算法设计和程序设计能力，进而培养学生应用所学解决复杂工程问题的实践能力，培养学生发现问题、分析问题和解决问题的实践和创新能力。

推荐教材或主要参考书：

[1]. 冈萨雷斯著，阮秋琦等译，数字图像处理（第三版），电子工业出版社，2017 年 5 月

[2]. 章毓晋，图像处理和分析教程（微课版 第 3 版），人民邮电出版社，2020 年 9 月

[3]. 统计学习要素：机器学习中的数据挖掘、推断与预测（第 2 版）， 特雷弗·哈斯蒂，[美] 罗伯特·提布施拉著,张军平译, 2020 年.

[4]. Cristopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006 年.

0010730 Practice of Pattern Recognition and Image Processing

Course Number: 0010730

Course Title: Practice of Pattern Recognition and Image Processing

Course Type: Mandatory Module

Credit: 1.5 **Total Credit Hours:** 48

Students: Undergraduate students majoring in automation

Prerequisites: Advanced mathematics, Linear algebra, Probability and statistics, Advanced Language Programming

Evaluation Method: Reports + Demos

Writer： Li Jinghua

Course Description:

This course is an independent compulsory practical course that is paired with the theoretical courses of image processing and pattern recognition. It is a basic practical course for students majoring in artificial intelligence to learn and master image processing and pattern recognition methods. This experimental course is based on the basic theories and knowledge of image processing and pattern recognition, with the goal of cultivating students' understanding, mastery, and application of classic methods of image processing and pattern recognition. Through specific application examples, it helps students consolidate their theoretical knowledge of image processing and pattern recognition during practice, and cultivates their abilities in system analysis, algorithm design, and program design, Furthermore, it aims to cultivate students' practical ability to apply what they have learned to solve complex engineering problems, as well as their practical and innovative abilities to discover, analyze, and solve problems.

Recommended Textbooks/References:

1.Gonzalez, translated by Ruan Qiuqi et al., Digital Image Processing (Third Edition), Publishing House of Electronics Industry, May 2017

2.Zhang Yujin, Image Processing and Analysis Tutorial (3rd Edition of Microcourse Edition), People's Posts and Telecommunications Press, September 2020

3.Statistical Learning Elements: Data Mining, Inference, and Prediction in Machine Learning (2nd Edition), Trevor Hasti, Robert Tibschla, translated by Zhang Junping, 2020.

4.Cristopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006 年.

0010731 机器学习基础实验

课程编码：0010731

课程名称：机器学习基础实验

英文名称： Machine learning basic experiment

课程类型：实践环节必修课

学分： 1.0 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：高等数学，概率论与数理统计，高级语言程序设计，python 编程实践

考核形式： 实验报告+答辩

撰写人：朴星霖

课程简介：（250-300 字）

机器学习基础实验是人工智能专业大三本科生的实践环节必修课，是人工智能专业学科基础必修课《机器学习》课程的实践环节配套课程。机器学习课程涉及计算机科学、工程技术和统计学等多学科交叉知识，对现实领域中各种数据的解释和操作有重要意义。本课程旨在使学生深刻理解机器学习基本技术的原理和方法，并能用于解决现实的应用问题。本课程的重点内容是设计实现机器学习的核心技术算法，包括分类、回归、聚类、降维，并结合数据收集和处理等实现特定的机器学习应用任务。难点是对机器学习核心技术的理解以及对影响算法性能的关键参数的作用的理解。

推荐教材或主要参考书：

[1]. 周志华，机器学习，清华大学出版社，2016 年 1 月

[2]. Peter Harrington 著，李锐、李鹏、曲亚东、王斌译，机器学习实战，人民邮电出版社，2021 年 2 月.

0010731 Machine learning basic experiment

Course Number: 0010731

Course Title: Machine learning basic experiment

Course Type: compulsory practice

Credit: 1.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Advanced mathematics, Probability and statistics, Advanced Language Programming, Python programming

Evaluation Method: Reports + Demos

Writer： Piao Xinglin

Course Description:

Machine learning basic experiment is one of the compulsory courses for undergraduate students Major in artificial intelligence. The main target of this course is to enable the students to understand the principal and method of machine learning technology, and apply the methods to practical problems. This course focuses on designing and implementing the core algorithms of machine learning technology. The teaching contents are mainly covered by the following aspects: coding the algorithms including classification, regression, clustering and dimension reduction, and implementing special machine learning task based on the algorithms. The difficulties of teaching contents are described as followings: deep understanding the machine learning technology and the function of key parameters.

Recommended Textbooks/References:

1.Zhou zhihua, Machine Learning, Tsinghua University Press, 1-2016.

2.Peter Harrington (writter) , Li rui, li peng, qu yadong, wang bin (translateor), machine learning in action, posts & telecom press, 2-2021..

0007260 认识实习

课程编码：0007260

课程名称：认识实习

英文名称：Cognitive Practice

课程类型：实践环节必修课

学分： 1.0 **总学时：** 30

面向对象：人工智能专业本科生

先修课程：新生研讨课

考核形式：平时成绩+报告

撰写人：奥顿

课程简介：（250-300 字）

认识实习是人工智能与自动化学院为自动化、机器人工程和人工智能专业本科生开设的实践环节必修课，旨在学生学习专业课之前，让学生初步了解专业相关行业特色，及对专业知识的需求，激发学生学习专业课程的兴趣，增强学生学习的主观能动性，是学生在专业课学习中能够联系行业实际应用，为专业知识的学习奠定基础。认识实习通过报告、参观等活动，使学生了解专业相关的公司企业工作环境、工作内涵等，了解相关企业的市场情况及其与国内外同类企业的竞争能力，了解国内外行业的发展趋势，从而培养学生的社会责任感、职业道德和国际化视野。增强学生对专业前景的感知，为后继更好地规划学业，规划人生，奠定基础。

推荐教材或主要参考书：

[1] 戴先中，赵光宙. 自动化学科概论（第二版）. 高等教育出版社，2016 年 6 月

[2] 中国科学技术协会. 自动化学科路线图. 中国科学技术出版社，2020 年 10 月

0007260 Cognitive Practice

Course Number: 0007260

Course Title: Cognitive Practice

Course Type: Practice compulsory course

Credit: 1.0 **Total Credit Hours:** 30

Students: Undergraduate students majoring in Automation, Robotic Engineering and Artificial Intelligence

Prerequisites: Freshman Seminar

Evaluation Method: Course participation + report paper

Writer：Ao Dun

Course Description:

Cognition practice is a compulsory practical course for automation, robotic engineering and Artificial intelligence undergraduates in the College of artificial intelligence and automation. It aims to enable students to preliminarily understand the characteristics of relevant industries and their needs for professional knowledge before learning professional courses, stimulate students' interest in learning professional courses and enhance students' subjective initiative in learning. It is that students can contact the practical application of the industry in the study of professional courses, so as to lay the foundation for the study of professional knowledge. Through reports, visits and other activities, students can understand the working environment and work connotation of companies and enterprises related to their majors, understand the market situation of relevant enterprises and their competitiveness with similar enterprises at home and abroad, and understand the development trend of industries at home and abroad, so as to cultivate students' sense of social responsibility, professional ethics and international vision. Enhance students' perception of professional prospects and lay a foundation for future generations to better plan their studies and life.

Recommended Textbooks/References:

1.Dai Xianzhong, Zhao Guangzhou, Introduction to automation (Second Edition). *Higher education press,* June 2016

2.China Association for science and technology, Road map of automation discipline. *China Science and Technology Press*, October 2020

0007256 工作实习

课程编码：0007256

课程名称：工作实习

英文名称：Professional Practice

课程类型：实践环节必修课

学分： 4.0 **总学时：** 120

面向对象：人工智能专业本科生

先修课程：新生研讨课，认识实习，电子技术，电路分析基础-1，微机原理与接口技术，高级语言程序设计，自动控制原理

考核形式： 平时成绩+报告

撰写人：奥顿

课程简介：（250-300 字）

工作实习是人工智能与自动化学院为人工智能专业本科生开设的实践环节必修课。学生通过为期四周的企业实习，熟悉企业文化和规章制度，强化人际交往能力和劳动纪律，了解企业运行模式，体会产品设计、生产或推广过程中需要考虑的成本、质量、品牌或法律问题等。熟悉自动化领域对人才知识构架的需求，为将来更好地适应社会和工作奠定基础。

推荐教材或主要参考书：

教材或参考资料根据实际实习内容选择

0007256 Professional Practice

Course Number: 0007256

Course Title: Professional Practice

Course Type: Practice compulsory course

Credit: 4.0 **Total Credit Hours:** 120

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Freshman Seminar, Cognitive Practice, fundamentals of circuit analysis, Digital electronic technology, Computer Principle and Interface Technology, High Level Language Programming, Automatic control principle

Evaluation Method: Course participation + report paper

Writer： Ao Dun

Course Description:

Work practice is a compulsory practical course for Artificial intelligence undergraduates in the College of artificial intelligence and automation. Through a four week enterprise internship, students are familiar with the enterprise culture, rules and regulations, strengthen interpersonal communication ability and labor discipline, understand the enterprise operation mode, and experience the cost, quality, brand or legal issues that need to be considered in the process of product design, production or promotion. Be familiar with the demand for talent knowledge framework in the field of automation, so as to lay a foundation for better adapting to society and work in the future.

Recommended Textbooks/References:

Textbooks/Reference selected based on the actual practice content

0008111 毕业设计

课程编码：0008111

课程名称：毕业设计

英文名称：Graduation Design

课程类型：实践环节必修课

学分： 8.0 **总学时：** 480

面向对象：人工智能专业本科生

先修课程：新生研讨课，电子技术，电路分析基础-1，微机原理与接口技术，高级语言程序设计，自动控制原理，认识实习，工作实习

考核形式： 平时成绩+报告

撰写人：奥顿

课程简介：（250-300 字）

毕业设计是人工智能与自动化学院为人工智能专业本科生开设的实践环节必修课，是本科教育阶段最后、但也是最重要的环节之一。它通过一个真实或虚拟课题的立项、调研、实施、总结（毕业论文）、汇报（毕业答辩），在对学生专业知识与实践能力进行综合考核基础上，完成对本专业学生专业相关工程项目能力的训练。 通过具有一定复杂性的自动化工程实际问题的解决，培养学生综合运用所学知识、理论和技能，问题抽象、建模、分析和解决的能力。通过考虑工程实践中的约束条件而设计方案，培养学生的学生独立思考、团队协作能力，及社会责任感和创新能力。通过毕业论文的撰写，使学生掌握科技论文撰写规范，强化学生归纳、总结与文字表达的能力。

推荐教材或主要参考书：

教材或参考材料根据具体课题选择

0008111 Graduation Design

Course Number: 0008111

Course Title: Graduation Design

Course Type: Practice compulsory course

Credit: 8.0 **Total Credit Hours:** 480

Students: Undergraduate students majoring in Artificial intelligence

Prerequisites: Freshman Seminar, Electronic technology, Fundamentals of circuit analysis, Computer Principle and Interface Technology, High Level Language Programming, Automatic control principle, Cognitive Practice, Professional Practice

Evaluation Method: Course participation + report paper

Writer： Ao Dun

Course Description:

Graduation design is a practical compulsory course set up by the College of artificial intelligence and automation for undergraduates majoring in artificial intelligence. It is the last but also one of the most important links in the undergraduate education stage. It completes the training of students' professional related engineering project ability on the basis of comprehensive assessment of students' professional knowledge and practical ability through the project establishment, investigation, implementation, summary (graduation thesis) and report (graduation defense) of a real or virtual subject. Through the solution of practical problems in automation engineering with certain complexity, cultivate students' ability to comprehensively use their learned knowledge, theory and skills and abstract, model, analyze and solve problems. The scheme is designed by considering the constraints in engineering practice to cultivate students' ability of independent thinking, teamwork, social responsibility and innovation. Through the writing of graduation thesis, students can master the writing standard of scientific and technological thesis and strengthen their ability of induction, summary and written expression.

Recommended Textbooks/References:

Textbooks/References selected according to specific topics

0010747 计算机视觉综合实验

课程编码：0010747

课程名称：计算机视觉综合实验

英文名称：Comprehensive Experiments of Computer Vision

课程类型：实践环节选修课

学分： 2.0 **总学时：** 64

面向对象：人工智能专业本科生

先修课程：线性代数(工)、模式识别

考核形式：平时成绩+考试

撰写人：王少帆

课程简介：（250-300 字）

“计算机视觉综合实验”是人工智能专业本科学生的一门实践环节选修课。随着计算机与人工智能技术的发展，计算机视觉综合实验的应用呈现快速发展之势，现已广泛应用于自然学科、工程技术、管理科学、军事科学等诸多领域，本课程是工科院校本科生、研究生以及从事模式识别研究领域的工程技术人员的一门重要课程。本课程旨在讲授计算机视觉的实验及应用，要求通过本课程的学习，具有应用计算机视觉的知识解决一些实际问题的初步技能，并为以后的学习和工作做必要的准备。

推荐教材或主要参考书：

[1] 章毓晋. 计算机视觉教程, 21 世纪高等学校计算机规划教材，人民邮电出版社，2011 年 3 月

[2] Wesley，E.，Snyder，戚海蓉. 计算机视觉基础，机械工业出版社，2020 年 9 月

0010747 Comprehensive Experiments of Computer Vision

Course Number: 0010747

Course Title: Comprehensive Experiments of Computer Vision

Course Type: Practice elective course

Credit: 2.0 **Total Credit Hours:** 64

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Linear algebra(Engineering), pattern recognition

Evaluation Method: Course participation + written exams

Writer： Wang Shaofan

Course Description:

"Comprehensive Experiments of Computer Vision" is a practical elective course for undergraduates majoring in artificial intelligence. With the development of computer and artificial intelligence technology, the application of computer vision comprehensive experiment presents a trend of rapid development. It has been widely used in many fields, such as natural science, engineering technology, management science, military science and so on. This course is an important course for undergraduates, postgraduates and engineers engaged in the research field of pattern recognition. The purpose of this course is to teach the experiment and application of computer vision. Through the study of this course, we are required to have the preliminary skills of applying the knowledge of computer vision to solve some practical problems, and make necessary preparations for future study and work.

Recommended Textbooks/References:

1．Yujin Zhang. A course of computer vision, 21st Century University Planned Textbooks of Computer Science，Post and Telecom Press，March, 2011

2． Wesley，E.，Snyder, Hairong Qi. Fundamentals of Computer Vision，China Machine Press，September, 2020

0010748 自然语言处理综合实验

课程编码：0010748

课程名称：自然语言处理综合实验

英文名称：Comprehensive Practice of Natural Language Processing

课程类型：实践环节选修课

学分： 2 **总学时：** 64

面向对象：人工智能专业本科生

先修课程：线性代数(工)、概率论与数理统计（工）

考核形式：平时成绩+考查

撰写人： 李笑颜

课程简介：（250-300 字）

该课程是人工智能专业的一门的实训课程，具有很强的实践性，该课程是培养人工智能专业人才的重要环节，是理论教学和实际应用之间的桥梁。通过对自然语言处理关键技术的学习和实践，帮助学生建立关于自然语言处理的基础知识框架。实践所用的数据来自真实场景，提出的问题是实际需求。学生需要分组合作，考验团队合作与沟通协作能力。该课程将让学生面向实际应用，结合所学的理论知识，完成问题分析、算法设计、模型构建、结果分析各个环节完整的实践训练。通过该课程学习，学生将具备直接解决自然语言处理领域实际问题的动手能力。

推荐教材或主要参考书：

[1] Chris Manning, Hinrich Schütze. Foundations of Statistical Natural Language Processing [M]. MIT Press, 1999.

[2] 宗成庆. 统计自然语言处理. 北京: 清华大学出版社, 2013

[3] Jurafsky D, James H Martin. 自然语言处理综论. 冯志伟, 译. 北京: 电子工业出版社, 2018

0010748 Comprehensive Practice of Natural Language Processing

Course Number: 0010748

Course Title: Comprehensive Practice of Natural Language Processing

Course Type: Professional elective course

Credit: 2 **Total Credit Hours:** 64

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Linear Algebra(Engineering), Probability and Statistics

Evaluation Method: Course participation + final project

Writer： Li Xiaoyan

Course Description:

This course is a practical training course for artificial intelligence major, which has the strong practicality. This course builds a bridge between the theoretical teaching and the practical application, and is an important part in training the artificial intelligence talents. Through the study and the practice of the key technologies of natural language processing, it helps students to understand the basic knowledge frameworks of the natural language processing. The data used in the practice comes from the real world scenarios, and the questions are the real requirements. Students need to work in groups to test their teamwork and communication skills. This course enables students to face the practical applications, and they exploit the learned theoretical knowledge to achieve the complete practical training procedure of the problem analysis, the algorithm design, the model construction and the result analysis. Through this course, students is still able to solve the practical problems in the field of natural language processing directly.

Recommended Textbooks/References:

1. Chris Manning, Hinrich Schütze. Foundations of Statistical Natural Language Processing [M]. MIT Press, 1999
2. Zong chengqing. Statistical Natural Language Processing, Tsinghua University Press, 2013.
3. Jurafsky D, James H Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition. Feng zhiwei, translated. Publishing House of Electronics Industry, 2018.

0010749 智能控制系统综合实验

课程编码： 0010749

课程名称：智能控制系统综合实验

英文名称：Comprehensive practice of intelligent control systems

课程类型：实践环节选修课

学分：2　　总学时：64

面向对象：人工智能专业本科生

先修课程：自动控制原理 I

考核形式：平时成绩+考查

撰写人：杜胜利

课程简介：（250-300 字）

该课程是自动控制原理课程提升的一门课程，是培养学生创新实践能力的设计类课程实践环节，是自动控制课程的核心实践课程，旨在培养学生动手能力，培养综合性、创新型、能力型的人工智能专业人才。本课程将在实验室的环境下，将所学的控制理论知识应用到真实的被控对象，让学生更好地理解理论知识与实践过程的结合与转化，提高学生实践应用能力和创新意识。同时，学生需要分组合作，考验团队合作与沟通协作能力。该课程将让学生面向实际应用，结合所学的理论知识，完成需求分析、系统设计、模型构建、结果分析各个环节完整的实践训练。通过该课程学习，学生将具备直接解决实际问题的动手能力。

推荐教材或主要参考书：

[1]. 韩红桂，杨翠丽，蒙西，于建均. 自动控制系统设计与实现. 北京：科学出版社，2020

0010749 Comprehensive practice of intelligent control systems

Course Number: 0010749

Course Title: Comprehensive practice of intelligent control systems

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 64

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Principles of Automatic Control I

Evaluation Method: Course participation + final project

Writer： Du Shengli

Course Description:

This course is a course for the improvement of the automatic control principle course. It is a design course that cultivates students' innovative and practical ability. It is the core practice course of automatic control courses. It aims to cultivate students' hands-on ability and cultivate comprehensive, innovative and abilities. This course will apply the knowledge of control theory to real controlled objects in a laboratory environment, so that students can better understand the combination and transformation of theoretical knowledge and practical processes, and improve students' practical application ability and innovative consciousness. At the same time, students need to work in groups to improve teamwork and communication and collaboration skills. This course will allow students to face practical applications and combine the theoretical knowledge they have learned to complete practical training in all aspects of demand analysis, system design, model construction, and result analysis. Through this course, students will have the practical ability to directly solve practical problems.

Recommended Textbooks/References:

1.Honggui Han, Cuili Yang, Xi Meng and Jianjun Yu. Design and Realization of Automatic Control System, Science Press, 2020.

0010735 大数据处理综合实验

课程编码：0010735

课程名称：大数据处理综合实验

英文名称： Comprehensive Practice of Big Data Analysis

课程类型：实践环节选修课

学分： 2 **总学时：** 60

面向对象：人工智能专业本科生

先修课程：Python 编程实践

考核形式：平时成绩+课程设计

撰写人：张勇

课程简介：

大数据分析综合实践课程是大数据能力提升的最后一门课，考核学生的综合素质。实践所用的数据来自真实场景，提出的问题是实际需求。学生们需要充分沟通了解需求，了解数据背后所隐藏的涵义，需要用数据思维来解决问题。同时，在完成个人综合实践的基础上，学生还需要分组实践完成创新性实践任务，从而锻炼学生的团队合作与沟通协作能力。该课程将让学生面向实际应用，结合所学的理论知识和相关技术，完成需求分析、模型构建、模型优化完善、结果分析等各个环节完整的实践训练。通过该课程学习，学生将具备直接解决实际问题的动手能力。

推荐教材或主要参考书：

无

0010735 Comprehensive Practice of Big Data Analysis

Course Number: 0010735

Course Title: Comprehensive Practice of Big Data Analysis

Course Type: Compulsory course for the major

Credit: 2 **Total Credit Hours**: 60

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Python Programming Practice

Evaluation Method: Regular performance + Course Design

Writer：Zhang Yong

Course Description:

Comprehensive Practice of Big Data Analysis is the final course for improving big data capabilities and assessing students' comprehensive qualities. The practice uses data from real scenarios and addresses actual demands. Students need to communicate fully to understand the requirements and the underlying implications of the data. They are required to use data thinking to solve problems. Meanwhile, in addition to completing individual comprehensive practices, students need to work in groups to complete innovative practical tasks, thereby enhancing their teamwork and communication skills. This course enables students to apply theoretical knowledge and relevant technologies to complete practical training in various aspects such as demand analysis, model construction, model optimization and refinement, and result analysis. Through this course, students will acquire the hands-on ability to directly solve practical problems.

Recommended Textbooks/References:

None

0010736 信息与决策

课程编码：0010736

课程名称：信息与决策

英文名称：Information and Decision

课程类型：专业选修课

学分： 2 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：线性代数(工)，高等数学，离散数学

考核形式：平时成绩+期末考查

撰写人：王自鹏

课程简介：（250-300 字）

《信息与决策》是信息学部为人工智能专业本科生开设的专业选修课。本课程的任务是通过系统讲授信息论的概念和基本原理以及决策论的理论与方法，培养学生综合运用信息和决策理论和方法分析和解决实际问题的能力。教学内容重点包括信息论基本理论、决策论基本理论(确定型决策、风险型决策、不确定型决策)、多目标决策、智能决策与控制。教学内容与案例分析相结合，通过案例分析使学生理解并掌握信息与决策理论与方法，以达到培养学生分析问题、解决问题的能力。加强学生的计算机仿真实践能力，学会科学运用信息并使用 Excel、Matlab 等软件进行科学决策。

推荐教材或主要参考书：

[1] 曹雪虹, 张宗橙. 信息论与编码, 清华大学出版社, 2020 年

[2] 郭文强等. 决策理论与方法, 高等教育出版社, 2020 年

0010736 Information and Decision

Course Number: Information and Decision

Course Title: 0010736

Course Type: Professional elective course

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Linear algebra (Engineering)，advanced mathematics, discrete mathematics

Evaluation Method: Course participation + final project or report

Writer：Wang Zipeng

Course Description:

Information and Decision is one of the practical elective courses for undergraduate students Major in artificial intelligence. The main target of this course is to clarify the concepts and basic principles of information theory and the decision theories and methods, and develop students' ability to comprehensively apply information and decision theories and methods to analyze and solve practical problems. The teaching contents are mainly covered by the following aspects: basic information theory, basic decision theory (certainty type decision, risk type decision, and uncertainty type decision), multi-objective decision, and intelligent decision and control. The teaching contents are combined with case analyses. Through case analyses, students can understand and master the theories and methods of information and decision, so as to develop students' ability to analyze and solve problems. Learn to use information scientifically and apply some basic softwares such as Excel and Matlab to make scientific decisions to strengthen students' practical ability of computer simulation.

Recommended Textbooks/References:

1.Xuehong Cao, Zongcheng Zhang, Information Theory and Coding, Tsinghua University Press, 2020

2.Wenqiang Guo et al., Decision Theory and Method, Higher Education Press, 2020

0010737 大数据处理技术

课程编码：0010737

课程名称：大数据处理技术

英文名称： Big data processing technology

课程类型：专业选修课

学分： 2 总学时： 32

面向对象：人工智能专业本科生

先修课程：数据库原理、Python 编程实践

考核形式： 平时成绩+考试

撰写人：张勇

课程简介：（250-300 字）

本课程的主要任务是讲授大数据处理的方法和主流的相关技术，注重强化培养学生面向大数据分析任务时综合分析能力和实际动手能力。通过本课程的教学，使学生掌握大数据的处理过程、常用处理方法和工具，并能使用真实的数据集完成特定的大数据分析任务。课程主要内容包括：大数据概述、大数据处理流程、大数据技术（数据采集与预处理、数据存储和管理、数据处理与分析、数据可视化）、大数据开源平台与工具、大数据应用以及大数据安全、伦理。通过该课程的学习，学生将具备大数据处理各个环节的相关知识，并会用相关理论和技术完成各环节的任务，最终完成大数据分析的目标。

推荐教材或主要参考书：

无

0010737 Big Data Processing Technology

Course Number: 0010737

Course Title: Big Data Processing Technology

Course Type: Elective course for the major

Credit: 2 **Total Credit Hours**: 32

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Principles of Databases, Python Programming

Evaluation Method: Regular performance + Examination

Writer：Zhang Yong

Course Description:

The main task of this course is to teach the methods and mainstream technologies of big data processing, emphasizing the cultivation of students' comprehensive analytical ability and practical hands-on ability for big data analysis tasks. Through the teaching of this course, students will master the process of big data processing, common processing methods, and tools, and be able to use real datasets to complete specific big data analysis tasks. The main contents of the course include: an overview of big data, big data processing flow, big data technologies (data collection and preprocessing, data storage and management, data processing and analysis, data visualization), big data open platforms and tools, big data applications, as well as big data security and ethics. Through the study of this course, students will have the relevant knowledge of various stages of big data processing and will use related theories and technologies to complete tasks in each stage, ultimately achieving the goal of big data analysis.

Recommended Textbooks/References:

None

0010738 机器视觉

课程编码：0010738

课程名称：机器视觉

英文名称：Machine Vision

课程类型：专业选修课

学分： 3.0 **总学时：** 48

面向对象：人工智能专业本科生

先修课程：高等数学、线性代数、图像处理

考核形式： 平时成绩+考试

撰写人：胡永利

课程简介：（250-300 字）

视觉是人类感知世界的最重要方式，据统计人类 70%以上的感知信息来自于视觉。机器视觉或者计算机视觉是研究使得机器具有人类视觉能力的学科，即以图像视频为输入，以对环境的表达和理解为目标，研究图像信息组织、物体和场景识别、进而对事件给予解释的学科。机器视觉是人工智能领域的研究热点，因此机器视觉课程也是人工智能专业的核心课程。本课程在介绍经典机器视觉理论的基础上，详细叙述了涵盖初级视觉、中级视觉和高级视觉的基本理论和方法，并结合典型的机器视觉应用场景开展了技术实践。通过本课程的学习，使得学生掌握机器视觉的基本概念、原理和方法，并通过实验环节培养学生理论与实际相结合的能力、分析问题、解决问题和工程实践能力。

推荐教材或主要参考书：

[1] 戴维斯（E. R. Davies）著，袁春，刘婧译. 计算机视觉：原理、算法、应用及学习（原书第 5 版），机械工业出版社, 2020 年 10 月

[2] Forsyth and J. Ponce. Computer Vision: A Modern Approach, 2nd edition, Pearson Education, 2011 年 11 月

[3] M. Sonka, V. Hlavac, and R. Boyle. Image Processing, Analysis, and Machine Vision, 4th edition, Cengage Learning, 2014 年 2 月

[4] Richard Szeliski. Computer Vision: Algorithms and Applications, 2nd ed, Springer Cham, 2022 年 1 月

0010738 Machine Vision

Course Number: 0010738

Course Title: Machine Vision

Course Type: Professional elective course

Credit: 3.0 **Total Credit Hours:** 48

Students: Undergraduate students majoring in AI

Prerequisites: Advanced mathematics, Linear algebra, Image Processing

Evaluation Method: Course participation + written exams

Writer： Hu Yongli

Course Description:

Vision is the most important way for humans to perceive the world. It has reported that more than 70% of human perception information comes from vision. Machine vision or computer vision aims to make machines have human vision capabilities, which takes images or videos as input, represents its feature and understands its scene or recognize its classification. Machine vision is a hot research topic in the field of AI, so machine vision course is also the core course for AI major. Based on the introduction of classic machine vision theory, this course narrates in detail the basic theories and methods covering primary vision, intermediate vision and advanced vision, and carries out practical projects in some typical machine vision application scenarios. Through this course, students will be able to master the basic concepts, principles and methods of machine vision, and develop their ability to combine theory with practice, analyze problems, solve problems, and develop AI applications.

Recommended Textbooks/References:

1. E. R. Davies. Computer Vision Principles, Algorithms, Applications, Learning, Academic Press, Nov. 2017

2. Forsyth and J. Ponce. Computer Vision: A Modern Approach, 2nd edition, Pearson Education, Nov. 2011

3. M. Sonka, V. Hlavac, and R. Boyle. Image Processing, Analysis, and Machine Vision, 4th edition, Cengage Learning, Jan 21, 2014

4. Richard Szeliski. Computer Vision: Algorithms and Applications, 2nd ed, Springer Cham, Jan. 2022

0009028 人机交互技术

课程编码：0009028

课程名称：人机交互技术

英文名称：Human Computer Interaction Technology

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：自然语言处理

考核形式：平时成绩

撰写人：苏婷婷

课程简介：

“人机交互技术”是研究人、计算机以及它们之间相互影响的技术。随着人与机器的关系日趋密切，人机交互也具有了更广的实用性，其技术研究的意义不仅体现在提供直观、方便、高效的交互方式上，更促成了一系列新兴产业的发展与壮大，对信息技术的发展产生了深刻的影响。本课程围绕人机交互领域追求的目标：自然性、智能化的交互，让学生掌握交互模式、交互理念等研究前沿动态，以及人机交互的认知过程、模型建立和系统设计，使学生能够了解最新的人机交互设备及软件。

推荐教材或主要参考书：

[1] 吴亚东. 人机交互技术及应用. 机械工业出版社, 2020 年 8 月

0009028 Human Computer Interaction Technology

Course Number: 0009028

Course Title: Human Computer Interaction Technology

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Natural Language Process

Evaluation Method: Course participation

Writer： Su Tingting

Course Description:

"Human computer interaction technology" is a technology to study human, computer and their interaction. With the increasingly close relationship between human beings and machines, human-computer interaction also has wider applications. The significance of its technology research is not only reflected in providing intuitive, convenient and efficient interaction mode, but also promotes the development and growth of a series of emerging industries, which has a profound impact on the development of information technology. This course focuses on the goal in the field of human-computer interaction: natural and intelligent interaction, so that students can master the cutting-edge research trends such as interaction mode and interaction concept, as well as the cognitive process, model building and system design of human-computer interaction, so that students can understand the latest human-computer interaction equipment and software.

Recommended Textbooks/References:

1． Yadong Wu. Human Computer Interaction Technology and Application. China Machine Press. August, 2020

0009352 数据可视化

课程编码：0009352

课程名称：数据可视化

英文名称： Data visualization

课程类型：专业选修课

学分： 2 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：数据库原理、Python 编程

考核形式：平时成绩+课程设计

撰写人： 张勇

课程简介：（250-300 字）

本课程的主要任务是讲授数据可视化的方法和基本实现，注重强化培养学生的动手能力。本课程的主要目的是培养学生的数据处理和可视化能力。通过本课程的教学，使学生了解数据可视化的意义、发展历史，掌握数据可视化相关理论，熟悉数据可视化整体过程和设计原则，并能使用数据可视化工具进行数据的可视化。主要内容包括：介绍数据可视化的基础理论和概念，针对实际应用中遇到的不同类型的数据介绍相应的可视化方法，结合具体实例介绍基于 Web 的可视化实现，并以实际的数据可视化系统介绍整体的过程。通过课程的学习，学生将具备使用高级可视化方法进行数据可视化分析的动手能力，并具备一定的可视化方法创新能力。

推荐教材或主要参考书：

[1] 陈为. 数据可视化的基本原理与方法. 科学出版社. 2013.6

0009352 Data Visualization

Course Number: 0009352

Course Title: Data visualization

Course Type: Elective Courset

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Artificial intelligence

Prerequisites: Principles of Databases, Python Programming

Evaluation Method: Regular Performance + Course Design

Writer：Zhang Yong

Course Description:

The main task of this course is to teach methods and basic implementations of data visualization, with a focus on strengthening students' hands-on abilities. The primary goal of this course is to cultivate students' data processing and visualization skills. Through the teaching of this course, students will understand the significance and development history of data visualization, master related theories of data visualization, become familiar with the overall process and design principles of data visualization, and be able to use data visualization tools for data visualization. The main content includes: introducing the basic theories and concepts of data visualization, introducing corresponding visualization methods for different types of data encountered in practical applications, introducing web-based visualization implementations with specific examples, and introducing the overall process through actual data visualization systems. Through the study of this course, students will have the hands-on ability to use advanced visualization methods for data visualization analysis, and possess a certain ability to innovate visualization methods.

Recommended Textbooks/References:

1．Chen, W.. Basic Principles and Methods of Data Visualization. Science Press. June 2013 (in chinese)

0010739 信息物理系统建模与仿真

课程编码：0010739

课程名称：信息物理系统建模与仿真

英文名称：Cyber-Physical Systems: Modeling and Simulation

课程性质：专业选修课

学分： 2.0 **总学时：** 32

面向对象：人工智能专业本科生

先修课程： 离散数学、自动控制原理、嵌入式系统 I

考核形式：平时成绩+大作业

撰写人：詹璟原

课程简介：（250-300 字）

《信息物理系统建模与仿真》是信息学部为人工智能专业本科生开设的专业选修课。信息物理系统是信息资源和物理世界充分融合且深度协作的新一代网络化智能系统，具有广泛的应用前景。本课程系统讲授信息物理系统的建模与仿真的基本原理、方法与应用，使学生掌握系统基础理论知识，培养学生综合运用理论与方法对信息物理应用系统进行建模、分析与控制设计的能力，为复杂工程项目的设计、开发与实施奠定基础。教学内容重点包括物理过程模型、有限状态机、计算、物理与信息变量之间的转换、数字网络、反馈控制设计等基础知识。教学内容的难点是将系统建模的基本原理与工程应用紧密结合，使学生能够设计集计算、通信与控制一体的实际信息物理系统。

推荐教材或主要参考书：

[1] Danda B. Rawat, Joel J.P.C. Rodrigues, Ivan Stojmenovic. Cyber-Physical Systems: From Theory to Practice. CRC Press, 2016.

[2] Houbing Song, Danda B. Rawat, Sabina Jeschke, Christian Brecher. Cyber-Physical Systems: Foundations, Principles and Applications. Academic Press, 2017.

[3] Rajeev Alur. Principles of Cyber-Physical Systems. MIT Press, 2015.

0010739 Cyber-Physical Systems: Modeling and Analysis

Course Number: 0010739

Course Title: Cyber-Physical Systems: Modeling and Simulation

Course Type: Professional selective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Discrete Mathematics、Automatic Control Theory I、Embedded System I

Evaluation Method: Course participation + Project

Writer： Zhan Jingyuan

Course Description:

Cyber-Physical Systems: Modeling and Simulation is one of the professional elective courses for undergraduate students majoring in Artificial Intelligence. Cyber-physical system (CPS for short) is a new generation of networked intelligent system based on the integration and deep cooperation between information resources and the physical world, which has wide application prospects. This course systematically introduces the basic principles, methods, and applications of CPSs, and thus to make students master the relevant theoretical knowledge of CPSs, and to train students to be capable of modelling, analyzing, and control design of CPSs, so as to lay a foundation for the design, development and implementation of complex engineering projects. The teaching contents are mainly covered by the following aspects: models of physical process, finite state machines, computation, converters between physical and cyber variables, digital networks, and feedback control design. The difficulties of teaching contents are to combine the basic principles of CPSs with engineering applications, so as to make students be capable of designing practical CPSs that integrate computing, communication and control.

Recommended Textbooks/References:

1.Danda B. Rawat, Joel J.P.C. Rodrigues, Ivan Stojmenovic. Cyber-Physical Systems: From Theory to Practice. CRC Press, 2016.

2.Houbing Song, Danda B. Rawat, Sabina Jeschke, Christian Brecher. Cyber-Physical Systems: Foundations, Principles and Applications. Academic Press, 2017.

3.Rajeev Alur. Principles of Cyber-Physical Systems. MIT Press, 2015.

0001997 数字信号处理 II

课程编码：0001997

课程名称：数字信号处理 II

英文名称：Digital Signal Processing II

课程性质：专业选修课

学分： 3 **总学时：** 48

面向对象：人工智能专业本科生

先修课程：线性代数、概率论与数理统计、高级语言程序设计

考核形式： 平时成绩+考试

撰写人：施云惠、朴星霖

课程简介：（250-300 字）

随着信息技术及人工智能的发展，数字信号处理技术应运而生，形成了一个独立的学科体系，在通信、机械制造和人工智能等领域得到广泛的应用。数字信号处理以数学、通讯、控制和计算机等多学科为理论基础，利用计算机或专用处理设备，以数字形式对信号进行采集、变换、综合分析滤波、增强、压缩、识别等处理，以达到提取信号中的有用信息和便于应用之目的。本课程的任务是以理论为基础，以工程应用为目标，培养学生理论与实际相结合的能力、分析问题、解决问题和编程实践的能力。通过本课程的学习，使学生牢固掌握离散时间信号和系统分析的基本原理和基本分析方法。教学内容重点：离散时间信号、离散时间系统的基本概念、Z 变换、离散时间系统分析、离散傅里叶变换、傅里叶变换的快速算法、离散时间系统的相位、滤波器的基本结构和数字滤波器的设计。教学内容的难点：离散时间傅里叶变换、快速傅里叶变换及数字滤波器的设计。

推荐教材或主要参考书：

[1]胡广书，数字信号处理导论，清华大学出版社，2005 年 1 月

[2]胡广书，数字信号处理，清华大学出版社，2003 年 8 月

[3]Sanjit K. Mitra,孙洪，余翔宇等译，数字信号处理—基于计算机的方法，电子工业出版社，2006 年 1 月

[4]John G. Proakis and Dimitris G. Manolakis，方艳梅，刘永清译，数字信号处理，电子工业出版社，2007 年 6 月

0001997 Digital Signal Processing II

Course Number: 0001997

Course Title: Digital Signal Processing II

Course Type: Professional Elective Courses

Credit: 3 **Total Credit Hours:** 48

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Linear Algebra, Probability and Statistics, Advanced Language Programming

Evaluation Method: Course participation + written exams

Writer：Shi Yunhui，Piao Xinglin

Course Description:

With the development of information technology and artificial intelligent, digital signal processing has became an independent disciplinary system which has been widely applied in many fields such as communication, mechanical manufacturing, and artificial intelligence. Digital signal processing is a synthetic technology based on multiple disciplines such as mathematics, communication, control, and computer science. It utilizes computers or specialized processing equipment to collect, transform, analyze, filter, enhance, compress, and recognize signals in digital form, in order to extract useful information from the original signals and refer it to the practical application. The task of this course is to cultivate the ability of students for practicing, analyzing, solving problems, and programming practical skills based on theories and engineering. This course also try to make students firmly grasping the basic principles and analysis methods of discrete time signals, systems analysis. The key points of this course includes: the basic concept of discrete time signal and discrete time system, Z-transform, the analysis of discrete time system, discrete fourier transform and its fast algorithm, the phase of discrete-time systems, basic structure of filters, and design of digital filters. Difficulties in this course includes the discrete time fourier transform, fast fourier transform, and the design of digital filter.

Recommended Textbooks/References:

1. Hu, Guangshu. Introduction to Digital Signal Processing, *Tsinghua University Press*, January-2015.
2. Hu, Guangshu. Digital Signal Processing, *Tsinghua University Press*, August-2003.
3. Sanjit K. Mitra. Digital Signal Processing: A Computer based Approach. *Publishing House of Electronics Industry*, January-2006.
4. John G. Proakis and Dimitris G. Manolakis. Digital Signal Processing. *Publishing House of Electronics Industry*, June-2007.

0010740 深度学习

课程编码：0010740

课程名称：深度学习

英文名称： Deep Learning

课程类型：专业选修课

学分：2.0　　**总学时：**32

面向对象：人工智能专业本科生

先修课程：高等数学、模式识别、机器学习

考核方式：平时成绩（课堂表现+作业+实验）+期末笔试成绩

撰写人：孙梦姝

课程简介：

深度学习是机器学习领域中一个重要分支，其最终目标是让机器能够像人一样具有分析学习能力，能够识别文字、图像和声音等数据。本课程是人工智能自动化学院根据人工智能专业的特点和需要开设的专业任选课程，旨在通过学习和实际应用培养本科生对人工智能领域知识的兴趣，掌握该学科的基础理论、经典算法、前沿技术。本课程主要介绍神经网络基础，以及通过典型的卷积神经网络、循环神经网络、基于注意力机制的神经网络等，介绍具体的深度学习算法和应用。重点：梯度下降法、卷积运算、激活函数和批归一化、各类典型神经网络结构等。难点：梯度下降法、Transformer 模型、生成对抗网络、强化学习等。

推荐教材或主要参考书：

[1] 焦李成, 赵进, 杨淑媛, 刘芳. 深度学习、优化与识别. 清华大学出版社, 2017.

[2] Ian Goodfellow, Yoshua Bengio, Aaron Courville. 深度学习. 赵申剑, 等译. 人民邮电出版社, 2017.

[3] 吴建鑫. 模式识别. 机械工业出版社, 2019.

[4] Christopher Bishop. Pattern Recognition and Machine Learning. Springer, 2007.

0010740 Deep Learning

Course Number: 0010740

Course Title: Deep Learning

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Advanced mathematics, Pattern Recognition, Machine Learning

Evaluation Method: In-Class Participation + Homework + Experiment + Written Exam

Writer： Sun Mengshu

Course Description:

Deep learning is an important branch of machine learning, with the ultimate goal as enabling machines to perform analytical learning like humans, recognizing information such as text, image, and audio data. This course is an elective course established by the College of Artificial Intelligence and Automation according to the characteristics and requirements of the Artificial Intelligence major. Its goal is to make students cultivate interest in knowledge in the field of artificial intelligence through learning and practical application, as well as mastering the basic theory, classical algorithms and cutting-edge technologies. This course mainly introduces the basics of neural networks, as well as specific deep learning algorithms and applications through typical convolutional neural networks, recurrent neural networks, neural networks based on attention mechanisms, etc. Focus: gradient descent, convolution operations, activation functions, batch normalization, various typical neural network structures, etc. Difficulties: gradient descent, Transformer model, generative adversarial network, reinforcement learning, etc.

Recommended Textbooks/References:

1.Licheng Jiao, Jin Zhao, Shuyuan Yang, Fang Liu. Deep Learning, Optimization and Recognition. Tsinghua University Press, 2017.

2.Ian Goodfellow, Yoshua Bengio, Aaron Courville. Deep Learning. MIT Press, 2016.

3.Jianxin Wu. Pattern Recognition. China Machine Press, 2019.

4.Christopher Bishop. Pattern Recognition and Machine Learning. Springer, 2007.

0000635 自然语言处理

课程编码：0000635

课程名称：自然语言处理

英文名称： Natural Language Processing

课程类型：专业选修课

学分： 2 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：线性代数(工)、概率论与数理统计（工）

考核形式：平时成绩+考试

撰写人：李笑颜

课程简介：（250-300 字）

自然语言处理是信息学部为人工智能专业本科生开设的专业任选课程。本课程以自然语言处理的基础知识与技术为主线，对于语言模型、词法和句法分析的基本概念与关键技术进行介绍，同时讨论机器翻译以及文本分类等的主要 NLP 技术应用方向，最后对智能问答、对话系统等现阶段广为流行的实用技术进行介绍。通过本课程的学习和相关实验训练，学生可以掌握自然语言处理的关键技术，为从事机器人工程研究和应用打下基础。教学重点内容包括语言模型、词法和句法分析方法，文本分类与聚类，机器翻译，教学难点内容包括基于神经网络的分析方法，推荐系统，智能问答，对话系统。

推荐教材或主要参考书：

[1] Chris Manning, Hinrich Schütze. Foundations of Statistical Natural Language Processing [M]. MIT Press, 1999.

[2] 宗成庆. 统计自然语言处理. 北京: 清华大学出版社, 2013

[3] Jurafsky D, James H Martin. 自然语言处理综论. 冯志伟, 译. 北京: 电子工业出版社, 2018

0000635 Natural Language Processing

Course Number: 0000635

Course Title: Natural Language Processing

Course Type: Professional elective course

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Probability Theory and Mathematical Statistics (Engineering)

Evaluation Method: Course participation + written exams

Writer： Li Xiaoyan

Course Description:

Natural Language Processing is one of the professional elective course for undergraduate students Major in Artificial Intelligence. This course focuses on the basic knowledge and techniques of natural language processing. Moreover, it introduces the language model, lexical and syntax analysis, and discusses the NLP applications such as machine translation, text classification and finally introduces the most prevalent applications for example intelligent question-answering and dialogue system. Through the study of this course and related experimental training, students can master the related technologies of natural language processing and lay a foundation for the research and application of artificial intelligence. The teaching contents are mainly covered by the following aspects: the language model, lexical and syntax analysis, text classification and clustering, machine translation. The difficulties of teaching contents are described as followings: the neural network analysis, the recommend system, intelligent question-answering and dialogue system.

Recommended Textbooks/References:

1. Chris Manning, Hinrich Schütze. Foundations of Statistical Natural Language Processing [M]. MIT Press, 1999
2. Zong chengqing. Statistical Natural Language Processing, Tsinghua University Press, 2013.
3. Jurafsky D, James H Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition. Feng zhiwei, translated. Publishing House of Electronics Industry, 2018.

0010741 高级 3D 图形学

课程编码：0010741

课程名称：高级 3D 图形学

英文名称：Advanced 3D Graphics

课程类型：专业选修课

学分： 2 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：线性代数、数据结构、高级程序设计语言

考核形式：平时成绩+考试

撰写人：孔德慧、李敬华

课程简介：（250-300 字）

高级 3D 图形学是人工智能专业选修课程。计算机图形学是研究真实或虚拟的物体在计算机中的表示及交互的一门学科，在计算机辅助设计与制造、计算机动画、计算机游戏、计算机仿真、虚拟现实、科学计算可视化等领域有广泛应用。计算机图形学通常包括三个基本任务：建模、绘制和交互，即如何在计算机中表示真实或虚拟物体，如何将三维模型绘制在屏幕等显示设备上，如何让用户通过某种手段与其交互。通过本课程的学习，学生将了解计算机三维世界的奥秘，理解建模、绘制和交互的原理和技术。课程主要内容包括：课程概论、基本图形生成算法、图形显示、3D 物体表示与几何建模、光照模型、纹理和计算机图形学前沿等。通过本课程的学习应使学生对图形系统硬件设备和软件算法有较为全面的了解，从而具备设计、开发图形系统的能力及对各种应用系统的快速掌握能力。该课程的开设对于研究型及应用型人才的培养都具有重要作用。

推荐教材或主要参考书：

[1] 黄华，张磊，现代计算机图形学基础，清华大学出版社，2020-06.

[2] 孙家广，胡事民，计算机图形学基础教程，清华大学出版社，2008-02.

[3] 苏小红，李东，唐好选，赵玲玲，郭勇 等. 计算机图形学实用教程（第 4 版）. 人民邮电出版社，2020 年 5 月.

[4] 陆枫，何云峰，计算机图形学基础（第 3 版），电子工业出版社，2018 年 7 月.
黄静，计算机图形学及其实践教程，机械工业出版社，2015 年.

[5] 史蒂文·戈特勒著. 夏时洪，高林译. 3D 计算机图形学基础. 清华大学出版社，2020 年 10 月.

0010741 Advanced 3D Graphics

Course Number: 0010741

Course Title: Advanced 3D Graphics

Course Type: Professional elective course

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in AI

Prerequisites: Advanced Mathematics, Linear Algebra, Advanced Programming Language

Evaluation Method: Course participation + written exams

Writer：Kong Dehui, Li Jinghua

Course Description:

Advanced 3D graphics is an elective course for AI majors. Computer graphics studies the representation and interaction of real or virtual objects in computers. It has wide applications in computer-aided design and manufacturing, computer animation, computer games, computer simulation, virtual reality, and scientific visualization et al. Computer graphics typically includes three basic tasks: modeling, rendering, and interaction, that is, how to represent real or virtual objects in a computer, how to render 3D models on display devices such as screens, and how to enable users to interact with them. Through the study of this course, students will understand the three-dimensional world in the computers, as well as the principles and techniques of modeling, rendering, and interaction. The main content of the course includes: Course Introduction, Basic Graph Generation Algorithms, Graph Display, 3D Object Representation and Geometric Modeling, Lighting Modeling, Texture and Computer Graphics Frontiers, etc. Through the study of this course, students should have better understanding of hardware devices and software algorithms of graphics system , thereby possessing the ability to design and develop graphics systems. The course plays an important role in cultivating both research and application skills.

Recommended Textbooks/References:

1. Huang Hua, Zhang Lei. Fundamentals of modern computer graphics. Tsinghua University Press, June 2020. (in chinese)
2. Sun Jiaguang, Hu Shimin. Basic tutorial of computer graphics. Tsinghua University Press, 2008. (in chinese)
3. Su Xiaohong, Li Dong, Tang haoxuan, Zhao Lingling, Guo Yong, et al. Practical tutorial of computer graphics (4th Edition). People's Posts and Telecommunications Press, may 2020 (in chinese)
4. Lu feng, He yunfeng. computer graphics foundation(3rd Edition), Publishing House of Electronics Industry, July 2018 (in chinese)
5. Steven gottler. Translated by Xia Shihong and Gao lin. Fundamentals of 3D computer graphics. Tsinghua University Press, October 2020 (in chinese)

0010742 过程控制系统

课程编码：0010742

课程名称：过程控制系统

英文名称：Process Control Systems

课程类型：专业选修课

学分：2　　学时：32

面向对象：人工智能专业本科生

先修课程：自动控制原理 I

考核形式：平时成绩+考试

撰写人：李方昱

课程简介：

过程控制系统是信息学部为人工智能专业本科生开设的专业选修课。本课程的任务是介绍过程控制系统的组成、特点及发展状况；对工业生产过程被控对象的数学模型讨论了建模方法；介绍了 PID 控制器的设计、选型与参数整定方法；论述了调节阀的流量特性、设计及选型；讨论了常用的复杂控制系统，如串级控制、补偿控制、比值控制、均匀控制、分程控制、选择性控制和解耦控制等系统的结构、分析、设计方法等；论述了计算机过程控制系统的组成与类型；最后介绍了人工智能在过程控制中的几个应用实例。通过本课程的学习和相关实验训练，使学生了解过程控制系统的设计步骤及相关内容，理解人工智能在控制系统中的潜在优势和挑战，应用人工智能技术来改善过程控制系统的性能和鲁棒性。教学内容重点：过程建模、简单控制系统、复杂控制系统。教学内容的难点：机理法建模、简单控制系统设计、串级控制系统设计。

推荐教材或主要参考书：

[1] 严爱军, 张亚庭, 高学金. 过程控制系统. 北京：北京工业大学出版社, 2010 年 3 月.

[2] 慕延华，华臻，林忠海. 过程控制系统. 北京：清华大学出版社，2018 年 7 月.

[3] 俞金寿, 孙自强. 过程控制系统. 北京：机械工业出版社, 2008 年 8 月.

0010742 Process Control Systems

Course Number: 0010742

Course Title: Process Control Systems

Course Type: Subject Elective

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students automation major in artificial intelligence class

Prerequisites: Automation control

Evaluation Method: Course participation + written exams

Writer: Li Fangyu

Course Description:

Process Control Systems is one of the subject elective courses for undergraduate students Automation in artificial intelligence class. The main target of this course is to introduce the composition, characteristics and development of the process control system. It discusses the mathematical modeling method of the controlled object in the industrial production process and presents the design, selection and parameter tuning methods of PID controller; the control valve flow characteristics, design and selection are discussed; the structure, analysis and design methods of the system such as cascade control, compensation control, ratio control, homogeneous control, sequence control, selective control and decoupling control are also discussed; then several typical advanced control methods are introduced; moreover, the composition and types of computer process control system are discussed; at the end of the paper, some applied examples of artificial intelligence in process control are introduced. Through the study of this course and related experimental training, students will learn the design steps and related contents of process control systems, understand the potential advantages and challenges of AI in control systems, and apply AI techniques to improve the performance and robustness of process control systems. The teaching contents are mainly covered by the following aspects: process modeling, simple control systems, and complex control systems. The difficulties of teaching contents are described as followings: process modeling by mechanism, simple control system design, and cascade control system design.

Recommended Textbooks/References:

1．Yan Aijun, Zhang Yating, Gao Xuejin. Process Control System. Beijing: Beijing Industrial University Press. 2010.

2．Mu Yanhua, Hua Zhen, Lin Zhonghai. Process Control System. Beijing: Tsinghua University Press, 2018.

3．Yu Jinshou, Sun Ziqiang. Process Control System. Beijing: Mechanical Industry Press. 2008.

0010743 知识图谱

课程编码：0010743

课程名称：知识图谱

英文名称：Knowledge Graph

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：深度学习

考核形式：平时成绩

撰写人：王博岳

课程简介：

“知识图谱”是一门通过图模型来描述知识、建模世界万物之间关联关系的课程，属于人工智能专业的专业选修课。通过学习大数据时代背景下知识图谱的基本概念及知识的表示、建模与学习技术，让学生掌握知识表示与建模、知识学习、实体识别与链接、实体关系学习、事件知识学习、知识存储与查询、知识推理、通用和领域知识图谱、语义集成和语义搜索等相关理论知识与研究前沿动态，使学生能够建立起知识与人工智能的依存关系框架，特别是在大数据环境下，从互联网开放环境的大数据中获得知识，用这些知识提供互联网相关行业的智能化服务，同时通过互联网可以获得知识更新。

推荐教材或主要参考书：

[1] 王昊奋, 漆桂林, 陈华均. 知识图谱：方法、实践与应用. 电子工业出版社, 2019 年 8 月

0010743 Knowledge Graph

Course Number: 0010743

Course Title: Knowledge Graph

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: Deep learning

Evaluation Method: Course participation

Writer: Wang Boyue

Course Description:

" Knowledge Graph" is a course to describe knowledge and model the relationship between everything in the world by using graph models, and is a professional elective course of artificial intelligence. By learning the basic concepts of knowledge graph and knowledge representation, modeling and learning technology under the background of big data era, students can master knowledge representation and modeling, knowledge learning, entity recognition and linking, entity relationship learning, event knowledge learning, knowledge storage and query, knowledge reasoning, general and domain knowledge graph, knowledge sharing and learning semantic integration, semantic search and other related theoretical knowledge and research frontier dynamics enable students to establish a framework of dependency relationship between knowledge and artificial intelligence, especially in the big data environment, to obtain knowledge from the big data in the open Internet environment, to provide intelligent services for Internet related industries, and to obtain knowledge updates through the internet.

Recommended Textbooks/References:

1．Haofen Wang, Guilin Qi, Huajun Chen. Knowledge graph: method, practice and applications. Publishing House of Electronics Industry. August, 2019

0000815 智能控制技术

课程编码：0000815

课程名称：智能控制技术

英文名称：Intelligent Control Technology

课程类型：专业选修课

学分：2.0 **总学时：**32

面向对象：人工智能专业本科生

先修课程：高等数学（工）、线性代数（工）、自动控制原理 I

考核形式：平时成绩+考试

撰写人：李晓理

课程简介：（250-300 字）

智能控制技术是信息学部为自动化、机器人工程和人工智能专业本科生开设的专业限选课程。本课程的任务是学习智能控制的理论基础及相关技术。教学内容重点：模糊控制系统设计及神经网络结构及相应的控制器设计。在模糊控制系统设计中，首先学习由模糊集、模糊运算、模糊规则、模糊化、解模糊、模糊推理方法等知识点构成的模糊数学，接着学习模糊控制器及模糊控制系统设计；神经网络控制方面，首先学习感知器、反向传播网络的结构设计及神经网络训练方法，并通过具体生产过程控制问题学习神经网络控制系统的设计、仿真及开发。教学内容的难点：模糊控制器的设计，神经网络的权值学习与控制器设计。

推荐教材或主要参考书：

[1] 张乃尧, 阎平凡编著. 神经网络与模糊控制. 北京: 清华大学出版社, 1998 年 10 月

[2] 孙增圻,邓志东,张再兴编著.智能控制理论与技术.北京：清华大学出版社,2011 年 9 月

[3] 刘金琨编著.智能控制.北京：电子工业出版社,2009 年 7 月

[4] 罗兵,甘俊英,张建民编著.智能控制技术.北京：清华大学出版社,2011 年 3 月.

[5] 刘杰 等编著，智能控制与 MATLAB 实用技术. 北京：科学出版社， 2019 年 7 月

0000815 Intelligent Control Technology

Course Number: 0000815

Course Title: Intelligent Control Technology

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Automation, Robotic Engineering and Artificial Intelligence

Prerequisites: Advanced Mathematic, Linear Algebra, Automatic Control Theory

Evaluation Method: Course participation + written exams

Writer： Li Xiaoli

Course Description:

Intelligent Control Technology is one of the Specialized Elective courses for undergraduate students major in automation, robotic engineering and artificial intelligence. The main target of this course is to clarify the theoretical basis and related technologies of intelligent control. This course is focus on fuzzy control system design, neural network structure and corresponding controller design. The teaching contents are mainly covered by the following aspects: first for the design of fuzzy control system(fuzzy mathematics of fuzzy sets, fuzzy operations, fuzzy rules, fuzziness, defuzzification, fuzzy reasoning methods and other knowledge points, and the design of fuzzy controller and fuzzy control system), then for the aspect of neural network control (the structure design of perceptron, back-propagation network and neural network training method, and design, simulation and development of neural network control system for specific production process control problems). The difficulties of teaching contents are described as followings: the design of fuzzy controller, the weight learning of neural network and the design of controller.

Recommended Textbooks/References:

1. Zhang Naiyao, Yan Pingfan. Neural Network and Fuzzy Control. Beijing: Tsinghua University Press, 1998,10.
2. Sun Zengqi, Deng Zhidong, Zhang Zaixing. Intelligent Control Theory and Technology. Beijing: Tsinghua University Press, 2011,9.
3. Liu Jinkun. Intelligent Control . Beijing: Publishing House of Electronics Industry, 2009,7.
4. Luo Bing, Gan Junying,Zhang Jianmin. Intelligent Control Technology. Beijing: Tsinghua University Press, 2011,3.
5. Liu Jie et al, Intelligent control and MATLAB practical technology. Beijing: Science Press, 2019，7

0010744 计算认知科学

课程编码：0010744

课程名称：计算认知科学

英文名称：Computational Cognitive Science

课程类型：专业选修课

学分： 2 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：人工智能导论

考核形式： 平时成绩+考试

撰写人：周海燕

课程简介：（250-300 字）

计算认知科学是信息学部为人工智能专业本科生开设的专业选修课程类型。本课程的任务是让学生在了解人类智能的基础上，使用计算的原则和方法拓展对人类智能的理解，从而提高在人工智能领域的创造力。教学内容重点：一是介绍包括感知觉、注意、表象、记忆、问题解决和语言等心理过程的认知神经机制，二是近年来计算科学与认知科学的融合所带来的关于人类认知过程研究的新成果和发展趋势。教学内容的难点：一是认知过程非常复杂，尽管近年来认知科学发展迅速，但很多基本的认知过程仍缺乏定论，课程内容具有开放性和不确定性；二是计算认知科学是多学科交叉领域，且仍在不断发展中，如何激发学生利用人工智能或计算科学知识进一步应用到认知科学的领域具有挑战性。

推荐教材或主要参考书：

[1] John H. Anderson 著，秦裕林、程瑶、周海燕、徐玥 译. 认知心理学及其启示. 人民邮电出版社，2012 年 1 月.

[2] Zenon W. Pylyshyn 著，任晓明、王左立 译. 计算与认知：认知科学的基础. 中国人民大学出版社，2007 年 7 月.

[3] Herbert A. Simon 著，荆其诚、张厚粲 译. 认知：人行为背后的思维与智能. 中国人民大学出版社，2020 年 1 月.

0010744 Computational Cognitive Science

Course Number: 0010744

Course Title: Computational Cognitive Science

Course Type: Professional Selective Course

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Introduction to Artificial Intelligence

Evaluation Method: Course participation + written exams

Writer：Zhou Haiyan

Course Description:

Computational Cognitive Science is one of the major selective courses for undergraduate students Major in Artificial Intelligence. The main target of this course is to clarify the mechanisms of human intelligence with computing principles, which might lead to the inspiration of researches and applications in artificial intelligence. This course is focus on the neural mechanisms of the cognitive processes. The development and progress in this area will also be involved in the course. The teaching contents are mainly covered by the following aspects: introduction, perception, attention, memory, problem solving, language, etc. The difficulties of teaching contents are described as followings: (1) Diversity of cognitive topics will be involved in the course, while many basic cognitive processes are still not conclusive. Hence, the course contents are full of uncertainty. (2) Computational cognitive science is a multi-disciplinary field, and it is still in continuous development. How to stimulate students to use artificial intelligence or computational science knowledge to further apply to the field of cognitive science is challenging.

Recommended Textbooks/References:

1.John H. Anderson (translated by Yulin Qin, Yao Cheng, Haiyan Zhou, and Yue Xu), Cognitive Psychology and It's Implications, *The People's Posts and Telecommunications Press*, 1-2012.

2.Zenon W. Pylyshyn (translated by Xiaoming Ren, and Zuoli Wang), Computation and Cognition: Toward a Foundation for Cognitive Science, *China Renmin University Press*, 7-2007.

3.Herbert A. Simon (translated by Qicheng Jing, and Houcan Zhang), Cognition: Thought and Intelligence behind Human Behavior, *China Renmin University Press*, 1-2020.

0009394 新生研讨课

课程编码：0009394

课程名称：新生研讨课

英文名称： Freshman Seminar

课程类型：自主课程

学分： 1.0 **总学时：** 16

面向对象：人工智能专业本科生

先修课程：无

考核形式： 平时成绩+考试

撰写人：尹宝才

课程简介：（250-300 字）

该课程是信息学部人工智能与自动化学院为人工智能专业本科生开设的自主课程类型。本课程的任务是通过讲授研讨人工智能发展史、人工智能系统、人工智能技术、人工智能专业、人工智能前沿技术与发展动态等知识，提升大一新生对大学学习生活和专业的认知和学习能力。激发学生后续专业学习的兴趣，培养学生探究的思维方式和习惯。教学内容重点：人工智能三起两落的发展史、典型的人工智能系统、经典和前沿的人工智能技术、人工智能专业课程体系及课程间关系。教学内容的难点：通过系列主题研讨，如何激发起学生探究未知的兴趣和思维习惯；人工智能系统设计；人工智能不同经典和前沿技术的特点以及用于解决领域问题的思路和方法，对人工智能专业知识体系的理解等。

推荐教材或主要参考书：

[1] 李德毅，人工智能导论，中国科学技术出版社，2019 年 8 月

[2] 王万良，人工智能通识教程， 清华大学出版社，2020 年 9 月

0009394 Freshman Seminar

Course Number: 0009394

Course Title: Freshman Seminar

Course Type: Self-Regulated Curriculum

Credit: 1.0 **Total Credit Hours:** 16

Students: Undergraduate students majoring in artificial intelligence

Prerequisites: No

Evaluation Method: Course participation + written exams

Writer: Yin Baocai

Course Description:

Freshman Seminar is one of the self-regulated courses for undergraduate students Major in artificial intelligence. The main target of this course is to clarify and discuss the development of artificial intelligence, artificial intelligence system, artificial intelligence technology, artificial intelligence specialty, artificial intelligence frontier technology and development trend. During the learning course, the freshmen's cognition and learning ability will be enhanced, the learning interest will be motivated, and the thinking and learning habit will be cultivated. This course is focus on the striving history of artificial intelligence development, the representative artificial intelligence system, the classical and advanced artificial intelligence technology, the knowledge architecture and structure of artificial intelligence speciality. The difficulties of teaching contents are described as followings: how to motivate the learning interest for the unknown domain and thinking habit, how to design artificial intelligence system, the characteristics and applications of artificial intelligence technologies , how to understanding the artificial intelligence knowledge system.

Recommended Textbooks/References:

1.Li deyi, Introduction to artificial intelligence, China Science and Technology Press, 08-2019.

2.Wang wanliang, General course of artificial intelligence, Tsinghua university press, 09-2020.

0010704 信息通信网络及应用

课程编码：0010704

课程名称：信息通信网络及应用

英文名称：Information Communication Network and its Application

课程类型：自主课程

学分：2　**总学时：**32

面向对象：人工智能专业本科生

先修课程：高级语言程序设计，微机原理与接口技术

考核形式：平时成绩+实验+考试

撰写人：韩华云

课程简介：

信息通信网络及应用是信息学部为机器人工程专业本科生开设的专业任选课程。本课程的任务是讲述信息通信网络的基本原理、技术和方法。主要内容包括信息通信网络的发展、应用，数据通信基础，计算机网络体系结构，局域网，TCP/IP 协议，无线网络技术，网络互连设备，广域网技术等。通过本课程的学习和相关实验训练，学生可以掌握信息通信网络的基本原理和相关技术，为从事机器人工程研究和应用打下基础。教学重点内容包括数据通信基础、计算机网络体系结构、局域网、TCP/IP 协议、无线网络技术。教学难点内容包括数据通信基础、计算机网络体系结构、TCP/IP 协议。

推荐教材或主要参考书：

[1] 陈熙源, 祝雪芬, 汤新华. 信息通信网络概论（第一版）. 北京: 清华大学出版社, 2018.10

[2] 谢希仁. 计算机网络（第八版）. 北京:电子工业出版社, 2021.06

[3] （美）詹姆斯·F. 库罗斯, （美）基思·W. 罗斯著; 陈鸣译. 计算机网络: 自顶向下（原书第 7 版）. 北京: 机械工业出版社, 2018.05

[4] 何莉, 许林英, 等. 计算机网络概论（第二版）. 北京: 高等教育出版社, 1999.04

0010704 Information Communication Network and its Application

Course Number: 0010704

Course Title: Information Communication Network and its Application

Course type: Independent course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students major in Artificial Intelligence and Robotic Engineering

Prerequisites: High Level Language Programming, Microcomputer Principle and Interface Technology

Evaluation Method: Usual performance+Experiment+Written Exam

Writer： Han Huayun

Course Description:

Information communication network and its application is an independent course for undergraduates majoring in robotic engineering. The task of this course is to describe the basic principles, technologies and methods of information communication network. The main contents include the development and application of information communication network, data communication foundation, computer network architecture, local area network, TCP/IP protocol, wireless network technology, network interconnection equipment, wide area network technology, etc. Through the study and related experimental training of this course, students can master the basic principles and related technologies of information communication network, laying a foundation for the research and application of robotics engineering. Key contents of the course include data communication foundation, computer network architecture, local area network, TCP/IP protocol, wireless network technology. Teaching difficulties include data communication foundation, computer network architecture, TCP/IP protocol.

Recommended Textbooks/References:

1. Chen Xiyuan, Zhu Xuefen, Tang Xinhua. Introduction of Information Communication Network (First Edition). Beijing: Tsinghua University Press, 2018.10

2. Xie Xiren. Computer Network (Eighth Edition). Electronic Industry Press, 2021.06

3. James F. Kurose, Keith W. Ross; translated by Chen MingYi. Computer Networking: A Top-Down Approach, Seventh Edition. Beijing: Mechanical Industry Press, 2018.05

4. He Li, Xu Linying, et al. Overview of Computer Networks (Second Edition). Higher Education Press, 1999.04

0004046 嵌入式系统 I

课程编码：0004046

课程名称：嵌入式系统 I

英文名称：Embedded System I

课程性质：自主课程

学分： 2 **总学时：** 32

面向对象：人工智能专业本科生

先修课程：电路分析基础-1，电子技术，微机原理与接口技术，高级语言程序设计，Python 编程实践

考核形式：平时成绩+大作业

撰写人：任坤

课程简介：（250-300 字）

嵌入式系统 I 是人工智能专业的自主课程。本课程的目标是使学生了解嵌入式系统的基本概念与基本原理，初步掌握基于 ARM Cortex-A 内核微处理器的嵌入式系统开发的过程、开发工具使用及常用的基本理论知识。课程的主要内容包括：系统概述，硬件结构体系，嵌入式 Linux 及其开发基础，开发环境和工具应用，交叉编译、文件处理、进程管理、嵌入式设备驱动等。通过本课程的学习，学生对于嵌入式系统开发有一个系统的知识支撑，基本具备本领域分析问题解决问题的能力, 具备一定的工程实践能力，成为从事嵌入式系统开发的应用型人才。

推荐教材或主要参考书：

[1] 张思民，嵌入式系统设计与应用（第 3 版），清华大学出版社，2021 年 5 月

[2] 王剑，刘鹏，李波，蔡明文，嵌入式系统设计与应用——基于 ARM Cortex-A8 和 Linux（第 2 版），清华大学出版社，2020 年 9 月

0004046 Embedded System I

Course Number: 0004046

Course Title: Embedded System I

Course Type: self-determination

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Foundation of circuit analysis-I, Electronics technology, Microcomputer principle，C language，Python

Evaluation Method: Course participation + project report

Writer：Ren Kun

Course Description:

Embedded System I is one of the self-determination courses for undergraduate students Major in Artificial Intelligence. The main target of this course is to clarify the basic concepts and principles of embedded systems, the process of embedded system development based on ARM Cortex-A core microprocessor, the use of development tools, and common basic theoretical knowledge. This course focuses on how students can engage in embedded system development with systematic knowledge support, have the essential ability to analyze and solve problems in this field, and have specific engineering practice abilities. The teaching contents are mainly covered by the following aspects: embedded system overview, hardware architecture, embedded Linux, embedded development environment, development tools, cross-compilation, file processing, process management, and embedded device driver.

Recommended Textbooks/References:

1.Simin Zhang, Embedded System Design and Applications (3rd Edition), *Tsinghua University* Press, 5-2021

2.Jian Wang, Peng Liu, Bo Li, Mingwen Cai, Embedded System Design and Applications - Based on ARM Cortex-A8 and Linux (2nd Edition), *Tsinghua University* Press, 9-2020

0010663 学术写作课程

课程编号：0010663

课程名称：学术写作课程

课程性质：自主课程

英文名称：Academic Writing

学分：1.0　　**总学时：**16

面向对象：人工智能专业本科生

先修课程：无

考核形式：课堂表现+课堂练习+论文分析报告

撰写人：孙梦姝

课程简介：

学术论文是专门对科学领域中的某些问题进行研究、探讨和描述结果的文章，是表现科学研究成果的重要形式。学术论文的写作方法与规范是大学生应具备的基本知识和技能。本课程是人工智能与自动化学院根据人工智能专业的特点和需要开设的自主课程，主要介绍学术论文的检索方法、论文结构、写作方法和规范、投稿流程等，旨在培养学生撰写毕业论文和科技论文的能力，使学生能够就人工智能领域专业问题，以文稿、图表等方式表达观点，与业界同行和社会公众交流，并能够在跨文化背景下交流。重点：论文检索、毕业论文的写作、学术规范等。难点：论文摘要的写作、参考文献列表及引用等。

推荐教材或主要参考书：

[1]闫茂德，左磊，杨盼盼等. 科技论文写作. 机械工业出版社，2021 年 3 月

[2]张孙玮，赵卫国，张迅. 科技论文写作入门（第五版）. 化学工业出版社，2019 年 11 月

[3]Barbara Gastel，Robert A. Day 著，任志刚译. 科技论文写作与发表教程(第八版). 电子工业出版社，2018 年 1 月

0010663 Academic Writing

Course Number: 0010663

Course Title: Academic Writing

Course Type: Self-Regulated

Credit: 1.0 **Total Credit Hours**: 16

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: None

Evaluation Method: In-Class Participation + In-Class Practices + Paper Analysis Report

Writer：Sun Mengshu

Course Description:

Academic papers are articles that study and discuss issues in certain scientific research field, as well as describing the results. They are important forms of representing the scientific research achievements. Undergraduate students should learn and grasp academic paper writing and criteria as the basic knowledge and skills. This course is established by the College of Artificial Intelligence and Automation according to the characteristics and requirements of the Artificial Intelligence major. It introduces the searching and structure of academic papers, writing methods and criteria, paper submission flow, etc. The target of this course is to cultivate the ability of students in writing the thesis and scientific papers, enabling students to express their opinions on professional problems in the artificial intelligence area using text, figures and tables, as well as communicating with peers and the public, maybe in a cross-cultural background. Key points: paper searching, thesis writing, academic criteria. Difficulties: the writing of the paper abstract, the reference list and citation.

Recommended Textbooks/References:

[1] YAN Maode, ZUO Lei, YANG Panpan, et al. Scientific Paper Writing. China Machine Press, March 2021

[2] ZHANG Sunwei, ZHAO Weiguo, ZHANG Xun. Introduction to Scientific Paper Writing, 5th Edition. Chemical Industry Press, November 2019

[3] Barbara Gastel, Robert A. Day, Translated by REN Zhigang. How to Write and Publish a Scientific Paper, 8th Edition. Publishing House of Electronics Industry, January 2018

0010745 人工智能前沿技术讲座

课程编码：0010745

课程名称：人工智能前沿技术讲座

英文名称：Lectures on Frontier Technology in Artificial Intelligence

课程类型：自主课程

学分： 1.0 **总学时：** 16

面向对象：人工智能专业本科生

先修课程：人工智能导论、图像处理、机器学习、模式识别、机器视觉、自然语言处理、数据挖掘、数据结构、数据库原理、高级语言程序设计、物联网技术基础、自动控制原理、微机原理与接口技术、新生研讨课

考核形式：平时成绩+汇报

撰写人：尹宝才

课程简介：（250-300 字）

人工智能前沿技术讲座是人工智能与自动化学院为人工智能专业本科生开设的自主课程。本课程是为人工智能专业大学四年级学生所开设的综合性专业提高课程。主要内容是介绍人工智能领域科学研究和技术的最新发展与前沿知识，包括自然语言处理技术研究与发展、计算机视觉技术研究与发展、机器人智能交互技术研究与发展等。通过本课程的学习，使学生能更多地了解人工智能领域面临的挑战和所要解决的主要问题，掌握人工智能前沿理论研究和技术发展的动态，以开阔学生视野，增强学生的创新意识，提高学生的交流能力和分析问题、解决问题的能力。

推荐教材或主要参考书：

自主查阅和论坛内容相关的学术文献。

0010745 Lectures on Frontier Technology in Artificial Intelligence

Course Number: 0010745

Course Title: Lectures on Frontier Technology in Artificial Intelligence

Course Type: Independent course

Credit: 1.0 **Total Credit Hours:** 16

Students: Undergraduate students majoring in Artificial Intelligence

Prerequisites: Introduction to Artificial Intelligence, Image Processing, Machine Learning, Pattern Recognition, Machine Vision, Natural Language Processing, Data Mining, Data Structure, Database Principles, Programming Design, Advanced Language Programming, Fundamentals of IoT Technology, Automatic Control Theory, Computer Principles and Interface Technology, Freshman Seminar

Evaluation Method: Course participation + report

Writer：Yin Baocai

Course Description:

This course is an independent course for senior artificial intelligence students. The main content is to introduce the latest development and frontier knowledge of scientific research and technology in the field of artificial intelligence, including the research progress of natural language process, computer vision and intelligent interaction between human-robot and so on. Through this course, students can learn more about the lasted progress and the challenging problems of artificial intelligence. This course will help the students to master the research trends of artificial intelligence, so as to broaden their academic vision, enhance their innovation ability. The final report will cultivate their communication ability and the ability to analyze and solve problems.

Recommended Textbooks/References:

Independent access to academic literature related to the forums.