人工智能专业人才培养方案

Undergraduate Program for Artificial Intelligence Major

学科门类：工学	国标代码：	08
Discipline Type: Engineering	Code: 08	
专业类：电子信息类	国标代码：	0807
Type: Electronic Information	Code: 0807	
专业名称：人工智能	国标代码： 080717T	校内代码： 66
Title of the Major: Artificial Intelligence	Code: 080717T	

一、学制与学位 Length of Schooling and Degree

学制：四年 Duration: Four years

授予学位：工学学士 Degree: Bachelor of Engineering

二、培养目标 Educational Objectives

本专业培养品德优良、人格健全、体魄健康、遵守法律法规，具有强烈的爱国情怀与社会和环境意识、扎实的基础、较强的创新意识、突出的工程实践能力、具有国际视野和良好发展潜力的人才。掌握自然科学和人文社科基础知识、计算机科学基础理论及控制、电子信息和能源电力等多学科交叉知识。培养能够解决人工智能技术领域的复杂工程技术问题，能够在科研机构、高等院校、企事业等单位从事人工智能技术相关的研发与应用等工作，尤其是在能源电力领域从事复杂智能化系统研发工作的高素质专门人才。

This major cultivates talents with good moral character, sound personality, healthy physique, compliance with laws and regulations, strong patriotism and social and environmental awareness, a solid foundation, a strong sense of innovation, outstanding engineering practice capabilities, an international vision and good development potential. The students master basic knowledge of natural sciences, humanities and social sciences, basic computer science theories, inter-disciplines including: cybernetics, electronic information, energy and power. Train students to be able to solve complex engineering technical problems in the field of artificial intelligence, and be able to engage in research and application of artificial intelligence in scientific research institutions, universities, enterprises and other jobs, especially train students to become highly qualified professionals engaged in the research and development of complex intelligent systems in the field of energy and power.

学生毕业 5 年左右能够达到的职业和专业成就：

（1）具备较高的人文社会科学素养、社会责任感和工程职业道德，具备较丰富的工程经验，深入了解与人工智能领域相关的职业和行业的智能化需求，能够提出专业的解决方案；

（2）具有灵活运用数学、自然科学以及经济、管理知识解决人工智能领域的复杂工程技术问题的能力，能够成为相关项目的管理和技术核心骨干；

（3）具有较为突出的创新能力，能够深入理解和准确评价复杂工程问题的工程实践对

环境、社会可持续发展的影响，能够在综合考虑健康、安全、法律以及文化等工程伦理因素下进行复杂智能化系统的设计与开发；

（4）能够在跨职能、多学科的工程实践团队中工作和交流，具备管理工作团队及协调项目的活动能力，能够组织制定工作计划并有效实施；

（5）具备终身学习的能力，能够应对科技发展挑战，掌握新兴技术，具备可持续发展理念和国际化视野，能够顺利进行跨文化的交流与合作；

（6）在计算机、控制、能源电力和电子信息等与人工智能相关专业或交叉学科领域成功就业或进入硕士、博士阶段学习。

Graduates are expected to have the following professional achievements after 5 years of work practice:

(1) They will have a high humanities and social science literacy, social responsibility and engineering professional ethics, rich engineering experience, in-depth understanding of the information requirements of occupations and industries related to the artificial intelligence field, and able to propose professional independent technical solutions;

(2) They Have the ability to flexibly use mathematics, natural sciences, economics, and management knowledge to solve complex engineering problems, proficient in the research, design, development and comprehensive application of the artificial intelligence field, and be able to become management or technical core members in related projects;

(3) They will have a relatively outstanding ability to innovate, be able to deeply understand and accurately evaluate the impact of engineering practices of complex engineering issues on the environment and sustainable development of society, and be able to design and development of complex intelligent systems with comprehensive consideration of health, safety, legal, and cultural factors;

(4) They have the ability to manage work teams and coordinate project activities, be able to organize and formulate work plans and implement them effectively; be able to effectively work and communicate with cross-functional and interdisciplinary colleagues in the engineering teams;

(5) They will have the ability to learn for life, be able to cope with the challenges of technological development, master emerging technologies, have the concept of sustainable development and an international vision, and be able to carry out cross-cultural exchanges and cooperation smoothly.

(6) They will have the ability to enter industry or the master/doctor-level in artificial intelligence and related disciplines such as computer science, cybernetics, electronics, energy and power.

三、专业培养基本要求 Skills Profile

毕业生应获得以下几方面的知识和能力：

1. 工程知识：能够将数学、自然科学、工程基础和专业知识用于解决人工智能相关领域的复杂工程问题。

2. 问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析智能系统及能源电力相关领域的复杂工程问题，以获得有效结论。

3. 设计/开发解决方案：能够设计针对复杂工程问题的解决方案，设计满足特定需求的智能系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

4. 研究：能够基于科学原理并采用科学方法对人工智能及能源电力相关领域的复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

5. 使用现代工具：能够针对复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对人工智能相关领域的复杂工程问题的预测与模拟，并能够理解其局限性。

6. 工程与社会：能够基于工程相关背景知识进行合理分析，评价专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

7. 环境和可持续发展：能够理解和评价针对复杂工程问题的工程实践对环境、社会可持续发展的影响。

8. 职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。

9. 个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

10. 沟通：能够就人工智能及能源电力相关领域的复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

11. 项目管理：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。

12. 终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

The required knowledge and ability for the graduates as follows:

1. Engineering knowledge: Ability to apply mathematics, natural sciences, engineering fundamentals and expertise to solve complex engineering problems in the field of artificial intelligence.

2. Problem Analysis: Ability to apply the basic principles of mathematics, natural science and engineering science to identify, express, and analyze complex engineering problems in artificial intelligence and energy and power related fields through literature research to obtain effective conclusions.

3. Design/Development Solutions: Ability to design solutions for complex engineering problems, design intelligent systems, units (components) or processes that meet specific needs, and reflect innovation in the design process, considering social, health and safety, legal, cultural and environmental factors.

4. Research: It is possible to conduct research on complex engineering problems in artificial intelligence and energy and power related fields based on scientific principles and scientific methods, including designing experiments, analyzing and interpreting data, and obtaining reasonable and effective conclusions through information synthesis.

5. Use modern tools: Ability to develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for complex engineering problems, including predictions and simulations of complex engineering problems in areas related to artificial intelligence, and understand their limitation.

6. Engineering and Society: Ability to conduct a rational analysis based on engineering-related background knowledge, evaluate the impact of professional engineering practices and complex engineering problem solutions on society, health, safety, law, and culture, and understand the responsibilities.

7. Environment and Sustainable Development: Ability to understand and evaluate the impact of engineering practices on complex engineering issues on environmental and social

sustainability.

8. Professional norms: With humanities and social science literacy and social responsibility, ability to understand and abide engineering professional ethics and norms and fulfill responsibilities in engineering practice.

9. Individuals and teams: Ability to assume the roles of individuals, team members, and responsible individuals in a multidisciplinary team.

10. Communication: Effective communication and communication with industry peers and the public on complex engineering issues related to artificial intelligence and energy and power, including writing reports and designing contributions, presenting statements, articulating or responding to instructions. It also has a certain international perspective and can communicate and communicate in a cross-cultural context.

11. Project Management: Understand and master engineering management principles and economic decision-making methods, and apply them in a multidisciplinary situation.

12. Lifelong learning: Awareness of self-directed learning and lifelong learning, with the ability to continuously learn and adapt to development.

四、学时与学分 Hours and Credits

类别 **Category**		学时 **Hours**	学分 **Credits**	比例 **Percentage**
必修课 Required course	公共基础教育 Public infrastructure	644	33	19.64%
	学科门类基础 Basis of discipline	640	40	23.81%
	专业类基础 Basis of major	384	24	14.29%
	专业核心 Core of major	208	13	7.74%
	集中实践 Intensive practice	208 学时+21 周 208 class hours +21weeks	33	19.64%
必修课小计 Subtotal of Required course		2084 学时+21 周 2084class hours + 21 weeks	143	85.12%
选修课 Elective courses		320	20	11.90%
课外实践学分 Practice of extra-curricular		5 周 5 weeks	5	2.98%
总计 Total		2404 学时+26 周 2404class hours + 26weeks	168	100%

说明：

必修实践环节学分包括：集中实践课程 33 学分，课外实践课程 5 学分，学科门类基础、专业基础、专业必修课程中的实验折算 5.5 学分，共计 43.5 学分，占总学分 25.89%。

Note:

Total of 43.5 credits for required practice training, accounting for 25.89% of the total credits, including: 33 credits for Intensive practice, 5 credits for practice credits of extra-curricular, 5 credits for class experiments in various compulsory courses.

五、专业主干课程 Main Courses

离散数学、数据结构、面向对象程序设计、操作系统、数据库原理、人工智能数学基础、计算机网络、机器学习、数据分析与程序设计、控制原理与应用、自然语言处理、机器人学，深度学习。

Discrete Mathematics, Data Structure, Object-Oriented Programming, Operating Systems, Database Principles, Mathematical Foundations of Artificial Intelligence, Computer Networks, Machine Learning, Data Analysis and Programming, Control Principles and Applications, Natural Language Processing, Robotics，Deep Learning。

六、总周数分配　Arrangement of the Total Weeks

学期 Semester / 教学环节 Teaching Program	一	二	三	四	五	六	七	八	合计
理论教学 Theoretic Teaching	17	16	16	16	16	16	16	2	
复习考试 Review and Exam	2	2	1	1	2	2	2	1	
集中实践环节 Intensive practice	3	2	3	4	3	2	0	16	
小计 Subtotal	22	20	20	20	21	20	19	19	
寒假 Winter Vacation	5		5		5		5		20
暑假 Summer Vacation		6		6		6			18
合计 Total	27	26	25	26	26	26	23	19	200

人工智能专业必修课程体系及教学计划

Table of Teaching Schedule for Required Course and Teaching Plan

类别 Type	课程编号 Course ID	课程名称 Course name	学分 Credits	总学时 Hours	课内学时 In class hours	实验学时 Lab hours	课外学时 Off class hours	开课学期 Semester
公共基础教育	00700975	中国近现代史纲要 Chinese Modern and Contemporary History Outline	3	48	32		16	2
	00701353	思想道德修养与法律基础 Ideology and Moral Cultivation & Law Basis	3	48	32		16	1
	00700983	毛泽东思想和中国特色社会主义理论体系概论 Mao Zedong Thought and the theory of building socialism with Chinese characteristics	3	48	32		16	3
	00700971	马克思主义基本原理 Marxist theory	3	48	32		16	3
	00700988	习近平新时代中国特色社会主义思想概论 Outline of Xi Jinping's New China's Socialist Ideology	3	48	32		16	2
	00701661-00701668	形势与政策 Current Events and Policy	2	64	64			1-8
	J100010	现代电力工程师	2	32	32			2
	01390011	军事理论 Military theory	2	36	16		20	1
	00801410	通用英语 English for General Purpose	4	64	64			1
	00801400	学术英语 English for Academic Purpose	4	64	64			2
	01000011	体育(1) Physical Culture (1)	1	36	30		6	1
	01000021	体育(2) Physical Culture (2)	1	36	30		6	2
	01000031	体育(3) Physical Culture (3)	1	36	30		6	3
	01000041	体育(4) Physical Culture (4)	1	36	30		6	4
	公共基础教育小计 Subtotal of public infrastructure		33	644	528		116	
学科门类基础课	00900130	高等数学(1) Advanced Mathematics (1)	5.5	88	88			1
	00900140	高等数学(2) Advanced Mathematics (2)	6	96	96			2
	00900462	线性代数 Linear Algebra	3	48	48			3
	00900111	概率论与数理统计 Probability and Mathematical Statistics	3.5	56	56			4
	00900053	大学物理(1) College Physics (1)	3.5	56	56			2
	00900064	大学物理(2) College Physics (2)	3	48	48			3
	00900440	物理实验（1） Experiments of Physics（1）	2	32		32		2
	00900450	物理实验（2） Experiments of Physics（2）	2	32		32		3
	04100300	高级语言程序设计 Advanced Language Programming	3.5	56	56			1
	04101700	计算机导论 Introduction to Computer Science	1	16	16			1
	00600460	离散数学 Discrete Mathematics	4	64	64			1
	10410221	面向对象程序设计 Object Oriented Programming	3	48	40	8		3
	学科门类基础课小计 subtotal of basis of discipline		40	640	568	72		

类别 Type	课程编号 Course ID	课程名称 Course name	学分 Credits	总学时 Hours	课内学时 In class hours	实验学时 Lab hours	课外学时 Off class hours	开课学期 Semester
专业类基础课	00600600	数据结构 Data Structure	3.5	56	56			2
	00600651	数字逻辑与数字系统设计 Digital Logic and Digital System Design	3	48	48			4
	00600100	操作系统 Operating Systems	3.5	56	56			4
	10410560	计算机组成原理	3.5	56	56			5
	10410240	人工智能导论 Introduction of Artificial Intelligence	2	32	32			4
	10141020	人工智能数学基础 Mathematic Basics of Artificial Intelligence	3	48	48			4
	10410160	计算机网络 Computer network	3	48	48			3
	00600621	数据库原理 Principles of Database	2.5	40	40			5
	专业类基础课小计Subtotal of basis of major		24	384	384			
专业类核心课	00601720	数据分析与程序设计 Data Analysis and Programming	2	32	32			4
	00601540	深度学习 Deep Learning	2	32	32			6
	00601780	机器学习 Machine learning	3	48	40	8		5
	10310641	控制原理与应用 Control Principles and Applications	2	32	32			5
	00601491	机器人学 Robotics	2	32	32			7
	00601560	自然语言处理 Natural Language Processing	2	32	24	8		6
	专业核心课小计 Subtotal of Core of major		13	208	192	16		
必修课学分合计 Subtotal of Required courses			110					

人工智能专业集中实践环节设置及教学计划

Table of Teaching Schedule for Main Practical Training

类别 Type	课序号 ID	环节名称 Name	学分 Credits	周数 Weeks	学时数 Hours	开课学期 Semester
集中实践	01390012	军事技能 Military Training	2	2		1
	00690092	程序设计实验 Course Project of Advanced Language Programming	1	1		1
	00690210	数据结构课程设计 Course Project of Data Structure and Algorithm	1	1		2
	00690130	认识实习 Acquaintanceship Practice	1	1		2
	00290232	劳动教育 Labor Education	2	2		3
	00690290	计算机网络综合实验 Experiments of Computer Networks	1	1		3
	00690380	数字逻辑与数字系统设计综合实验 Experiments of Digital Logic and Digital System Design	1	1		4
	00601711	数据分析与程序设计课程设计 Course Project of Data Analysis and Program Design	2	2		4
	00690061	操作系统综合实验 Experiments of Operating System	1	1		4
	00690190	数据库原理课程设计 Course Project of Database Application	1	1		5
	00690760	机器学习课程设计 Course Project of Machine Learning	2	2		5
	10410569	计算机组成原理综合实验 Experiments of Computer Composition Principles	1	1		5
	00690790	专业综合实践	2	2		6
	00690031	毕业实习 Major Practice	2	2		8
	00690021	毕业设计 Graduation Project	13		208	7-8
	00690010	毕业教育 Graduation Education	0	1		8
	集中实践小计 Subtotal of intensive practice		33	21	208	

人工智能专业选修课教学进程

Table of Teaching Schedule for Electives

选修课程分为专业领域课程、其它专业课程、通识教育课程 3 个部分，总学分不低于 20 学分。其中，专业领域课程和其它专业课程学分不低于 12 学分。学生可根据自身情况、兴趣爱好等进行选课。

Elective courses are divided into 3 parts: major courses, general education courses, other major courses. The total elective credits are not less than 20 credits total credits, and the total courses including major courses and other major courses are not less than 12 credits total credits. Students can choose courses according to their own situation and interests.

1．**专业领域课程** Major field courses

专业领域课程旨在培养学生在该专业某领域内具备综合分析、处理（研究、设计）问题的技能及专业前沿知识。本专业领域的选修课程如下表所示。

Major field courses aim to develop students' skills and advanced knowledge of comprehensive analysis, processing (research, design) problems in a certain field of the major. Elective courses in this field are shown in the following table.

2．**其他专业课程** Other major courses

为了培养复合型人才，鼓励学生跨专业选修专业课程。学生可以选修我校开设的任何专业的专业课程。

In order to cultivate compound talents, students should be encouraged to cross major elective courses. Students can take any courses offered by our university.

3．**通识教育课程** General education curriculum

通识教育课程包括人文社科、语言交流、文化艺术、科学技术、经济管理、创新创业等模块，学生从学校给定的通识教育课程中选择。

General education curriculum includes humanities and social sciences, language communication, culture and art, science and technology, economic management, innovation and entrepreneurship modules. Students choose from general education courses offered by the university. The courses “Introduction to environmental protection and sustainable society” and “Engineering Project Management” are suggested to be selected.

人工智能专业选修课程体系及教学计划

Table of Teaching Schedule for Elective Course and Teaching Plan

类别	课程编号		课程名称	学分	总学时	课内学时	实验学时	上机学时	课外学时	开课学期	必修选修
选修课	00601671	理论模块	Python语言高级编程	2	32	32				3	至少选修20学分
	00201980		智能电网导论 Introduction of Smart Grid	2	32	32				4	
	00400311		图像处理与计算机视觉 Computer Vision	2	32	32				6	
	00601640		专业英语（智能科学与技术） Professional English	1	16	16				4	
	00600661		算法设计与分析基础 Basic Algorithm Design and Analysis	2	32	32				4	
	00601510		人工智能安全 Artificial Intelligence Security	2	32	32				5	
	00601660		分子智能计算 Molecular Intelligence computing	2	32	32				6	
	00601690		脑与认知科学 Brain and Cognitive Science	2	32	32				4	
	00601400		智能优化算法 Modern Intelligent Optimization Algorithm	2	32	32				7	
	00601750		博弈理论 Gaming Theory	2	32	32				6	
	00601760		智能边缘计算 Intelligent Edge Computing	2	32	32				6	
	00601600		纳米智能机器人 Nano Intelligent Robot	2	32	32				7	
	00600040	应用模块	LINUX 体系及编程 LINUX Architecture and Programming	2	32	24		8		4	
	00600521		人工智能及应用 Artificial Intelligence and Application	2	32	32				4	
	00601740		Web智能编程与应用 Web Intelligent programming and application	2	32	32				5	
	00601620		量子智能计算 Quantum Intelligent Computing	2	32	32				5	
	00601500		电力大数据分析与应用 Big Data in Electric Power Industry	1.5	24	24				6	
	00601680		OpenCV开发与应用 OpenCV Development and Applications	2	32	32				7	
	00601770		多智能体博弈 Multi-Agent Gaming	2	32	32				7	
	00900480	通识模块	管理运筹学 Managerial Operation Research	2	32	32				6	
	通识教育选修课程 General knowledge electives			建议							
	跨专业课程 Cross-major Electives			建议							
	研究生学位课程 Postgraduate Electives			建议							
	选修小计 Subtotal of Electives			至少选修 20 学分							

选修课选课建议：Recommendations for electives

1.第二、第三学期：建议每学期选修通识教育选修课程模块中的课程 1-2 门。

2.第四、五、六、七、八学期：建议每学期从专业选修课各模块中选修 1-3 门课程；也可根据个人兴趣，跨专业选修其他专业的专业课程。

1. Second and third semesters: It is recommended to select 1-2 courses in **General Education Electives** every semester.
2. Fourth, fifth, sixth, seventh, and eighth semesters: It is recommended to choose 1-3 courses from each part of electives each semester; you can also select **Interdisciplinary Electives** based on personal interests.

辅修人工智能专业人才培养方案

Undergraduate Program for the Network Engineering Minor

组别	课程编号	课程名称	学分	总学时	课内学时	实验学时	开课学期	备注
A【必须包括所有专业核心课程，其他必须是必修课】	00600600	数据结构 Data Structure	3.5	56	56		3	
	00600100	操作系统 Operating Systems	3	48	48		4	
	10410240	人工智能导论 Introduction to Artificial Intelligence	2	32	32		4	
	10141020	人工智能数学基础 Mathematical Foundations of Artificial Intelligence	3	48	48		4	
	00600621	数据库原理 Principles of Database	2.5	40	40		5	
	00601720	数据分析与程序设计 Data Analysis and Programming Design	2	32	32		5	
	10310641	控制原理与应用 Control Principles and Applications	2	32	32		5	
	00601780	机器学习 Machine learning	3	48	40	8	6	
	00601560	自然语言处理 Natural language Processing	2	32	32		6	
	00601540	深度学习 Deep Learning	2	32	24	8	6	
	00601491	机器人学 Robotics	2	32	24	8	7	
B		毕业设计 Graduation Project	13				8	
学分合计 Subtotal of courses			40					

说明：1.辅修专业需修读 A 组课程，计 27 学分；

2.辅修专业学士学位需修读 A、B 两组课程，计 40 学分。