

自动化专业人才培养方案

Undergraduate Program for Automation Major

学科门类：工学	国家代码：08	
Discipline Type: Engineering	Code: 08	
专业类：自动化类	国家代码：0808	
Type: Automation	Code: 0808	
专业名称：自动化	国家代码：080801	校内代码：0202
Title of the Major: Automation	Code: 080801	Code: 0202

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 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, and can correctly understand the impact of engineering practice on environmental and social sustainable development;

(2) They can systematically apply automation theories and technologies, comprehensively consider social, health, safety, legal, cultural, and environmental factors, and design and develop corresponding solutions to complex engineering problems in the field of energy and power-related automation;

(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, 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	公共基础教育 Public infrastructure	564	29	19.3%
	学科门类基础 Basis of discipline	560	35	23.3%
	专业基础 Basis of major	592	37	24.7%
	专业必修 Required courses of major	336	21	14.0%
	集中实践 Intensive practice	28+1 周	28	18.7%
必修课小计 Subtotal of Required courses		2052 学时+29 周 2052 hours + 29 weeks	150	85.7%
选修课 Electives		320	20	11.4%
课外实践学分 Practice credits of extra-curricular		5 周 5 weeks	5	2.9%
总计 Total		2372 学时+34 周 2372 hours + 34 weeks	175	100%

说明:

1. 必须实践环节学分包括: 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 5.5 学分, 共计 45 学分。

2.选修实践环节学分包括：选修实践课程 4 学分，课内实验、上机学时折算 0.5 学分。

Note:

1. Total of 45 credits for required practice training, 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, 5.5 credits for experiment and computer practice in basis of discipline, basis of major, and required courses of major.
2. Elective practice training, including: 4 credits for elective practice courses, 0.5 credit for in-class experiment and computer practice

五、专业核心课程 Main Course

自动控制理论 A、现代控制理论、建模与辨识、数字信号处理基础、微机原理与嵌入式系统、检测技术与仪表、计算机控制技术与系统、过程控制系统、运动控制、开关量控制 B。

Automatic control theory A, modern control theory, modeling and identification, fundamentals of digital signal processing, microcomputer principle and embedded system, detection technology and instrument, computer control technology and system, process control system, motion control, switch 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	17	18	19	15	18	16	17		120
复习考试 Review and Exam	1	2	2	2	1	1	1		10
集中实践环节 Intensive Practice	2	0	0	3	2	3	3	19	32
小计 Subtotal	20	20	21	20	21	20	21	19	162
寒假 Winter Vacation	5		5		5		5		20
暑假 Summer Vacation		6		6		6			18
合计 Total	25	26	26	26	26	26	26	19	200

自动化专业必修课教学进程

Table of Teaching Schedule for Required Course

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
公共基础教育	00700972	中国近现代史纲要 Outline of Modern Chinese History	2	32	24			8	1
	00701351	思想道德修养与法律基础 Ideological and Moral Cultivation and law basis	3	48	32			16	2
	00700981	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	6	96	64			32	4
	00700971	马克思主义基本原理 Marxist theory	3	48	32			16	3
	00701650	形势与政策 Current Events and Policy	2	32	12			20	1
	01390011	军事理论 Military theory	1	36	36				1
	00801410	综合英语 College English	4	64	64				1
	00400230	英语听说 Spoken English	三门课程中选修两门,取		2	32	32		

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
	00400240	英语读写 English reading and writing	得4学分即可。 Choose two of the three courses and achieve 4 credits	2	32	32			2
	00801400	通用学术英语(理工类) English for General Academic Purpose (Science and Engineering)		2	32	32			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
学科门类基础	00900130	高等数学(1)Advanced Mathematics B(1)	5.5	88	88				1
	00900140	高等数学(2)Advanced Mathematics B(2)	6	96	96				2
	00900462	线性代数 Linear Algebra	3	48	48				1
	00900111	概率论与数理统计 B Probability and Mathematical Statistics B	3.5	56	56				3
	00900050	大学物理(1)College Physics (1)	4	64	64				2
	00900060	大学物理(2)College Physics (2)	2.5	40	40				3
	00900440	物理实验(1)Experiment of Physics(1)	2	32		32			2
	00900450	物理实验(2)Experiment of Physics(2)	2	32		32			3
	00401110	高级语言程序设计(C++)Advanced Language Programming (C++)	3.5	56	36		20		1
	00900090	复变函数与积分变换 Complex Function and Integral Transformation	3	48	48				2
专业基础	00401120	工程图学 Engineering Drawing	2	32	32				2
	00401130	电路分析基础 Fundamentals of Circuit Analysis	3.5	56	56				3
	00200521	电路分析基础实验 Experiment of Fundamentals of Circuit Analysis	0.5	8		8			3
	00401140	热工及流体机械基础 Fundamentals of Thermal and Fluid Machinery	3	48	48				3
	00500170	模拟电子技术基础实验 B Experiment of Analogous Electronic Technic Basis B	1	16		16			3
	00500350	模拟电子技术基础 B Fundamentals of Analogue Electronics	3	48	48				3
	00401150	发电厂动力部分 Thermal System of Power Plant	2	32	32				4
	00500180	数字电子技术基础实验 B Experiment of Digital Electronic Technic Basis B	1	16		16			4
	00500410	数字电子技术基础 B Fundamentals of Digital Electronic Technique B	2.5	40	40				4
	00401060	计算机网络及应用 Computer Network and Application	2	32	28	4			4
	00400481	自动化专业概论 Introduction to Automation	0.5	8	8				4
	00400840	工程伦理 Engineering Ethics	1	16	16				4
	00400850	环境与可持续发展 Environment and sustainable development	1	16	16				4
	00400860	电力电子技术 B Power Electronics Technique B	2	32	32				4
	00400700	自动控制理论 A Automatic Control Theory A	4	64	60	4			4
	00400870	微机原理与嵌入式系统 Microcomputer Principle and Embedded System	4	64	56	8			5
	00401170	数字信号处理基础 Fundamentals of Digital Signal Processing	2	32	32				5
00401180	管理运筹学 Management Operational Research	2	32	32				6	
专	00401190	建模与辨识 Modeling and Identification	2	32	24	8			5

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
业必修	00400430	运动控制 Motion Control	2.5	40	32	8			5
	00401200	检测技术与仪表 Measurement Technology and Instrument	4	64	52	12			5
	00400710	现代控制理论 Modern Control Theory	2	32	32				5
	00401210	分散控制系统与现场总线技术 Distributed Control System and Fieldbus Technology	2	32	28	4			6
	00401220	过程控制系统 Process Control System	4	64	56	8			6
	00400580	计算机控制系统 Computer Control System	2.5	40	36	4			6
	00400880	开关量控制 B Sequence Control B	2	32	24	8			7
理论课程小计 Subtotal of Theory Courses			122	2052	1744	172	20	116	
集中实践	01390012	军事实践 Military Training	2	2周					1
	00490090	公益劳动 Public Laboring	1	1周					2-8
	00490180	认识实习 Cognition Practice	1	1周					4
	00490360	火电厂运行仿真实践 A Computer Simulation of Power Plant A	2	2周					4
	00390200	金工实习 B Metalworking Practice B	2	2周					5
	00490370	微机原理与嵌入式系统综合实践 Comprehensive Practice of Microcomputer Principle and Embedded System	3	3周					6
	00490380	控制系统综合实践 Comprehensive Practice of Control System	3	3周					7
	00490020	毕业设计 Graduation Project	13	13周					8
	00490050	专业实习 Major Practice	1	1周					8
	00490390	毕业教育 Graduation Education	0	1周					8
实践环节小计 Subtotal of practical training			28	29周					
必修课合计 Total of required courses			150	2052学时 +29周	1744	172	20	116	

自动化专业选修课教学进程

Table of Teaching Schedule for Electives

组别	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	模块
1	00600330	计算机软件技术 Computer Software Technology	2	32	32				4	专业选修一 Elective Part 1
	00600620	数据库 Database	1	16	16				5	
	00400460	专业英语阅读(自动化) Professional English Reading (Automation)	2	32	32				6	
	00400361	系统工程导论 Introduction to System Engineering	2	32	32				7	
	00400270	管理信息系统与决策支持系统 Management Information 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	
2	00400250	机器人控制 Robot Control	2	32	32				6	专业选修二 Elective Part 2
	00601060	无线传感网络 Wireless Sensor Network	2	32	28	4			6	
	00400260	先进控制 Advanced Control	2	32	32				7	
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	专业选修三 Elective Part 3
	00400720	新能源发电系统控制 Alternative Energy Generation System Control	2	32	32				7	
	00400570	火电厂自动化专题 Special Subject on Automation	2	32	32				8	
4	00401080	自动化创新实践(1) Automation Innovation Practice (1)	2	32					3	选修实践 Elective Practice
	00401090	自动化创新实践(2) Automation Innovation Practice (2)	2	32					4	
5		通识教育选修课程 General Education Electives								选修课 Electives
		跨专业选修其他专业的专业课程 Interdisciplinary Electives								
		研究生学位课程 Postgraduate Electives								
选修课小计 Subtotal of Electives			27	432	360	8				
选修课要求 Elective requirement			不低于 20 学分 No less than 20 credits							

选修课模块说明:

1.“专业选修一”模块是对本专业基础课程的拓展和深化。

2.“专业选修二”模块是对本专业专业课程的拓展和深化。

3.“专业选修三”模块是与电力行业相关的特色自动化技术。

4.“实践选修”模块是为培养学生动手能力设置的教学环节。

5.“通识教育选修”模块包括人文社科、语言交流、文化艺术、经济管理、创新创业等内容。学生可从学校给定的通识教育选修课程中选择。

6.跨专业选修其他专业的专业课程，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。

7.研究生学位课程，对于学有余力的同学或今后准备攻读研究生的学生可以选修研究生学位课程。

Note on Electives:

1. Elective part 1: it is set up to expand and deepen the basic courses of this major.
2. Elective part 2: it is set up to expand and deepen the professional courses of this major.
3. Elective part 3: it is a characteristic automation technology related to the power industry.
4. Elective practice: it is set up to cultivate students' practical ability.
5. General Education Electives: they include humanities and social sciences, language exchange, culture and art, economic management, innovation and entrepreneurship. Students can choose from the general education electives given by the school.
6. Interdisciplinary Electives: they are set up to cultivate compound talents. Students are encouraged to take interdisciplinary elective courses. Students can take any professional courses offered by the school.
7. Postgraduate Electives: for students who have the abilities to study or who are going to study for graduate students in the future, they can choose a postgraduate elective.

选修课选课建议(选修课学分不得低于20学分): Recommendations for electives (credits for electives should not be less than 20 credits)

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。

3.第六和第七学期：可根据个人兴趣，选修适量的研究生学位课程。

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.
3. Sixth and seventh semesters: According to personal interests, you can also select an appropriate amount of **Postgraduate Electives**.

自动化专业分学期教学进程

第一学年									
第一学期					第二学期				
课程性质	课程编号	课程名称	学分	课程类别	课程性质	课程编号	课程名称	学分	课程类别
必修	00700972	中国近现代史纲要	2	理论	必修	00701351	思想道德修养与法律基础	3	理论
	00701650	形势与政策	2			00400230	英语听说	2	
	01390011	军事理论	1			00400240	英语读写	2	
	00801410	综合英语	4			00801400	通用学术英语(理工类)	2	
	01000011	体育(1)	1			01000021	体育(2)	1	
	00900130	高等数学(1)	5.5			00900140	高等数学(2)	6	
	00900462	线性代数	3			00900050	大学物理(1)	4	
	00401110	高级语言程序设计(C++)	3.5			00900090	复变函数与积分变换	3	
	01390012	军事实践	2	实践		00401120	工程图学	2	
必修学分小计			24		必修学分小计			25	实践
第二学年									
第三学期					第四学期				
课程性质	课程编号	课程名称	学分	课程类别	课程性质	课程编号	课程名称	学分	课程类别
必修	00700971	马克思主义基本原理	3	理论	必修	00700981	毛泽东思想和中国特色社会主义理论体系概论	6	理论
	01000031	体育(3)	1			01000041	体育(4)	1	
	00900111	概率论与数理统计 B	3.5			00401150	发电厂动力部分	2	
	00900060	大学物理(2)	2.5			00500410	数字电子技术基础 B	2.5	
	00401130	电路分析基础	3.5			00401060	计算机网络及应用	2	
	00401140	热工及流体机械基础	3			00400481	自动化专业概论	0.5	
	00500350	模拟电子技术基础 B	3			00400840	工程伦理	1	
						00400850	环境与可持续发展	1	
	00900450	物理实验(2)	2	实践		00400860	电力电子技术 B	2	
	00200521	电路分析基础实验	0.5	00400700		自动控制理论 A	4		
00500170	模拟电子技术基础实验 B	1	00500180	数字电子技术基础实验 B	1				
必修学分小计			23		00490180	认识实习	1	实践	
必修学分小计			23		必修学分小计			26	
第三学年									
第五学期					第六学期				
课程性质	课程编号	课程名称	学分	课程类别	课程性质	课程编号	课程名称	学分	课程类别
必修	00400870	微机原理与嵌入式系统	4	理论	必修	00401180	管理运筹学	2	理论
	00401170	数字信号处理基础	2			00401210	分散控制系统与现场总线技术	2	
	00401190	建模与辨识	2			00401220	过程控制系统	4	
	00400430	运动控制	2.5			00400580	计算机控制系统	2.5	
	00401200	检测技术与仪表	4			00490370	微机原理与嵌入式系统综合实践	3	
	00400710	现代控制理论	2			必修学分小计			
	00390200	金工实习 B	2	实践		必修学分小计			18.5
必修学分小计			18.5		必修学分小计			13.5	
第四学年									
第七学期					第八学期				
课程性质	课程编号	课程名称	学分	课程类别	课程性质	课程编号	课程名称	学分	课程类别
必修	00400880	开关量控制 B	2	理论	必修	00490020	毕业设计	13	实践
	00490380	控制系统综合实践	3	实践		00490050	专业实习	1	
必修学分小计			5			00490390	毕业教育	0	
必修学分小计			5		必修学分小计			14	