Intelligent Science and Technology

(Grade 2022)

Course code: 080907T

I. Cultivation Objectives

1. General cultivation objective

According to the orientation of running an application-oriented university, this program is based on the field of Intelligent Science and Technology, with intelligent information processing and intelligent application development as the entry point, to cultivate high quality application-oriented talents in Engineering Technology, who have a love for the motherland, comprehensive development of moral, intellectual, physical, aesthetic and labor, and independent learning and innovation abilities, and can systematically master the basic theory, basic knowledge, basic skills and methods in the field of Intelligent Science and Technology, and be capable of analyzing and solving problems.

2. Objective of value guidance

With the core values of socialism and the value orientation of craftsmanship and the spirit of the new era's model workers, this program combines the humanities and social science courses, engineering fundamental course and professional courses in the mode of Civic Education to cultivate students' good humanities and social science literacy, professional ethics, psychological quality and sense of social responsibility, as well as a strong sense of innovation and entrepreneurship.

3. Five years after graduation, students in this program should achieve the following objectives:

(1) Have a sense of social responsibility and good professional ethics, be able to integrate the impacts of legal, environmental, social, cultural and sustainable development factors in their engineering practice.

(2) Master high scientific and professional qualities, be able to skillfully apply theories, techniques, tools and methods of mathematics, natural sciences, basic principles of engineering and artificial intelligence in the field of intelligent information processing and intelligent application development to solve complex engineering problems, have strong technical innovation ability and international perspective, and be capable of senior technical and managerial work in intelligent information processing and intelligent application development.

(3) Have rich professional and technical work experience, capable of synthesizing basic knowledge of engineering mathematics and science and professional knowledge in the field of intelligent science to solve complex engineering and technical problems in the field of intelligent information processing and intelligent application development, and grow into the core player of the industry and high quality talents.

(4) Master a healthy personality, good humanities and science skills, have team spirit and good communication, coordination, cooperation, competition and engineering Project Management skills.

(5) Be able to communicate internationally with international counterparts using a foreign language. Be able to proactively adapt to changing domestic and international scientific and technological developments, develop the habit of independent and lifelong learning, and continuously increase knowledge base and enhance abilities.

II. Graduation requirements

1. Engineering knowledge: Have the ability to apply mathematical, natural science and engineering fundamentals and expertise to the solution of complex engineering problems.

1-1: Have the ability to apply techniques from the fields of mathematics, natural science, engineering science and Intelligent Science and Technology to the formulation of complex engineering problems.

1-2: Be able to develop mathematical models and solve them for specific objects in complex engineering problems.

1-3: Be able to apply relevant knowledge and mathematical modelling methods to the reasoning and analysis of complex engineering problems.

1-4: Be able to apply relevant knowledge and mathematical modelling methods to the comparison and synthesis of solutions to complex engineering problems.

2. Analysis of the Problem: Have the ability to apply fundamental principles of mathematics, natural and engineering sciences to identify, express, and through literature
research and analysis of complex engineering problems to reach valid conclusions.

2-1: Be able to identify and determine the key aspects and factors of complex engineering problems based on relevant scientific principles.

2-2: Be able to express complex engineering problems correctly using relevant scientific principles and analytical methods.

2-3: Be able to recognize that there are multiple options available for solving problems, to conduct literature research for alternative solutions using a variety of resources and tools, and to synthesize and select appropriate solutions.

2-4: Be able to analyse influencing factors and draw valid conclusions by applying basic principles, drawing on literature research or other methods.

3. Design/develop of solutions: Have the ability to design solutions to complex engineering problems, to design and develop intelligent information processing modules or intelligent application systems that meet specific needs, and to demonstrate a sense of innovation in the design process, taking into account social, health, safety, legal, cultural and environmental factors.

3-1: Have knowledge of basic design/development methods and techniques for intelligent information processing and intelligent application systems, and understanding of the factors that influence design objectives and technical solutions.

3-2: Be able to complete the design, implementation and testing of modules/components for specific requirements.

3-3: Have the ability to develop a system design for a specific need and to demonstrate a sense of innovation in the design.

3-4: Be able to consider social, health, safety, legal, cultural and environmental factors in the design of systems.

4. Problem Research: Have the ability to apply scientific principles and methods to complex engineering problems, including designing experiments, analyzing and interpreting data, and synthesizing information to reach reasonable and valid conclusions.

4-1: Be able to analyse solutions to complex engineering problems based on scientific principles and the relevant principles and methods of Intelligent Science and Technology.

4-2: Be able to select a route of research and design an experimental program based on the characteristics of the problem.

4-3: Be able to construct experimental systems to carry out experiments according to experimental protocols and to obtain valid experimental data.

4-4: Be able to analyse and interpret experimental data and synthesize information to draw reasonable and valid conclusions.

5. Use of modern tools: The ability to develop, select and use appropriate techniques, resources, modern engineering tools and information technology tools for complex engineering problems, including the analysis, design, development, prediction, simulation and testing of intelligent information processing and intelligent application systems, and to understand their limitations.

5-1: Have knowledge of the principles and methods of use of modern engineering and information technology tools commonly used in the field of Intelligent Science and Technology and an understanding of their limitations.

5-2: Be able to select and use appropriate technologies, resources, modern engineering tools and information technology tools to complete the analysis, design and development of systems.

5-3: Be able to develop or select modern tools to meet the needs for specific objects, simulate and test systems, predict operational effects and be able to analyse their limitations.

6. Engineering and Society: Have the ability to undertake sound analysis based on background knowledge of Intelligent Science and Technology and to evaluate the social, health, safety, legal and cultural impacts of engineering practices and solutions to complex engineering problems, and to understand the responsibilities involved.

6-1: Understand the technical standards system, intellectual property rights, industrial policies and laws and regulations in the field of Intelligent Science and Technology, and understand the impacts of different social cultures on Software Engineering activities.

6-2: Be able to analyse and evaluate the social, health, safety, legal and cultural impacts of solutions to complex engineering problems based on practical application scenarios, and the impacts of these factors on project implementation, and understand the responsibilities involved.

7. Environment and Sustainable Development: Have the ability to understand and evaluate the environmental and social sustainability impacts of engineering practices for complex engineering problems.

7-1: Know and understand the concepts and impacts of environmental protection and sustainable development as they relate to the engineering practice of complex engineering problems, and develop an consciousnesses of environmental and sustainable development.

7-2: Be able to think about the sustainability of solutions to complex engineering problems in terms of environmental protection and sustainable development, and be able to evaluate the possible damage and potential hazards to humans and the environment in the context of practical application scenarios.

8. Professional Codes: Have humanities and social sciences literacy, social responsibility, and the ability to understand and comply with engineering ethics and codes of practice and responsibilities in engineering practices such as intelligent information processing and intelligent application development.

8-1: Be able to build and practise the core values of socialism, understand the relationship between the individual and society, understand the national conditions of China and clarify the responsibilities and missions of the individual as a builder and successor to the socialism cause.

8-2: Understand the professional ethics and codes of honesty, fairness and integrity and be able to consciously observe them in the practice of engineering.

8-3: Understand the engineer's social responsibility for the safety, health and well-being of the public, and for environmental protection, and be able to exercise this responsibility consciously in the practice of engineering.

9. individual and team: Have the ability to assume the role of individual, team member and leader of a team in a multidisciplinary context.

9-1: Be able to understand the meaning of teamwork in a multidisciplinary context and be able to communicate effectively and work cooperatively with members of other disciplines.

9-2: Be able to perform the role of team member or leader depending on the team role: as a team member should be able to work independently or collaboratively within the team; as a team leader should be able to organize, co-ordinate and direct the work of the team.

10. Communication: Have the ability to communicate effectively with industry peers and the public on complex engineering issues, including writing reports and design briefs, presenting statements, articulating or responding to instructions, and having an international perspective and the ability to communicate and interact in a cross-cultural context.

10-1: Have excellent verbal and written communication skills with the ability to clearly and accurately express ideas and respond to queries orally, in writing, and in diagrams. Understand the differences in communication with industry peers and the public on complex engineering issues.

10-2: Understand and follow international trends and research hotspots in the field of Intelligent Science and Technology. Understand and respect the differences and diversity of different cultures around the world.

10-3: Demonstrated verbal and written skills in cross-cultural communication and the ability to communicate and interact in a basic manner in a cross-cultural context on complex engineering issues.

11. Project Management: Understand and master the principles of complex engineering management and economic decision-making methods and apply them in a multidisciplinary environment.

11-1: Be able to understand the full process of intelligent information processing and intelligent systems development, and understand engineering management and economic decision-making issues.

11-2: Be able to master the management and economic decision-making methods involved in engineering projects and to apply them in the design and development of solutions in a multidisciplinary environment, including simulation.

12. Spirit and ability of lifelong learning: A sense of independent and lifelong learning, with the ability to learn and adapt to development.

12-1: Be able to recognize the need for lifelong and independent learning in the wider context of social development.

12-2: Have ability to learn independently, including the ability to understand technical issues, to summarize and to ask questions.

III. Schooling System

Four years.

IV. Length of Study

Flexible study period, generally four years, the minimum length of flexibility is not less than three years, the longest not more than six years.

V. Requirements for Graduation and Degree Conferring

In order to graduate, students must complete the minimum number of credits required by the Instructive Cultivation Plan for each course category and all the content required by the Extracurricular Class, with a total of 164 credits, and will be awarded a Bachelor of Engineering degree if they meet the requirements for the award of a Bachelor's degree.

VI. Discipline

Computer Science and Technology, Software Engineering.

VII. Core Courses

Discrete Mathematics, Data Structures and Algorithms, Introduction to Database Systems, Intelligent Statistical Techniques, Fundamentals of Artificial Intelligence, Machine Learning, Deep Learning and Applications, Data Mining Techniques, Humanoid Robotics, Natural Language Processing, Computer Vision, Integrated Design of Humanoid Robotics, Integrated Design of Artificial Intelligence.

VIII. Course Structure and Course Hours (excluding Extracurricular Class)

Category	**Total Credit**	**%**	**Total Course Hours**	**Theory Learning**	**Practical Training**
Public Fundamental Course	57.5	35	1056	976	80
General Education	10	6	160	160	0
Engineering Fundamental Course	18	11	288	230	58
Professional Fundamental Course	25	15	400	329	71
Professional Course	30	19	480	340	140
Professional Practice	22.5	14	688	0	688
Total	163	100	3072	2035	1037
Theory: **Practical** (%)	66:34				

IX. Teaching schedule (1)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hours	Theory Learning	Practical Training	Recommended semester
Public Fundamental Course	required	School of Marxism	b1080001	Basic Principles of Marxism	test	3	48	42	6	Spring 1
	required	School of Marxism	b1080009	Ethics and the Rule of Law	non-test	3	48	42	6	Spring 1
	required	School of Marxism	b1080006	Outline of Modern Chinese History	non-test	3	48	42	6	Autumn 1
	required	School of Marxism	b1080004	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics I	test	3	48	42	6	Autumn 2
	required	School of Marxism	b1080007	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics II	test	2	32	28	4	Spring 2
	required	School of Marxism	-----	Situation and Policy (Modules 1 to 4)	non-test	2	32	28	4	Autumn 1 to Spring 2
	required	School of Marxism	B1080008	Labour Education A	non-test	0.5	16	16		Autumn 2
	required	College of Arts and Sciences	b1020112	Advanced Mathematics D1	test	5	80	80		Autumn 1
	required	College of Arts and Sciences	b1020113	Advanced Mathematics D2	test	5	80	80		Spring 1
	required	College of Arts and Sciences	b1020108	Linear Algebra	test	3	48	48		Autumn 1
	required	College of Arts and Sciences	b1020114	Probability Theory and Mathematical Statistics	test	3	48	48		Autumn 2
	required	College of Arts and Sciences	b1020018	Academic Chinese	non-test	2	32	32		Spring 1
	required	College of Arts and Sciences	b1020063	Academic Physics A (Module 2)	test	3	48	48		Spring 1
	required	College of Arts and Sciences	b1020065	Academic Physics B	test	2	32	32		Autumn 2
	required	College of Arts and Sciences	b1020111	Academic Physics C	non-test	2	32		32	Autumn 2
	required	College of Physical Education	-----	Physical Education I to VI	non-test	3	160	160		Autumn 1 to Autumn 4
	required	Others	b1110003	Military skills	non-test	0.5	2W			Autumn 1
	required	College of Arts and Sciences	b1110002	Military theory	non-test	0.5	32	32		Autumn 2
	required	Others	b1110004	Mental Health Education for University Students	non-test	2	32	16	16	Spring 1
	★Academic English (Select 1 module for 10 credits)	Module A	b1020003	General English III	test	3	48	48		Autumn 1
			b1020004	General English IV	test	3	48	48		Spring 1
			b1020005	Academic English A	test	2	32	32		Autumn 2
			---	Foreign Language Expansion	non-test	2	32	32		Spring 2
		Module B	b1020002	General English II	test	3	48	48		Autumn 1
			b1020003	General English III	test	3	48	48		Spring 1
			b1020006	Academic English B	test	2	32	32		Autumn 2
			---	Foreign Language Expansion	non-test	2	32	32		Spring 2
		Module C	b1020001	General English I	test	4	64	64		Autumn 1
			b1020002	General English II	test	3	48	48		Spring 1
			b1020003	General English III	test	3	48	48		Autumn 2
	★ Academic German	College of Arts and Sciences	b1020040	Academic German I	test	3	48	48		Autumn 1
		College of Arts and Sciences	b1020041	Academic German II	test	3	48	48		Spring 1
		College of Arts and Sciences	b1020042	Academic German III	test	4	64	64		Autumn 2
	★ Academic Japanese	College of Arts and Sciences	b1020077	Academic Japanese I	test	3	48	48		Autumn 1
		College of Arts and Sciences	b1020078	Academic Japanese II	test	3	48	48		Spring 1
		College of Arts and Sciences	b1020079	Academic Japanese III	test	4	64	64		Autumn 2
Subtotal (Public Fundamental Course)						**57.5**	**1056**	**976**	**80**	
General Education	selective	Art Education Center	b0-----	Aesthetic Education	non-test	2	32	32		Autumn, Spring
	selective	Each College	b0-----	Social Sciences and Humanistic Qualities	non-test	4	64	64		Autumn, Spring
				Natural Sciences and Technology Innovation	non-test	4	64	64		Autumn, Spring
Subtotal (General Education)						**10**	**160**	**160**		

(★Note: The first foreign language is 10 credits in total, including 3 languages: Academic English, Academic German and Academic Japanese, choose the appropriate language as required; When Academic English is chosen,please choose the appropriate module in Module A, B, C)

IX. Teaching schedule (2)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hours	Theory Learning	Practical Training	Recommended semester
Engineering Fundamental Course	required	School of Computer and Information Engineering	b2012018	Fundamentals of Programming	test	4	64	48	16	Autumn 1
	required	College of Arts and Sciences	b2022147	Discrete Mathematics	test	4	64	64		Spring 1
	required	School of Computer and Information Engineering	b2012344	Object Oriented Programming	test	4	64	40	24	Autumn 2
	required	School of Computer and Information Engineering	b2012345	Foundations of Artificial Intelligence	test	3	48	30	18	Spring 2
	required	School of Computer and Information Engineering	b2012171	Introduction to Software Engineering	test	3	48	48		Spring 3
Subtotal (Engineering Fundamental Course)						**18**	**288**	**230**	**58**	
Professional Fundamental Course	required	School of Computer and Information Engineering	b2012312	Introduction to the Program of Intelligent Science and Technology	non-test	2	32	32	0	Autumn 1
	required	School of Computer and Information Engineering	b2012231	Data Structures and Algorithms	test	4	64	56	8	Spring 1
	required	School of Computer and Information Engineering	b2012258	Introduction to Database Systems	test	3	48	39	9	Autumn 2
	required	School of Computer and Information Engineering	b2012106	Algorithm design and analysis	test	3	48	36	12	Autumn 2
	required	School of Computer and Information Engineering	b2012267	Machine Learning	test	3	48	32	16	Autumn 3
	required	School of Computer and Information Engineering	b2012045	Computer networks	test	3	48	39	9	Autumn 3
	required	School of Computer and Information Engineering	b2012239	Operating systems	test	3	48	39	9	Autumn 3
	required	School of Computer and Information Engineering	b2012290	Principles of Computer Composition	test	4	64	56	8	Spring 3
Subtotal (Professional Fundamental Course)						**25**	**400**	**329**	**71**	
Professional Course	required	School of Computer and Information Engineering	b2012347	Fundamentals of Intelligent Development	non-test	3	48	30	18	Autumn 2
	required	School of Computer and Information Engineering	b2012346	Foundations of Brain and Cognitive Science	non-test	2	32	32		Spring 2
	required	School of Computer and Information Engineering	b2012093	Data mining techniques	test	3	48	30	18	Spring 2
	required	School of Computer and Information Engineering	b2012348	Smart Terminal Application Development	non-test	3	48	30	18	Spring 2
	required	School of Computer and Information Engineering	b2012349	Intelligent statistical techniques	test	3	48	30	18	Spring 2
	required	School of Computer and Information Engineering	b2012027	Humanoid robots	test	3	48	30	18	Autumn 3
	required	School of Computer and Information Engineering	b2012310	Natural Language Processing	test	2	32	24	8	Autumn 3
	required	School of Computer and Information Engineering	b2012203	Computer Vision	test	2	32	24	8	Autumn 3
	required	School of Computer and Information Engineering	b2012154	Intelligent Information Acquisition Technology	non-test	2	32	24	8	Autumn 3
	required	School of Computer and Information Engineering	b2012350	Deep Learning and Applications	test	3	48	30	18	Spring 3
	required	School of Computer and Information Engineering	b2012297	Scientific and Technical Paper Writing and Literature Search	non-test	2	32	32		Spring 3
	Subtotal(Required Professional Course)					**28**	**448**	**316**	**132**	
	select different courses in different modules for 2 credits	Module A	b2012303	Intelligent interaction technology	non-test	2	32	20	12	Autumn 4
		Module B	b2012204	Big Data Technology Fundamentals	non-test	2	32	24	8	Autumn 4
		Module C	b2012351	New Technologies in Smart Science	non-test	2	32	24	8	Autumn 4
		Subtotal (Selective Professional Course)				**2**	**32**	**24**	**8**	
Subtotal (Professional Course)						**30**	**480**	**340**	**140**	

IX. Teaching schedule (3)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hours	Theory Learning	Practical Training	Recommended semester
Professional Practice	required	School of Computer and Information Engineering	b4012005	Programming and Practice	non-test	2	48		48	Summer 1
	required	School of Computer and Information Engineering	b4012050	Data Structures and Algorithms Course Placement	non-test	2	48		48	Summer 1
	required	School of Computer and Information Engineering	b4012206	Practice for Enterprise-level transaction modelling and development	non-test	2	48		48	Spring 2
	required	School of Computer and Information Engineering	b4012207	Smart Terminal Software Course Design	non-test	2	48		48	Summer 2
	required	School of Computer and Information Engineering	b4012216	Data Mining Technology Course Design	non-test	2	48		48	Summer 2
	required	School of Computer and Information Engineering	b4012082	Integrated design of humanoid robots	non-test	2	48		48	Summer 3
	required	School of Computer and Information Engineering	b4012208	Integrated Design for Artificial Intelligence	non-test	2	48		48	Summer 3
	required	School of Computer and Information Engineering	b4012186	Labour Education B	non-test	0.5	16		16	Autumn 4
	required	School of Computer and Information Engineering	b4000020	the Program of Intelligent Science and Technology Innovation and Entrepreneurship	non-test	2	48		48	Autumn 4
	required	School of Computer and Information Engineering	b4012135	Intelligent Science and Technology Graduation Internship and Graduation Design (Thesis)	non-test	6	288		288	Spring 4
Subtotal(Professional Practice)						**22.5**	**688**		**688**	
Extracurricular Class	required	Others	b5110001	Extracurricular Class	non-test	**1**	-	-	-	Autumn, Spring, Summer
Total						**164**	**3072**	**2035**	**1037**	

★ Description of professional course modules and professional practice modules.

Professional courses are divided into modules according to different competencies and students must take one of these modules and achieve the required credits for that module. Professional practice modules must be taken in accordance with the corresponding professional course modules.

1. Module A: Intelligent Interactive Technology Module
2. Module B: Data Application Development Module
3. Module C: New Technologies in Intelligent Science Module

X. Prerequisite for Course Study

No.	Course Name	Prerequisite Course
1	Programming and Practice	Fundamentals of Programming
2	Data Structures and Algorithms	Fundamentals of Programming
3	Data Structures Course Placement	Data Structures and Algorithms
4	Intelligent Information Acquisition Technology	Fundamentals of Intelligent Development
5	Introduction to Database Systems	Discrete Mathematics
6	Algorithm design and analysis	Data Structures and Algorithms
7	Foundations of Artificial Intelligence	Algorithm Design and Analysis, Probability Theory and Mathematical Statistics, Foundations of Intelligent Development
8	Intelligent statistical techniques	Probability Theory and Mathematical Statistics, Foundations of Intelligent Development
9	Practice for Enterprise-level transaction modelling and development	Object Oriented Programming, Introduction to Database Systems
10	Smart Terminal Application Development	Object Oriented Programming, Introduction to Database Systems
11	Data mining techniques	Fundamentals of Intelligent Development, Linear Algebra, Introduction to Database Systems
12	Machine Learning	Algorithm Design and Analysis, Probability Theory and Mathematical Statistics, Foundations of Intelligent Development, Linear Algebra
13	Computer Vision	Machine Learning, Fundamentals of Artificial Intelligence
14	Natural Language Processing	Machine Learning, Fundamentals of Artificial Intelligence
15	Computer networks	Discrete Mathematics, Algorithm Design and Analysis
16	Operating systems	Discrete Mathematics, Algorithm Design and Analysis
17	Humanoid robots	Linear Algebra, Foundations of Intelligent Development, Foundations of Artificial Intelligence
18	Deep Learning and Applications	Computer Vision, Natural Language Processing
19	Introduction to Software Engineering	Object Oriented Programming, Introduction to Database Systems
20	Integrated design of humanoid robots	Humanoid robotics, computer vision, natural language processing
21	Integrated Design for Artificial Intelligence	Deep Learning and Applications
22	Data Mining Technology Course Design	Data mining techniques
23	Smart Terminal Software Course Design	Smart Terminal Application Development

XI. Credit of Extracurricular Class

Through taking extracurricular classes, students are encouraged to take part in academic lectures, social practice activities, campus cultural and sports activities, innovative and entrepreneurial activities, voluntary activities, etc. to improve their social adaptability and enhance the competitiveness in the job market. Details are specified in Students' Manual.