智能科学与技术专业人才培养方案

Undergraduate Program for Intelligent Science and Technology Major

学科门类：工学　　　　　　　　　　　国标代码： 08

Discipline Type: Engineering　　　　　Code:　08

专业类：计算机类　　　　　　　　　　国标代码：0809

Type: Computer　　　　　　　　　　　Code:　0809

专业名称：智能科学与技术　　　　　　国标代码：080907T　　　校内代码： 65

Title of the Major: Intelligent Science and　Code:　080907T

Technology

一、学制与学位　Length of Schooling and Degree

学制：四年　Duration：Four years

学位：工学学士　Degree：Bachelor of Engineering

二、培养目标　Educational Objectives

培养适应国民经济建设和现代科技发展需求，具备良好的人文、科学与工程素质，系统地掌握智能科学与技术、计算机、自动化的基本理论、基本知识和基本技能与方法，在智能科学与工程领域具有较强的科学研究能力和创新创业能力，具有良好的科学思维方法和系统的工程实践技术，具有良好的职业道德，能综合运用交叉知识与国际接轨的复合型、创造型科技人才，成为德智体美劳全面发展的 社会主义事业合格建设者和可靠接班人。毕业生具有在工程技术、社会经济等各领域进行创新创业的能力，可以在科研机构、高等院校、工厂企业等单位从事智能系统分析与设计、智能技术研发与应用等工作。

本专业预期学生在毕业五年左右能够达到的目标如下：

(1) 具有良好的人文科学素养、工程职业道德和社会责任感，能够积极服务国家与社会;

(2) 能够运用智能科学与技术领域的专业知识、工程技能和现代工具，具有将专业知识用于问题分析、技术方案设计和运用工程技术解决问题的实际工作能力;

(3) 能在智能科学与技术相关领域胜任智能系统的运行与维护、智能装备的研发、生产、制造等工作，具有较强的科学研究、技术开发、管理与决策能力;

(4) 具备良好的沟通与表达能力及一定的组织管理能力，能够在团队中分工协作、交流沟通，在多学科、跨文化背景中发挥有效作用;

(5) 具有创新意识、终身学习能力与可持续发展理念，能够自我更新知识、不断学习适应社会发展和行业竞争的能力。

This major istargetedat cultivating excellent talents who are equipped with good humanities, science and engineering qualities, who systematically master the basic theories, basic knowledge and basic skills and methods of intelligent science and technology, computer and automation, and have strong scientific research capabilities and innovative entrepreneurship in the field of intelligent science and engineering. Graduates should have a good scientific thinking method and systematic engineering practice technology, with a good professional ethics, can comprehensively use cross-knowledge and international integration of composite, creative technology. They should

also have the ability to innovate in various fields such as engineering technology, social economy, etc. They can engage in intelligent system analysis and design, intelligent technology research and development and application in civil or military departments, scientific research institutions, universities, factories and other institutions jobs.

The goals that students are expected to achieve in the five years of graduation are as follows:

(1) Have a sound personality and good human qualities and moral cultivation;

(2) Have the practical ability to apply expertise to problem analysis, technical solution design, and engineering techniques to solve problems;

(3) Be able to operate and maintain intelligent systems, research and development, production and manufacturing of intelligent equipment in areas related to intelligent science and technology;

(4) Have the ability to continuously learn to adapt to social development and industry competition;

(5) Be able to work and communicate in a team, capable of technical responsibility and management.

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智能系统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智能系统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，包括对智能系统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：能够就智能系统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 intelligent systems.

2. Problem Analysis: It can apply the basic principles of mathematics, natural science and engineering science to identify, express, and analyze complex engineering problems in intelligent systems 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 intelligent systems 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 intelligent systems, and understand them 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, we can understand and abide by engineering professional ethics and norms and fulfill our 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 intelligent systems 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 environment.

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 classhours + 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 + 26 weeks	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、专业基础课程中的实验课程 4 学分，学科门类基础、专业基础、专业必修课程中的实验、上机学时折算 1.5 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, 4 credits for basis of discipline and basis of major, 1.5 credit for experiment and computer practice in basis of discipline, basis of major, and required courses of major.

五、专业主干课程　Main Courses

人工智能导论、人工智能数学基础、脑与认知科学、智能电网导论、数据分析与程序设计、人工智能安全、智能信息处理、电力大数据分析与应用、机器学习、自然语言处理、图像处理与计算机视觉、智能优化算法、分子智能计算、纳米智能机器人、量子智能计算、深度学习、智能边缘计算、 OpenCV 开发与应用、多智能体博弈、人工智能及应用。

Introduction of Artificial Intelligence, Mathematic basisof Artificial Intelligence,Brain and Cognitive Science, Smart Grid Introduction, Data Analysis and Programming, Artificial Intelligence Security, Intelligent Information Processing, Big Data Analysis and Application in Electric Power Industry, Machine Learning, Natural Language Processing, Image Processing and Computer Vision, Intelligent Optimization Algorithm, Molecular Intelligent Computing, Nano-intelligent robots, Quantum Intelligent Computing, Deep learning, Intelligent Edge Computing, OpenCV development and Applications, Multi-agent Gaming, Artificial Intelligence and Applications.

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	17	16	16	16	17	2	118

学期 Semester 教学环节 Teaching Program	一	二	三	四	五	六	七	八	合计
复习考试 Review and Exam	2	2	1	1	2	2	2	1	11
集中实践环节 Intensive practice	3	2	2	4	3	2	0	16	32
小计 Subtotal	22	20	20	20	21	20	19	19	162
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	24	19	200

智能科学与技术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	思想道德与法治 Ideology and Moral Cultivation & Law	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	24		12	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

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
	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		
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 Principles of Computer Organization	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
	00601690	脑与认知科学 Brain and Cognitive Science	2	32	32			4
	00601780	机器学习 Machine learning	3	48	40	8		5
	00601460	智能信息处理 Intelligent Information Processing	2	32	32			5
	00400311	图像处理与计算机视觉 Computer Vision	2	32	32			6
	00601400	智能优化算法 Modern Intelligent Optimization Algorithm	2	32	24	8		7
		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					

智能科学与技术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
	J100060	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 ExperimentsofDigitalLogicandDigitalSystem Design	1	1		4
	00601710	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 Specialty Comprehensive Training	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	

智能科学与技术专业选修课教学进程

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课程。学生可以选修我校开设的任何专业的课程。

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.

智能科学与技术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 Advanced Programming in Python	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	
	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	
	00601540		深度学习 Deep Learning	2	32	32				6	
	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	
	00601560		自然语言处理 NaturalLanguageProcessing	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							
	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.

选修课选课建议：Recommendations for electives

辅修智能科学与技术专业人才培养方案

Undergraduate Program for Intelligent Science and Technology 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	00600600	数据结构 Data Structure	3.5	56	56		2	
	00600100	操作系统 Operating Systems	3.5	56	56		4	
	10410560	计算机组成原理 Principles of Computer Organization	3.5	56	56		5	
	00600621	数据库原理 Database Principles	2.5	40	40		5	
	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	
	00601720	数据分析与程序设计 Data Analysis and ProgrammingDesign	2	32	32		4	
	00601690	脑与认知科学 Brain and Cognitive Science	2	32	32		4	
	00601780	机器学习 Machine learning	3	48	40	8	5	
	00601400	智能优化算法 Intelligent OptimizationAlgorithm	2	32	32		7	
	00400311	图像处理与计算机视觉 Image Processing and Computer Vision	2	32	32		6	
	00601460	智能信息处理 IntelligentInformation Processing	2	32	32		5	
B	00690021	毕业设计 Graduation Project	13				8	
学分合计 Subtotal of courses			44					

说明：1.辅修专业需修读 A 组课程，计 31 学分；

2.辅修专业学士学位需修读 A、B 两组课程，计 44 学分。