

电气工程及其自动化

Electrical Engineering and Automation

专业代码: 080601

学 制: 4 年

Program Code: 080601

Duration: 4 years

培养目标:

培养能坚持社会主义道路, 适应现代经济、科技、社会的需要和进步, 德智体全面发展, 具有扎实和宽广的电气工程学科的基础理论和专业知识、突出的创新精神、创业意识与综合素质、国际视野、以及较强的计算机操作应用和独立解决电气工程技术问题的能力, 能够从事与电气工程领域有关的、宽口径的复合型高层次工程技术人才。

Educational Objectives:

The students are cultivated as interdisciplinary highly-skilled engineering talents with wide knowledge in electrical engineering field, who should stick to the path of socialism, accommodate the requirement and development of modern economy, technology as well as society. The students should have the following qualities: full physical and moral development; solid and broad background of fundamental theory and professional knowledge; outstanding innovation spirit, entrepreneurial awareness and comprehensive qualities; good proficiency of IT skills and the ability to solve electrical engineering problems independently.

毕业要求:

No1.工程知识: 能够将数学、自然科学、工程基础和专业知用于解决电气工程领域复杂工程问题。

No2.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电气工程领域复杂工程问题, 以获得有效结论。

No3.设计/开发解决方案: 能够设计针对电气工程领域复杂工程问题的解决方案, 设计满足特定需求的系统、单元(部件)或工艺流程, 并能够在设计环节中体现创新意识, 考虑社会、健康、安全、法律、文化以及环境等因素。

No4.研究: 能够基于科学原理并采用科学方法对电气工程领域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。

No5.使用现代工具: 能够针对电气工程领域复杂工程问题, 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。

No6.工程与社会: 能够基于工程相关背景知识进行合理分析, 评价电气工程领域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, 具备初步的电气工程实际经验, 工作后能较快地融入角色。

№7.环境和可持续发展：能够理解和评价针对电气工程领域复杂工程问题的专业工程实践对环境、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，能够在电气工程领域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，具备一定的电气领域科研/工程团队的实践经验。

№10.沟通：能够就电气工程领域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：通过电气工程实践理解并掌握电气工程领域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：能够胜任相关单位从事研究、规划、及技术改进、设计、施工和运行管理工作，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。

Student Outcomes:

№1.Engineering Knowledge: An ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to the solution of complex electrical engineering problems.

№2.Problem Analysis: An ability to identify, formulate and analyze complex electrical engineering problems, reaching to substantiated conclusions using basic principles of mathematics, science, and engineering.

№3.Design / Development Solutions: An ability to design solutions for complex electrical engineering problems and innovatively design systems, components or process that meet specific needs with societal, public health, safety, legal, cultural and environmental considerations.

№4.Research: An ability to conduct investigations of complex electrical engineering problems based on scientific theories and adopting scientific methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

№5.Applying Modern Tools: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

№6.Engineering and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional electrical engineering practice.

№7.Environment and Sustainable Development: An ability to understand and evaluate the impact of professional electrical engineering solutions in environmental and societal contexts and demonstrate knowledge of and need for sustainable development.

№8.Professional Standards: An understanding of humanity science and social responsibility, being able to understand and abide by professional ethics and standards responsibly in electrical engineering practice.

№9. Individual and Teams: An ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

№10. Communication: An ability to communicate effectively on complex electrical engineering problems with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions, and communicate in cross-cultural contexts with international perspective.

№11. Project Management: Demonstrate knowledge and understanding of electrical engineering management principles and methods of economic decision-making, to function in multidisciplinary environments.

№12. Lifelong Learning: A recognition of the need for, and an ability to engage in independent and life-long learning with the ability to learn continuously and adapt to new developments.

专业简介:

电力学院的电气工程专业前身可以追溯到建国前的中山大学电机工程系。1994 年与广东省电力工业局联合共建，在全国首创高校与政府、企业联合共建的办学模式。本专业拥有电气工程国家一级学科博士点（包括电力系统及其自动化、电力电子与电力传动、电机与电器、电站系统及其控制、电工理论与新技术、高电压与绝缘技术 6 个二级学科博士学位授权点），及相应的硕士学位授权点和博士后科研流动站，形成了完整的人才培养体系。本专业拥有风电控制与并网技术国家地方联合工程实验室、广东省风电控制与并网工程实验室、广东省电力工程技术研究开发中心、电力实验中心、电力系统工程研究所、电力经济与电力市场研究所、电能质量与节能研究所等机构，在华南地区电力行业的人才培养和科学研究领域具有举足轻重的地位。本专业与中国南方电网公司等业内龙头企业拥有长期、广泛和密切的产学研合作关系。与电信学院共同建设了“华南理工大学电气信息及控制国家级实验教学示范中心”。拥有 3 个创新学科平台、4 个特色实验室、14 个校外实习基地，为学生参与各种科研和生产实践活动提供了优越的环境。学院加入了学校与英国爱丁堡、美国密苏里等大学的本科联合培养计划和中法中心的“3+1+2”培养计划、中澳“3+2”培养计划。

Program Profile:

The Major in Electrical Engineering of School of Electric Power, South China University of Technology historically inherited from Department of Electrical Engineering, Sun Yat-sen University. In 1994, the school started to cooperate with Guangdong Electric Power Bureau, which is the groundbreaking of a totally new educational mode in China, including the collaboration between the university and both the government and the industry.

The Major in Electrical Engineering has a complete talent-training system. It has the Doctor Degree of the Electrical Engineering First-Level Discipline, which includes six Second-Level Disciplines: Electric Power System and Its Automation, Power Electronics and Electric Drive, Electromechanics, Power Plant System and Its Control, Theory and New Technology of Electrical Engineering, High Voltage and Insulation

Technique. All the research directions have the corresponding master's degree authorizations and post-doctoral research stations.

The Major in Electrical Engineering has several high-level scientific research institutions including National & Local Joint Engineering Laboratory of Wind Power Control and Integration Technology, Guangdong Engineering Laboratory of Wind Power Control and Integration Technology, Guangdong Research and Development Center of Electrical Engineering Technology, Experimental Center of Electric Power, Research Institute of Power System, Research Institute of Power Economy and Market, Research Institute of Power Quality and Energy Conservation, etc. The major plays an important role in the field of education and research for electrical industry in South China.

The Major in Electrical Engineering has a long-time, comprehensive and close collaboration with leading Chinese electrical enterprises such as China South Grid. The National Experimental Teaching Demonstration Center of Electrical Information and Control of South China University of Technology is held by School of Electric Power and School of Electronic and Information Engineering. To participate in many scientific research practice activities, the students have an enriched environment including 3 innovation platforms, 4 featured laboratories as well as 14 off-campus practice bases.

The School of Electric Power has joined the undergraduate education programs with The University of Edinburgh of UK and The University of Missouri of US. Furthermore, the school has joined the "3+1+2" education plans collaborating with The Sino-French Centre.

专业特色:

本专业面向电力系统、电气装备制造、电气科学研究等领域，包含电力系统及其自动化、电机电器及其控制、电力电子与电力传动、高电压与绝缘技术等专业方向的强电类宽口径专业，与国内电力企业（尤其是中国南方电网）拥有长期良好科研合作关系，并与国外多所知名大学的相关专业保持密切的科研合作及人才培养关系。

Speciality Features:

The Major in Electrical Engineering is a wide-adaptable strong-power major, including the professional specialities of Electric Power System and Its Automation, Electromechanics, Power Electronics and Electric Drive, High Voltage and Insulation Technique. The major has a long-time and comprehensive collaboration with leading Chinese electrical enterprises such as China South Grid. Furthermore, the major has close educational and research collaborations with corresponding majors of several famous international universities.

授予学位: 工学学士学位

Degree Conferred: Bachelor of Engineering

主干课程:

电路、电磁场、模拟电子技术、数字电子技术、电机学、电力系统分析、电力电子技术、自动控制理论、高电压技术等。

Core Courses:

Circuit, electromagnetic field, analog electronic technology, digital electronic technology, electric machinery, power system analysis, power electronics, automatic control theory and so on.

特色课程:

双语教学课程：电力经济与管理概论、电力系统通信技术

研究型课程：电力系统课程设计、电力电子课程设计

讨论型课程：专业概论与发展系列讲座

工作坊：电气工作坊与专题设计

创新实践课程：仿真技术在电气工程领域的应用、电气工作坊与专题设计

创业教育课程：电气控制产业模式与创业、新能源产业模式与创业

Featured Courses:

Bilingual courses: introduction to economics and management of power system, power line communication technology

The research course: the course design of electric power system, power electronics course design

Discussion of curriculum: Lecture Series professional introduction and development

Innovative practice course: application of simulation technology in the field of Electrical Engineering

Entrepreneurship education courses: electrical control mode of industry and entrepreneurship, new energy industry mode and Entrepreneurship

2.类别统计表 (Category Registration Form)

学时 Academic Hours					学分 Credits						
总学时数 Total	其中 Include		其中 Include		总学分数 Total	其中 Include		其中 Include			其中 Include
	必修学时 Compulsory	选修学时 Elective	理论教学学时 Theory Course	实验教学学时 Lab		必修学分 Compulsory	选修学分 Elective	集中实践教学环节学分 Practice-concentrated Training	理论教学学分 Theory Course Credits	实验教学学分 Lab	创新创业教育学分 Innovation and Entrepreneurship Education
2292	1796	496	1952	340	176	145	31	35	130	11	14

三、专业教学计划表 (Teaching Schedule)

类别 Course Category	课程 代码 Course No.	课程名称 Course Title	是否 必修 C/E	学时数 Total Curriculum Hours				学 分 数 Credi ts	开课 学期 Semeste r	毕业 要求 Student Outcomes
				总学 时 Class Hours	上机 Computer -aided Class Hours	实验 Lab Hours	实践 Practice Hours			
公共基础课 General Basic Courses	143093	思想道德修养与法律基础 Cultivation of Thought and Morals & Fundamental of Law	必修 课 C	(40) (36)				2.5	2	No8
	143091	中国近现代史纲要 Skeleton of Chinese Modern History		(32) 24				2.0	1	No8
	143106	毛泽东思想和中国特色社会主义理论体系概论 Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics		(80) 48				5.0	4	No8
	143090	马克思主义基本原理 Fundamentals of Marxism Principle		(40) 36				2.5	3	No8
	143094	形势与政策 Analysis of the Situation & Policy		(128)				2.0	1-8	No8
	144001	大学英语(一) College English(1)		64				4.0	1	No10
	144002	大学英语(二) College English(2)		64				4.0	2	No10
	145223	大学计算机基础 Foundations of Computer		32				2.0	1	No5
	145268	C++程序设计基础 C++ Programming Foundations		48				3.0	2	No5
	152001	体育(一) Physical Education (1)		32			32	1.0	1	No12
	152002	体育(二) Physical Education (2)		32			32	1.0	2	No12
	152003	体育(三) Physical Education (3)		32			32	1.0	3	No12
	152004	体育(四) Physical Education (4)		32			32	1.0	4	No12
	106001	军事理论 Military Principle		(16)				1.0	2	No9
	140191	微积分II(一) Calculus(1)		80				5.0	1	No1-5
	140192	微积分II(二) Calculus(2)		80				5.0	2	No1-5
	140197	线性代数与解析几何 Linear Algebra & Analytic Geometry		48				3.0	1	No1-5
	140019	概率论与数理统计 Probability & Mathematical Statistics		48				3.0	2	No1-5
	140099	数学实验 Mathematical Experiments		48	32			2.0	2	No1-5
	140015	复变函数 Complex Variable		32				2.0	3	No1-5
	140016	积分变换 Integral Transformation		16				1.0	3	No1-5
	141005	大学物理III(一) General Physics (1)		64				4.0	2	No1-5
	141006	大学物理III(二) General Physics (2)		64				4.0	3	No1-5
	141007	大学物理实验(一) Physics Experiment(1)		32		32		1.0	2	No1-5
	141008	大学物理实验(二) Physics Experiment(2)		32		32		1.0	3	No1-5
	130009	工程制图 Engineering Drawing		48				3.0	1	No1-5

	人文科学领域 Humanities	通识课 E	96				6.0		№1-5
	社会科学领域 Social Science		64				4.0		№1-5
	合 计 Total		1196	32	64	128	76		

三、专业教学计划表（续）（Teaching Schedule）

类别 Course Category	课程 代码 Course No.	课程名称 Course Title	是否 必修 C/E	学时数 Total Curriculum Hours				学分 数 Credits	开课 学期 Semester	毕业 要求 Student Outcomes
				总学 时 Class Hours	上机 Computer-aided Class Hours	实验 Lab Hours	实践 Practice			
学科基础课 Disciplinary Basic Courses	134130	电气工程学科概论 Introduction to Electrical Engineering	必 C	32				2.0	3-4	№1,2,7-10
	134164	电路 III（一） Electric Circuits(1)	必 C	48				3.0	2	№1-6
	134165	电路 III（二） Electric Circuits(2)	必 C	48				3.0	3	№1-6
	135005	电路实验 Experiment of Circuit	必 C	16		16		0.5	3	№1~5,7, 12
	134006	电机学（一） Electric Machinery(I)	必 C	32				2.0	3	№1-6
	134007	电机学（二） Electric Machinery(II)	必 C	64				4.0	4	№1-6
	134072	电机实验 Electric Machinery Experiment	必 C	16		16		0.5	5	№1~5,7, 12
	135034	模拟电子技术 II Analog Electronics	必 C	64				4.0	4	№1
	135043	模拟电子技术实验 Experiment of Analog Circuits	必 C	16		16		0.5	4	№1~5,7, 12
	155081	数字电子技术 II Digital Electronics	必 C	64				4.0	5	№1
	135045	数字电子技术实验 Experiment of Digital Electronics	必 C	16		16		0.5	5	№1~5,7, 12
	135088	电磁场 Electromagnetic Fields	必 C	56				3.5	3	№1-6
	134059	自动控制理论 Automatic Control Theory	必 C	48				3.0	4	№1-6
	134177	电力系统分析（一） Electric Power System Analysis (Part I)	必 C	48				3.0	5	№1-6
	134178	电力系统分析（二） Electric Power System Analysis (Part II)	必 C	48				3.0	6	№1-6
	134005	电力电子技术 Power Electronics	必 C	48				3.0	5	№1-6
	134188	电力电子综合实验 Comprehensive Experiment of Power Electronics	必 C	16		16		0.5	6	№1~5,7, 12
	134013	高电压技术 High Voltage Engineering	必 C	48		4		3.0	5	№1
	134127	电力系统综合实验 Comprehensive Experiment of Electric Power System	必 C	32		32		1.0	7	№1~5,7, 12
		合 计 Total		必 C	760		116		44.0	
专 业 课 Special	134011	发电厂电气部分 Electrical Equipments in Power Plants	选 E	48				3.0	6	№1-6

134040	继电保护 The Protective Relaying	选 E	64		10		4.0	6	№1-6
134071	单片机设计技术 Technology and Application of Microcontroller	选 E	48	8			3.0	6	№1-6
134166	电机控制 Electrical Machine Control	选 E	48				3.0	5	№1-6
134071	嵌入式系统原理及应用 Principles and Applications of Embedded System	选 E	32			14	2.0	5	№1-6
134057	电力电子仿真技术 Simulation of Power Electronic Systems	选 E	32		12		1.5	6	№1-6
134131	电力经济与管理概论 Introduction of Electricity economics and Management	选 E	48				3.0	6	№1-6
134082	专业概论与发展讲座 Introduction to Specialty and Development of Electric Power	选 E	32 (16)				2.0	5-6	№1-6
134067	电力系统自动装置 Power System Automation Equipment	选 E	32		4		2.0	7	№1-6
134044	电力系统规划 Power System Planning	选 E	32				2.0	7	№1-6
134135	现代控制技术	选 E	32				2.0	5	№1-6
134098	电力系统通信技术 Power Information Systems Theory and Engineering	选 E	32				2.0	5	№1-6
134012	电气测试技术 Technology of Electric Measurement	选 E	32				2.0	6	№1-6
134003	电器学 Electrical apparatus	选 E	32				2.0	5	№1-6
134167	电磁兼容技术导论 Introduction to Electromagnetic Compatibility	选 E	32				2.0	6	№1-6
134168	开关电源设计 Design of Switched-mode Power Supply	选 E	32				2.0	6	№1-6
134169	新能源发电中的电力电子技术 Power Electronics in New Energy Generation	选 E	32				2.0	6	№1-6
134179	可再生能源发电与并网技术 Renewable Energy Power Generating & Grid-connected Technology	选 E	32				2.0	6	№1-6
134133	电器与 PLC 控制技术 Electric Appliance and PLC Control Technology	选 E	32	4			2.0	6	№1-6
134052	配电网自动化 Distributing Automation	选 E	32				2.0	7	№1-6
134074	人工智能概述 Artificial Intelligence	选 E	32				2.0	7	№1-6
134100	变电站综合自动化 Substation integrated automation systems	选 E	32				2.0	7	№1-6
134136	电力信息系统原理与工程 Power Information System Theory and Engineering	选 E	32				2.0	7	№1-6
134043	直流输电 Direct Current Transmission	选 E	32				2.0	7	№1-6

134170	电气控制产业模式与创业 Electrical Control Industries Model and Entrepreneurship	选 E	32 (16)				2.0	5	№1-6
134171	新能源产业模式与创业 Innovative Development Mode and Entrepreneurship of New Energy Industry	选 E	32 (16)				2.0	5	№1-6
134172	电气设备在线监测与故障诊断 On-line Monitoring and Diagnostic System of Power Equipments	选 E	32				2.0	7	№1-6
134186	仿真技术在电气工程领域的应用	选 E	32				2.0	7	№1~5,12
134173	高电压试验技术 High Voltage Testing Technology	选 E	32				2.0	7	№3
134189	电力系统过电压防护及仿真 Simulation Techniques in Electrical Engineering	选 E	32				2.0	7	№1~5,12
134175	高电压绝缘 High Voltage insulation	选 E	32				2.0	7	№1-6
134176	脉冲功率技术 Pulsed Power Technology	选 E	32				2.0	7	№1-6
134195	有限元分析概论及电气工程应用实例 Introduction to Finite Element Analysis and Its Application to Electrical Engineering	选 E	24		8		1.5	6	№1~5,12
120003	创新研究训练 Innovation Research Training	选 E	32				2.0		№3
120004	创新研究实践 I Innovation Research Practice 1	选 E	32				2.0		№3
120005	创新研究实践 II Innovation Research Practice 2	选 E	32				2.0		№3
120006	创业实践 Entrepreneurial Practice	选 E	32				2.0		№3
合计 Total		选 E	选修课修读最低要求 21.0 学分 minimum elective course credits required:21						

备注：学生根据自己开展科研训练项目、学科竞赛、发表论文、获得专利和自主创业等情况申请折算为一定的专业选修课学分（创新研究训练、创新研究实践 I、创新研究实践 II、创业实践等创新创业课程）。每个学生累计申请为专业选修课总学分不超过 4 个学分。经学校批准认定为选修课学分的项目、竞赛等不再获得对应第二课堂的创新学分。

四、集中实践教学环节(Practice-concentrated Training)

课程 代码 Course No	课程名称 Course Title	是否 必修 C/E	学时数 Total Curriculum Hours		学分 Credits	开课 学期 Semester	毕业要求 Student Outcomes
			实践 Practice weeks	授课 Lecture Hours			
106002	军训 Military Training	必 C	3 周		3.0	1	№9
143197	马克思主义理论与实践 Marxism Theory and Practice	必 C	2 周		2.0	假期 Vacation	№8
130356	工程训练 I Engineering Training (I)	必 C	2 周		2.0	3	№5
141073	电子工艺实习 Practice of Electronic	必 C	2 周		2.0	4	№5
134077	电力电子课程设计 Course Project of Power Electronics	必 C	2 周		2.0	7	№4
134076	电力系统课程设计 Course Project of Power System	必 C	2 周		2.0	7	№4
134083	社会实践 Social Practice	必 C	1 周		1.0	2	№8

134196	电气工作坊与专题设计 Design Workshop and Special Topic Design	必 C	2 周		2.0	7	№2,3,4,6,9,10
134064	生产实习 Engineering Internship	必 C	1 周		1.0	6	№3
134080	毕业实习 Undergraduate Practice	必 C	3 周		3.0	6	№3
134091	毕业设计 Undergraduate Thesis	必 C	15 周		15.0	8	№2,3,4
合 计 Total		必 C	35 周		35.0		

五、第二课堂

第二课堂由人文素质教育和创新能力培养两部分组成。

1.人文素质教育基本要求

学生在取得专业教学计划规定学分的同时，还应结合自己的兴趣适当参加课外人文素质教育活动，参加活动的学分累计不少于 2 个学分。

2.创新能力培养基本要求

学生在取得本专业教学计划规定学分的同时，还必须参加国家创新创业训练计划或广东省创新创业训练计划或 SRP（学生研究计划）或百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于 4 个学分。

5.“Second Classroom” Activities

“Second Classroom” Activities are comprised of two parts, Humanities Quality Education and Innovative Ability Cultivation.

1)Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one’s interest, acquiring no less than two credits.

2)Basic Requirements of Innovative Ability Cultivation

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in any one of the following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities of Innovative Ability Cultivation that last a certain period of time (e.g. subject contests, academic lectures), acquiring no less than four credits.