

自动化专业人才培养方案

Undergraduate Program for Automation Major

学科门类：工学	国标代码： 08	
Discipline Type: Engineering	Code: 08	
专业类：自动化类	国标代码： 0808	
Type: Automation	Code: 0808	
专业名称：自动化	国标代码： 080801	校内代码： 19
Title of the Major: Automation	Code: 080801	

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

适应社会经济发展和能源电力相关行业技术进步需求，以培养社会主义建设者和接班人为根本任务，在发电过程自动化系统、工业过程控制、检测与自动化仪表、计算机控制系统等工程技术领域，培养从事控制装置与系统的设计、开发、运维、管理等工作，德智体美劳全面发展的卓越工程科技人才。

This major is set to adapt the needs of socio-economic development and technological progress in energy and power related industries and the fundamental task of training socialist builders and successors. The graduates are required to have the comprehensive development of moral, physical and mental skills, and they will be excellent in the design, development, operation, maintenance and management of control devices and systems in engineering technology fields such as power generation process automation systems, industrial process control, detection and automation instruments, and computer control systems.

学生毕业 5 年左右能够达到的职业和专业成就：

(1) 具备良好的理工基础与人文素养，具有健全的人格和正确的价值观，能够正确认识工程实践对环境、社会可持续发展的影响；

(2) 能够系统运用自动化理论与技术，综合考虑社会、健康、安全、法律、文化以及环境等因素，针对能源电力相关行业自动化领域复杂工程问题，设计开发相应的解决方案；

(3) 具有良好的团队合作精神与项目管理能力，遵守法律法规，具有工程职业道德，遵守职业规范，有社会责任感；

(4) 能够跟踪自动化领域的前沿技术和能源电力相关行业国内外发展趋势，具备良好的主动发展意识、创新精神与自主终身学习能力；

(5) 具备良好的表达与沟通能力，能够承担国际交流与对外合作工作。

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

(1) They will have a good scientific and technological foundation and humanistic literacy,

and have a sound personality and correct values;

(2) They can systematically apply automation theory and technology to provide solutions to complex engineering problems in the automation field of energy and power related industries, and has the ability to undertake automation engineering projects;

(3) They will have a good teamwork spirit and management coordination ability, have a sense of social responsibility and engineering ethics, and abide by professional standards;

(4) They are able to track cutting-edge technologies in the field of automation and development trends at home and abroad in energy and power-related industries, and have a good sense of active development, innovative spirit and independent lifelong learning ability;

(5) They will have good expression and communication skills, and be able to undertake international exchanges and foreign cooperation.

三、专业培养基本要求 Skills Profile

本专业学生毕业时应达到以下要求：

1. 工程知识：掌握数学、自然科学、工程基础和专业基础知识，能够用于解决能源电力相关行业自动化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能源电力相关行业自动化领域的复杂工程问题，能够给出合理的解决方案。

3. 设计/开发解决方案：能够设计针对能源电力相关行业自动化领域复杂工程问题的解决方案，设计满足生产需求的自动化装置或系统，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自动化相关领域，尤其是能源电力相关行业自动化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：能够针对能源电力相关行业自动化领域的复杂工程问题，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：能够基于能源电力相关行业的工程背景知识进行合理分析，评价自动化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能源电力相关行业自动化领域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，能够在能源电力相关行业自动化领域的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：能够就能源电力相关行业自动化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：理解并掌握自动化领域的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 graduates should meet the following requirements:

1. Engineering knowledge: they should possess mathematics, natural science, engineering

foundation and professional knowledge to analyze and solve the complicated engineering problems in automation field of energy and power related industries.

2. Problem analysis: they should have the ability to identify, express and analyze complicated engineering problems in automation field of energy and power related industries through literature research by using the basic principles of mathematics, natural science, and engineering science, and design solutions.

3. Solutions design/development: they should have the ability to design the solution for automatic system in the complex engineering problems in automation field of energy and power related industries systematically, and have the ability to design the technological process and system for some purpose, taking multi-factors, such as innovativeness in the design phase, society, healthy, safety, law, culture, and environment in account.

4. Research: they should have the ability to conduct investigations of complex automatic control engineering problems in automation field of energy and power related industries using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

5. Modern tool usage: they should be able to develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for complex engineering problems in automation field of energy and power related industries, including the prediction and simulation of complex engineering problems, and be able to understand their limitations.

6. Engineer and society relations: they should be able to conduct reasonable analysis based on energy and power engineering-related background knowledge, and evaluate the impact of automation professional engineering practices and complex engineering problem solutions on society, health, safety, law, and culture, and understand their responsibilities.

7. Environment and sustainable development: they should be able to understand and evaluate the impact of engineering practices on complex engineering issues in automation field of energy and power related industries on environmental and social sustainable development.

8. Professional standard accomplishment: they should have humanities and social sciences literacy and social responsibility, be able to understand and abide by engineering professional ethics and norms, and perform their responsibilities in engineering practice in automation field of energy and power related industries.

9. Individual and team competence: they should be able to assume the roles of individuals, team members, and leaders in teams with multidisciplinary backgrounds.

10. Communication: they should be able to effectively communicate and communicate with industry peers and the public on complex engineering issues in automation field of energy and power related industries, including writing reports and design manuscripts, making statements, expressing or responding to explanations, and has a certain international vision, able to communicate and communicate in a cross-cultural background.

11. Project management: they should be able to understand and master engineering management principles and economic decision-making methods in the field of automation, and be able to apply them in a multidisciplinary environment.

12. Lifelong learning: they should have the consciousness of independent learning and lifelong learning, and have the ability to learn and adapt to development.

四、学时与学分 Hours and Credits

类别		学时	学分	比例
必修课 Required courses	公共基础 Public infrastructure	644	33	19.41%
	学科门类基础 Basis of discipline	560	35	20.59%
	专业类基础 Basis of major	460	28.5	16.76%
	专业核心 Required courses of major	328	20.5	12.06%
	集中实践 Intensive practice	208 学时+16 周 208 class hours + 16 weeks	28	16.47%
必修课小计 Subtotal of Required courses		2200 学时+16 周 2200 class hours + 16weeks	145	85.29%
选修课 Electives		320	20	11.76%
课外实践学分 Practice credits of extra-curricular		5 周 5 weeks	5	2.94%
总计 Total		2520 学时+21 周 2520 class hours + 21 weeks	170	100%

说明:

必修实践环节学分包括：集中实践课程 28 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 6.5 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 4.75 学分，共计 44.25 学分，占总学分 26.03%。

Note:

Total of 44.25 credits for required practice training, accounting for 26.03% of the total credits, including: 28 credits for Intensive practice, 5 credits for practice credits of extra-curricular, 6.5 credits for basis of discipline and basis of major, 4.75 credits 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 Course

自动控制理论、现代控制理论、建模与辨识、运筹学、微机原理与嵌入式系统、过程参数检测技术、计算机控制系统、过程控制系统、顺序控制。

Automatic Control Theory, Modern Control Theory, Modeling and Identification, Operation Rresearch, Microcomputer Principle and Embedded System, Process Parameter Detection Technology, Computer Control System, Process Control System, Sequence Control.

六、总周数分配 Arrangement of the Total Weeks

学期 Semester	一	二	三	四	五	六	七	八	合计
教学环节 Teaching Program									
理论教学 Theory Teaching	18	17	18	16	17	16	17	2	121
复习考试 Review and Exam	2	1	3	1	2	1	3	0	13
集中实践环节 Intensive Practice	2	2	0	2	2	3	1	16	28
小计 Subtotal	22	20	21	19	21	20	21	18	162
寒假 Winter Vacation	5		5		5		5		20
暑假 Summer Vacation		6		6		6			18
合计 Total	27	26	26	25	26	26	26	18	200

自动化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
公共基础类课程 Public basic courses	00700975	中国近现代史纲要 Outline of Modern Chinese History	3	48	32		16	2
	00701353	思想道德与法治 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 Affair and Policy	2	64	64			1-8
	01390011	军事理论 Military Theory	2	36	24		12	1
	J100010	现代电力工程师 Modern Power Engineer	2	32	32			2
	00801410	通用英语 General English	4	64	64			1
	00801400	学术英语 Academic English	4	64	64			2
	01000011	体育(1) Physical Education (1)	1	36	30		6	1
	01000021	体育(2) Physical Education (2)	1	36	30		6	2
	01000031	体育(3) Physical Education (3)	1	36	30		6	3
	01000041	体育(4) Physical Education (4)	1	36	30		6	4
	公共基础课程小计 Subtotal of public basic courses			33	644	528		116
学科门类基础课程 Basis of discipline	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			2
	00900111	概率论与数理统计 Probability and Mathematical Statistics	3.5	56	56			4
	00900090	复变函数与积分变换 Complex Function and Integral Transformation	3	48	48			3
	00900053	大学物理(1) College Physics (1)	3.5	56	56			2
	00900440	物理实验(1) Experiment of Physics (1)	2	32		32		2
	00900064	大学物理(2) College Physics (2)	3	48	48			3

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	
	00900450	物理实验(2) Experiment of Physics (2)	2	32		32		3	
	00600204	C/C++程序设计 C/C++ Language Programming	3.5	56	36	20		1	
	学科门类基础类课程小计 Subtotal of Engineering foundation		35	560	476	84			
专业基础类课程 The major basic courses	00600233	工程制图基础 Engineering Graphics	2	32	32			2	
	10310610	自动化概论 Introduction to Automation	0.5	8	8			2	
	00200491	电路分析基础 Circuit Analysis Fundamentals	3.5	56	56			3	
	00200522	电路实验 Experiment of Circuit Analysis Fundamentals	0.5	8		8		3	
	00500351	模拟电子技术基础 Fundamentals of Analogue Electronics Technology	3	48	48			3	
	00500172	模拟电子技术基础实验 Experiment of Fundamentals of Analogue Electronics Technology	1	16		16		3	
	10411080	热工及流体机械基础 Thermal Theory and Fluid Mechanics Basis	2.5	40	40			4	
	00500410	数字电子技术基础 Fundamentals of Digital Electronics Technology	3	48	48			4	
	00500180	数字电子技术基础实验 A Experiment of Fundamentals of Digital Electronics Technology A	1	20		20		4	
	00200611	发电厂动力部分 Thermal System in Power Plant	2	32	32			4	
	00400700	自动控制理论 A Automatic Control Theory A	4	64	60	4		5	
	10141180	微机原理与嵌入式系统 Microcomputer Principle and Embedded System	3.5	56	46	10		5	
	10141160	数字信号处理基础 B Fundamentals of Digital Signal Processing B	2	32	32			4	
		专业基础类课程小计 Subtotal of The major basic courses		28.5	460	402	58		
	10141220	发电过程建模与辨识 Modeling and Identification for Power Generation	2	32	24	8		4	
	00400710	现代控制理论 Modern Control Theory	2	32	32			6	
	10141290	过程参数检测技术 B Measurement Technology for process parameters - B	2.5	40	36	4		5	
	00900480	管理运筹学 Management Operational Research	2	32	32			6	
	10141230	DCS 及工业控制网络 DCS and Industrial Control Network	2	32	22	10		7	
	10141240	计算机控制系统 Computer Control System	2.5	40	36	4		6	
10141250	过程控制系统 A Process Control System A	3.5	56	48	8		6		
10141260	清洁能源发电控制系统 B Control System for Power Generation with Clean	2	32	26	6		6		

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
		Energy Resources - B						
	00400730	顺序控制 Sequence Control	2	32	24	8		7
	专业核心课程小计 Subtotal of Required courses of major		20.5	328	280	48		
必修课学分合计 Subtotal of Required courses			117	1992	1686	190	116	

自动化专业部分集中实践环节设置

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
必修 Required	01390012	军事技能 Military Training	2	2 周		1
	J100060	劳动教育 Labor Education	2	2 周		2-7
	00490170	认识实习 Acquaintanceship Practice	1	1 周		4
	00490321	火电厂运行仿真实践 B Simulation-based Operation and Practice Training for of Thermal Power Plant B	1	1 周		8
	00390200	金工实习 Metalworking Practice	2	2 周		2
	00690830	微机原理与嵌入式系统课程设计 Course Design for Microcomputer Principle and Embedded System	1	1 周		5
	00490240	自动控制理论课程设计 Course Design for Automatic Control Theory	1	1 周		5
	00490142	DCS 及工业控制网络课程设计 Course Design for DCS and Industrial Control Network	1	1 周		7
	00690810	自动化创新实践 Practice on Innovation of Automation	1	1 周		6
	00490130	过程控制系统 A 课程设计 Course Design for Process Control System A	1	1 周		6
	00490140	计算机控制系统课程设计 Course Design for Computer Control System	1	1 周		6
	00490043	毕业实习 Major Practice	1	1 周		8
	00690021	毕业设计 Graduation Project	13		208	7-8
	00490010	毕业教育 Graduation Education	0	1 周		8
集中实践小计 Subtotal of major practical training			28	16	208	

自动化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.

组别	课程编号	课程名称	学分	总学时	课内学时	实验学时	课外学时	开课学期	模块
1	模块 1	00600331 计算机软件技术 Computer Software Technology	2	32	32			4	总学分不少于 12 学分 Electives, not less than 12 credits
		00401060 计算机网络及应用 Computer Network and Application	2	32	28	4		4	
		00600152 单片机 C 程序设计 Microcontroller C Programming	2	32	32			4	
		00400462 专业英语阅读(自动化) Specialized English Reading(Automation)	2	32	32			6	
		00400361 系统工程导论 Introduction to Systems Engineering	2	32	32			7	
		00400560 管理信息系统与决策支持系统 Management Information System and Decision Support System	2	32	32			7	
		00401070 人工智能原理与方法 Principles and methods of artificial intelligence	2	32	28	4		7	
	模块 2	00200192 电力电子技术 B Power Electronics Technology B	2	32	32			5	
		00400430 运动控制 Motion Control	2	32	28	4		5	
		11111494 无线传感网络 Wireless Sensor Networks	2	32	28	4		6	
		00601492 先进控制 Advanced Control	2	32	32			7	
	模块 3	00400610 控制系统数字仿真与参数优化 Control System Digital Simulation and Parameter Optimization	2	32	32			6	
		00400570 火电厂自动化专题 Special Subject on Automation	2	32	32			8	
	模块 4	跨专业选修其他专业的专业课程 Interdisciplinary Electives							
2		通识教育选修课程 General Education Electives						公共艺术类课程至少选修 2 学分; 其它可用组别 1 中课程学分替代	

选修课总学分不低于 20 学分。其中, 组别 1 中的专业领域课程和其它专业课程学分不低于 12 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.

辅修自动化专业人才培养方案

Undergraduate Program for the Automation Minor

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
00400700	自动控制理论 A Automatic Control Theory A	4	64	60	4	4	
10141180	微机原理与嵌入式系统 Microcomputer Principle and Embedded System	3.5	56	46	10	5	
10141160	数字信号处理基础 B Fundamentals of Digital Signal Processing B	2	32	32		5	
00400710	现代控制理论 Modern Control Theory	2	32	32		5	
10141220	发电过程建模与辨识 Modeling and Identification	2	32	24	8	5	
10141290	过程参数检测技术 B Process Parameter Detection Technology B	2.5	40	36	4	5	
00900480	管理运筹学 Management Operational Research	2	32	32		6	
00400590	DCS 及工业控制网络 DCS and Industrial Control Network	2	32	22	10	6	
10141240	计算机控制系统 Computer Control System	2.5	40	36	4	6	
10141250	过程控制系统 A Process Control Systems A	3.5	56	48	8	6	
10141260	清洁能源发电控制系统 B Clean Energy Power Generation Control System	2	32	26	6	7	
00400730	顺序控制 Sequence Control	2	32	24	8	7	
学分合计 Subtotal of courses		30					

说明：辅修专业总学分 25-30 学分。