Instructive Cultivation Plan for the Program of Automation

(Grade 2021)

Course code: 080801

1. Orientation

In accordance with the strategic requirements of nation and the needs of regional economic development, this program bases on Shanghai and faces to the whole nation to cultivate equipment intelligence related fields to engage in system analysis and design of automation engineering, application research and development, system operation and integration, technical management and service of automation engineering, and have the potential for sustainable development.

2. Cultivation Objectives

2.1. General Objective

This program aims to train all-round field engineering talents, who have solid knowledge of mathematics and natural sciences, basic engineering knowledge, fine humanistic literacy and professional ethics; have application and innovation ability; can be engaged in system analysis and design, application research and development, system operation and integration, technical management and service of automation engineering in the fields of equipment intelligence Talent.

2.2. Value

The programs aims to train applied engineering talents who are able to adapt to social development by following the spirit of craftsmanship. Through university-enterprise cooperation and curriculum teaching, the students' professionalism of being rigorous, dedicated and responsible are developed, and their sense of social responsibility, teamwork spirit, lifelong learning as well as application innovation spirit are elevated.

2.3. Objectives students must achieve five years after graduation:

1) Master the natural science knowledge, engineering science knowledge, engineering technology knowledge and engineering environment knowledge required in automation and related fields;

2) Be able to use automation expertise, technology and skills to analyze and solve automation engineering problems related to professional positions, obtain the ability to propose solutions according to engineering needs, and have their own thinking on social, environmental factors and relevant policies and regulations to improve professional ability to design, develop and debug automation systems;

3) Have good team organization, communication and coordination skills, and be able to undertake, organize or participate in engineering problems in automation related fields as a team member or person in charge;

4) Have humanities and social science literacy, professional ethics, sense of social responsibility, global vision and sense of innovation in career and professional activities;

5) Obtain the ability of lifelong learning, be able to learn advanced manufacturing technology at home and abroad through self-learning, familiar with the current situation and development trend of automation engineering at home and abroad, be familiar with industry regulations and standards, and continuously improve their own quality and ability to adapt to professional and social development.

3. Requirement for Graduation

The automation program expands the core competence and quality expression of the 12 graduation requirements based on the talent training positioning of our school in accordance with the 12 graduation requirements of the General Standards of the China Engineering Education Professional Certification Association. The index points of each graduation requirement are broken down as follows:

3.1: Ability to acquire and apply engineering knowledge: be able to apply basic principles of mathematics, natural sciences, engineering foundations and professional knowledge to abstract complex engineering problems in automation into mathematics and physics models, select appropriate models to describe, and analyze and solve the models.

1-1: master natural science knowledge such as mathematics and physics;

1-2: use mathematics, natural sciences, engineering foundations and professional knowledge to solve complex engineering problems appropriately;

1-3: use mathematics, natural sciences, engineering foundations and professional knowledge for calculation and analysis of engineering problems;

1-4: abstract complex engineering problems into mathematical and physical models, select appropriate models for description, make inference solutions and necessary corrections to the models, and understand their limitations.

3.2: Problem analysis ability: be able to apply the basic principles of mathematics, natural science and engineering science to identify, express, and analyze complex automation engineering application problems through literature research and obtain effective conclusions.

2-1: be able to use professional knowledge to reason, analyze, identify and judge the key links and parameters of complex automation engineering application problems;

2-2: be able to recognize that there are multiple solutions to complex automation engineering application problems, and be able to find effective solutions to engineering problems through literature research and analysis;

2-3: be able to analyze automation engineering problems and obtain effective conclusions based on mathematics, natural sciences and engineering sciences.

3.3: Ability to innovate design/development solutions: be able to design solutions for users' complex automation needs, design systems, units (components) or process flows that meet specific needs, and be able to reflect the sense of innovation in the design process, and always consider social, health, safety, legal, cultural and environmental factors.

3-1: Master the basic methods of automation engineering design, and be able to analyze complex automation engineering problems, propose design goals, and determine solutions;

3-2: Be able to formulate solutions based on the characteristics of users' complex automation needs, and can design systems, units or technological processes that meet specific needs;

3-3: Be able to comprehensively consider social, health, safety, legal, ethical, cultural and environmental factors in the design to reflect a certain sense of innovation.

3-4: Be able to present the design results in the form of design reports, engineering drawings or objects.

3.4: Scientific research ability: Be able to study complex automation engineering application problems based on scientific principles and by using scientific methods, including designing

experiments, analyzing and interpreting data, and obtaining reasonable and effective conclusions through information synthesis.

4-1: Be able to apply the knowledge learned to formulate feasible experimental plans for related problems in automation engineering;

4-2: Be able to construct an experimental system or process according to the experimental plan, and be able to conduct experiments;

4-3: Be able to correctly analyze and interpret experimental data/results, and obtain reasonable and effective conclusions through information synthesis.

3.5: Ability to use modern tools: Be able to develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for complex automation engineering application problems, including the prediction and simulation of complex automation engineering application problems, and can understand its limitations.

5-1: Understand the status and development trend of automation engineering, and be able to grasp and use modern engineering technology, methods, tools or equipment in practice;

5-2: Be able to predict and simulate complex automation engineering application problems by using appropriate modern engineering tools, and understand the working principles and limitations of the modern tools used;

5-3: Master the sources and acquisition methods of important documents in the field of automation engineering.

3.6: Ability to analyze and evaluate the relationship between engineering and society: be able to conduct reasonable analysis and evaluation on the impact of professional engineering practices and complex engineering problem solutions on society health, safety, law and culture based on the relevant background knowledge of automation, and understand the responsibility.

6-1: Master the technical standards, intellectual property rights, industrial policies, laws and regulations related to automation;

6-2: Be able to conduct reasonable analysis based on professional knowledge and standards in terms of social, health, safety, legal and cultural influences, and evaluate solutions to complex automation engineering problems;

6-3: Be able to correctly understand the social, safety and legal responsibilities that automation engineers should bear in engineering practices.

3.7: Ability to understand and evaluate the environment and sustainable development: be able to understand and evaluate the impact of complex automation engineering application processes on the environment and sustainable development of society.

7-1: Be able to understand national and local policies, laws and regulations on environmental and social sustainable development;

7-2: Be able to correctly learn about and understand the impact of engineering practice aimed at automation engineering problems on the environment and the sustainable development of society.

3.8: Abide by professional standards: have humanities and social science literacy and a sense of social responsibility, be able to understand and abide by engineering professional ethics and standards in engineering practices, and can undertake responsibilities correctly.

8-1: Have humanities and social science literacy, understand the social responsibilities that should be undertaken, and be willing to serve the society;

8-2: Understand the professional nature and responsibilities of automation engineers, have legal awareness and consciously abide by professional ethics and norms in automation engineering practices.

3.9: Ability to assume individual and team roles: Be able to assume the roles of individuals, team members and leaders in a multidisciplinary team.

9-1: Have basic interpersonal and communication skills, and be able to correctly understand the role and significance of team strength and wisdom on complex engineering problems;

9-2: Be able to understand the meaning of each role in a multidisciplinary team for the goals of the entire team, and be able to play a role in a multidisciplinary team.

3.10: Ability to effectively communicate and exchange: be able to effectively communicate and exchange with industry colleagues and the public on complex automation engineering application issues, including reports and design manuscripts, presentations, clear expressions or response instructions. Have a certain international perspective, and be able to communicate and exchange under a cross-cultural context.

10-1: Be able to accurately express their opinions orally or in writing, respond to queries, and understand the differences in communication with industry peers and the public on automation issues;

10-2: Master at least one foreign language, be able to read the foreign literature of the major, and be able to use technical language to communicate and exchange in a cross-cultural context.

3.11: Ability to manage engineering projects: understand and master the principles of automation engineering project management and economic decision-making methods, and be able to apply them in a multidisciplinary environment.

11-1: Understand and master the important economic and management factors involved in automation engineering activities;

11-2: Be able to apply engineering management and economic decision-making knowledge in a multidisciplinary environment.

3.12: Have the consciousness and ability of lifelong learning: Have the consciousness of independent learning and lifelong learning, and be able to continuously learn and adapt to development.

12-1: Be able to correctly understand the necessity of lifelong learning, and have the consciousness of independent learning and lifelong learning;

12-2: Be able to learn independently according to personal or professional development needs, and have the ability to adapt to the development of society and automation engineering technology.

4. Schooling System

Four years

5. 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.

6. Requirements for Graduation and Degree Conferring

Students of this program must complete the minimum credits required for each category of courses and complete all the content specified in extracurricular class according to the requirements of the instructional training plan, and the total credits must reach 154 credits for graduation; those who meet the requirements for bachelor's degree can be conferred bachelor degree in engineering.

7. Discipline

Control Science and Engineering, Electrical Engineering, Computer Science and Technology.

8. Core courses

8.1. Principle of single chip microcomputer

This course teaches the principle, structure, interface and application technology of single-chip microcomputers. The main content includes: basic knowledge of microcomputer, hardware structure of single-chip microcomputer, instruction system, program design, interrupt system, timer and application, serial port and serial communication, minimum system design of single-chip microcomputer and serial peripheral chip expansion, application system interface configuration And system application examples.

8.2. Principle of Automatic Control

This course is a basic engineering course that studies the basic concepts, basic principles, and basic analysis and design methods of automatic control systems. The main contents of this course include automatic control system modeling, automatic control system analysis, and automatic control system design (correction). aspect. Through the study of this course, students will master the classic control theory and methods of analyzing and synthesizing SISO automatic control system, and be able to analyze and design the control system, and perform computer-aided analysis and analysis of the control system with the support of MATLAB and Simulink. design. It will lay a solid foundation for further in-depth study and research on other control theories and control system design in the future.

8.3. Power Electronics Technology

This course teaches power semiconductor devices, drive and protection circuits, AC and DC conversion circuits, soft switching technology, etc. Through the study of this course, students will be able to master the basic principles of various types of electrical energy conversion, the circuit structure, basic principles, control methods, design calculations, etc. of various power electronic conversion devices, and have the ability to design, debug and analyze power electronic converter devices.

8.4. Modern control theory

This course mainly teaches the basic principles and basic analysis and design methods of modern control systems based on the state space method. Including the method of establishing the state space model of the system, the method of solving the state space expression, and some qualitative characteristics of the system and its analysis methods, such as the controllability and observability of the system, and the stability of the system. On the basis of the analysis, further lectures on related issues of system synthesis and design, such as pole configuration, stabilization, decoupling issues, and state observer design issues. Through learning, you can master some basic methods of establishing the state space model of the system and analyzing and designing the system.

8.5. Motor and drag basics

This course teaches the main structure, basic principles and working characteristics of AC and DC motors and transformers; the mechanical characteristics, starting, braking and speed regulation of AC and DC electric drive systems; the selection of electric motors for electric drive systems.

8.6. Motion Control System

This course teaches motion control composed of DC motors, AC motors, servo motors, and stepping motors, including single closed loop speed control systems, double loop speed control systems, reversible speed control systems, DC pulse width speed control systems, and AC speed control systems. The basic composition and control law of the system, static and dynamic performance analysis and engineering design method.

9. Practical Training

Metalworking practice, electronic technology practice, embedded system design, industrial robot comprehensive training, power electronics comprehensive training, single-chip curriculum design, machine tool electrical control comprehensive training, controller assembly practice, electrical control and PLC comprehensive training, sports Control system comprehensive training, second classroom, automation major, graduation practice and graduation design (thesis), etc.**10. Course Structure and Course Hours (excluding extracurricular class)**

Category	Total Credit	%	Total Course Hours	Theory Learning	Practical Training
General Education	52.5	35	992	928	64
Basic Course	35	23	560	436	124
Professional Course	28	18	448	354	94
Practical Training	29.5	19	856	0	856
General Course	8	5	128	110	18
Total	**153**	**100**	**2984**	**1828**	**1156**
Theory : Practice(%)	61:39				

11. Teaching schedule (1)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester
General Education	required	School of Marxism	b1080001	Basic principles of Marxism	test	3	48	42	6	spring 1
	required	School of Marxism	b1080006	Outline of Chinese Modern History	non-test	3	48	42	6	autumn 1
	required	School of Marxism	b1080003	Morality and Laws	non-test	3	48	42	6	spring 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 (module 1～4)	non-test	2	32	28	4	autumn 1～ spring 2
	required	School of Marxism	B1080008	Labor Education A	non-test	0.5	16	16		autumn 2
	required	College of Arts and Sciences	b1020080+	Advanced Mathematics A1	test	4	64	64		autumn 1
	required	College of Arts and Sciences	b1020081+	Advanced Mathematics A2	test	4	64	64		spring 1
	required	College of Arts and Sciences	b1020012	Linear algebra	test	2	32	32		autumn 2
	required	College of Arts and Sciences	b1020013	Probability Theory and Mathematical Statistics	test	2	32	32		autumn 2
	required	College of Engineering College of Arts and Sciences	b1020023	Complex variable function and integral transformation	test	2	32	32		autumn 2
	required	College of Arts	b1020062	College Physics A(module 1)	test	3	48	48		spring 1

		and Sciences								
	required	College of Arts and Sciences	b1020065	College Physics B	test	2	32	32		autumn 2
	required	College of Arts and Sciences	b1020066	College Physics C	non-test	1	32		32	spring 1
	required	College of Arts and Sciences	b1020018	College Chinese	non-test	2	32	32		spring 1
	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	College of Arts and Sciences	b1020003	General English III	test	3	48	48		autumn 1
	required	College of Arts and Sciences	b1020004	General English IV	test	3	48	48		spring 1
	required	College of Arts and Sciences	b1020005	General Academic English A	test	2	32	32		autumn 2
	required	College of Arts and Sciences	---	English development	non-test	2	32	32		spring 2
	required	Department of Physical Education	-----	Physical Education I～VI	non-test	3	160	160		autumn 1～autumn 4
Total (General Education)						**52.5**	**992**	**928**	**64**	
General Course	required	Art Education Center	b0-----	Aesthetic Education	non-test	2	32	32		autumn, spring
	selective	Each College	b0-----	Social Science and Humanities Literacy	non-test	2	32	32		autumn, spring
	required	School of Intelligent Manufacturing and Control Engineering	b2011912zd	Computer and Information Technology Fundamentals	non-test	1	16	16		summer 1
	required	School of Intelligent Manufacturing	b2013024zd	Scientific paper writing and document retrieval	non-test	2	32	32		autumn 1

		and Control Engineering								
	required	School of Intelligent Manufacturing and Control Engineering	b2011911zd	Engineering ethics	non-test	1	16	16		autumn 2
Subtotal (general course)						**8**	**128**	**128**		

11. Teaching schedule (2)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester
Basic professional courses	required	School of Intelligent Manufacturing and Control Engineering	b2011243zd	Introduction to Automation	non-test	1	16	16	0	autumn 1
	required	School of Intelligent Manufacturing and Control Engineering	b2011398zd	Modern Engineering Drawing	test	3	48	39	9	autumn 1
	required	Engineering Training Center	b2011031zd	Electric Circuit	test	4	64	48	16	autumn 2
	required	Engineering Training Center	b2012060zd	Analog electronics	test	3	48	36	12	spring 2
	required	Engineering Training Center	b2012099zd	Digital Electronic Technology	test	3	48	36	12	spring 2
	required	School of Intelligent Manufacturing and Control Engineering	b2011028zd	Fundamentals of motor and drive	test	3	48	36	12	spring 2
	required	School of Intelligent Manufacturing and Control Engineering	b2011267zd	Fundamentals of control programming	test	3	48	30	18	spring 1
	required	School of Intelligent Manufacturing and Control	b2011901zd	Principle of single chip microcomputer	test	3	48	36	12	spring 2

	Engineering								
required	School of Intelligent Manufacturing and Control Engineering	b2011168zd	Principle of Automatic Control	test	4	64	52	12	spring 2
required	School of Intelligent Manufacturing and Control Engineering	b2011157zd	Operations Research	non-test	2	32	32	0	spring 2
required	School of Intelligent Manufacturing and Control Engineering	b2011471zd	Signals and Systems	test	3	48	36	12	autumn 3
required	School of Intelligent Manufacturing and Control Engineering	b2011902zd	Power Electronics Technology	test	3	48	39	9	autumn 3
Subtotal (Basic professional courses)					**35**	**560**	**436**	**124**	
required	School of Intelligent Manufacturing and Control Engineering	b2011411zd	ElectricalControl and PLC	test	3	48	39	9	autumn 3
required	School of Intelligent Manufacturing and Control Engineering	b2011159zd	Motion Control System	test	3	48	36	12	autumn 3
required	School of Intelligent	b2011159zd	Industrial Robot Technology	non-test	3	48	39	9	spring 3

	Manufacturing and Control Engineering								
required	School of Intelligent Manufacturing and Control Engineering	b2011904zd	Sensors and detection technology	non-test	2	32	26	6	spring 3
required	School of Intelligent Manufacturing and Control Engineering	b2011223zd	Modern control theory	test	3	48	40	8	spring 3
required	School of Intelligent Manufacturing and Control Engineering	b2011228zd	Control system modeling and simulation	non-test	3	48	24	24	autumn 4
required	School of Intelligent Manufacturing and Control Engineering	b2011231zd	Computer control technology	test	3	48	40	8	autumn 4
Subtotal (required professional courses)					**20**	**320**	**244**	**76**	
★Module, Selective, 8 credits	Module A	b2011412zd	Process control technology	non-test	2	32	26	6	autumn 3
		b2011906zd	Automation instrument	non-test	2	32	28	4	spring 3
		b2011907zd	Industrial Control Configuration Software Technology	non-test	2	32	20	12	spring 3
		b2011908zd	Factory power supply and distribution	non-test	2	32	28	4	autumn 4
		b2011913zd	New energy power generation system	non-test	2	32	16	16	autumn 4
		b2011909zd	Intelligent optimization and	non-test	2	32	28	4	autumn 3

				application						
			b2011161zd	Intelligent control	non-test	2	32	28	4	spring 3
			b2011405zd	Machine vision	non-test	2	32	28	4	spring 3
			b2011230zd	Virtual instrument technology	non-test	2	32	26	6	autumn 4
			b2011914zd	Artificial Intelligence Fundamentals	non-test	2	32	28	4	autumn 4
	Subtotal (modular professional courses)					**8**	**128**	**110**	**18**	
Subtotal (professional courses)						**28**	**448**	**354**	**94**	

11. Teaching schedule (3)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester
	required	Engineering Training Center	b4090003zd	Metalworking internship	non-test	1	24		24	summer 1
	required	Engineering Training Center	b4090004zd	Electronic technology internship	non-test	1	24		24	summer 1
	required	School of Intelligent Manufacturing and Control Engineering	b4011901zd	Solidworks solid modeling	non-test	1.5	36		36	autumn 3
	required	School of Intelligent Manufacturing and Control Engineering	b4011902zd	Embedded System Design	non-test	2	48		48	spring 3
	required	School of Intelligent Manufacturing and Control Engineering	b4011914zd	Comprehensive training of industrial robots	non-test	1.5	36		36	summer 3
	required	School of Intelligent Manufacturing and Control Engineering	b4011904zd	Comprehensive training of power electronics	non-test	2	48		48	spring 3
	required	School of Intelligent Manufacturing and Control Engineering	b4011905zd	MCU course design	non-test	1.5	36		36	autumn 3
	required	School of	b4011906zd	Comprehensive training of machine	non-test	2	48		48	summer 3

		Intelligent Manufacturing and Control Engineering		tool electrical control						
	required	School of Intelligent Manufacturing and Control Engineering	b4011272zd	Automated production line training	non-test	2	48		48	autumn 4
	required	School of Intelligent Manufacturing and Control Engineering	b4011907zd	Controller installation practice	non-test	1.5	36		36	summer 2
	required	School of Intelligent Manufacturing and Control Engineering	b4011908zd	Comprehensive training of electrical control and PLC	non-test	2	48		48	spring 3
	required	School of Intelligent Manufacturing and Control Engineering	b4011275zd	Electrical CAD	non-test	1	24		24	summer 2
	required	School of Intelligent Manufacturing and Control Engineering	b4011911zd	Comprehensive training of motion control system	non-test	2	48		48	spring 3
	required	School of Intelligent Manufacturing and Control Engineering	b4011339	Labor Education B	non-test	0.5	16		16	spring 3

	required	School of Intelligent Manufacturing and Control Engineering	b4011253zd	Automation Program (CDIO) Graduation Practice and Graduation Design (Thesis)	non-test	6	288		288	spring 4
	Subtotal (required practice courses)					**27.5**	**808**		**808**	
	★Professional module selective 2 credits	module A	b4011912zd	Automation Professional Innovation and Entrepreneurship Course_Process Control System Integration	non-test	2	48		48	autumn 4
		module B	b4011913zd	Automation Professional Innovation and Entrepreneurship Course_Intelligent Instrument and System Integration	non-test	2	48		48	autumn 4
	Subtotal (practice module)					**2**	**48**		**48**	
Total (professional practice)						**29.5**	**856**		**856**	
Extracurricular Class	required	Others	b5110001	Extracurricular Class	non-test	1	-	-	-	autumn , spring , summer
Total						**154**	**2984**	**1828**	**1156**	

★1. Guidance for professional module courses and practical module courses:

Professional courses are divided into modules according to different ability requirements. Students must take one of the modules and meet the required credits for that module. Among them, the professional module courses must be completed with 8 credits; the practical module courses must be completed with 2 credits, and the corresponding professional module courses are elective.

1. Module A is the direction of traditional industrial automation, which specifically includes: process control technology, automation instrumentation, industrial control configuration software technology, factory power supply and distribution, new energy power generation system (integration of theory and practice).
2. Module B is the direction of industrial intelligence, which specifically includes: intelligent optimization and application, intelligent control, machine vision, virtual instrument technology, artificial intelligence foundation.

12. Prerequisite for Course Study

No.	Course name	Prerequisite Course	No.	Course name	Prerequisite Course
1	Electric Circuit	Advanced Mathematics A1	16	Electrical CAD	Electric Circuit
		Advanced Mathematics A2			Analog electronics
		College Physics			Digital Electronic Technology
2	Analog electronics	College Physics	17	Sensors and detection technology	Embedded System Design
					Comprehensive training of power electronics
					Probability Theory and Mathematical Statistics
		Electric Circuit	18	Industrial control configuration software technology	Electrical control and PLC
3	Digital Electronic Technology	College Physics			
		Electric Circuit	19	Intelligent optimization and application	Intelligent control
		Analog electronics	20	Factory power supply and distribution	Electric Circuit
4	Motor and drag foundation	College Physics			Motor and drag foundation
		Electric Circuit			
5	Principle of Automatic Control	Advanced Mathematics A1	21	Industrial Robot Technology	Motion Control System
		Advanced Mathematics A2			
		Electric Circuit			Introduction to Embedded Systems
		Motor and drag foundation	22	Process control technology	Analog electronic circuit
6	Principle of single chip microcomputer	Electric Circuit			Electrical control and PLC
		Analog electronics			
		Digital Electronic Technology	23	Virtual instrument technology	Sensors and detection technology
7	Computer control technology	Principle of single chip microcomputer			Principle of single chip microcomputer
		Basics of control programming	24	Controller installation practice	Electric Circuit
8	Signals and Systems	Advanced Mathematics A2			Motor and drag foundation
					Principle of Automatic Control
		Electric Circuit	25	Solidworks solid modeling	Modern Engineering Drawing I
		Principle of Automatic Control			
9	Power electronic converter technology	Electric Circuit	26	Comprehensive training of power electronics	Electric Circuit
		Analog electronics			Analog electronics
		Digital Electronic Technology			Digital Electronic Technology
					Power Electronics Technology
10	Motion Control System	Principle of Automatic Control	27	Automated production line training	Electrical control and PLC
		Motor and drag foundation			Industrial Control Configuration Software Technology
					Electrical CAD
		Power Electronics Technology	28	Comprehensive training of industrial robots	Motor and drag foundation
					Industrial Robot Technology
11	Electrical control and PLC	Electric Circuit			Basics of control programming
					Signals and Systems
		Digital Electronic Technology	29	Embedded System Design	Basics of control programming
		Motor and drag foundation			Principle of single chip microcomputer
12	Modern control theory	Linear algebra			Introduction to Embedded Systems
			30	Comprehensive training of electrical control and PLC	Electrical control and PLC
		Principle of Automatic Control			Motor and drag foundation
13	Intelligent control	Principle of Automatic Control	31	Comprehensive training of machine tool electrical control	Electrical control and PLC
14	Automation instrument	Principle of single chip microcomputer			Motor and drag foundation
		Process control technology	32	Automation Professional Innovation and Entrepreneurship Course_Process Control System Integration	Process control technology
					Automation instrument
					Industrial Control Configuration Software Technology
					Factory power supply and

					distribution
15	Control system modeling and simulation	Motion control system	33	Automation Professional Innovation and Entrepreneurship Course_Intelligent Instrument and System Integration	New energy power generation system
		Modern control theory			Intelligent optimization and application
		Principle of Automatic Control			Intelligent control
					Machine vision
					Virtual instrument technology
					Artificial Intelligence Fundamentals

13. 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.