

电子科学与技术

Electronic Science & Technology

专业代码: 080702

学 制: 4 年

Program Code: 080702

Duration: 4 years

培养目标:

培养能够适应社会主义建设需要和德智体全面发展, 具有电子科学与技术学科宽厚理论基础, 精通电子材料及元器件制备技术及其应用电路技术; 能够创造性地利用电子应用技术以及材料科学与工程基本原理识别、解决实践和工业需求遇到的问题; 具备在团队沟通合作能力, 进而具备电子科学与技术领域的领导能力的高素质、复合型高级工程技术人才。学生毕业后能够胜任在工业企业部门从事电子材料及元器件及其在电子信息工程、自动化、智能系统中应用的设计、制造、研究、开发与质量管理工作, 也可到科学研究部门、高等学校从事研究与教学工作, 并具备终身学习的能力。

Educational Objectives:

The aim of the program is to develop high quality and complex qualified personnel in technology and engineering with adaptability to socialist construction, all-round development, solid theoretical foundation in electronic science technology, and good knowledge of electronic materials and devices as well as their applied electronic circuits technology; with the ability of applying knowledge of electronic applied technology, materials science and engineering to identify and solve practical engineering problems; with communication and cooperation skills for team-work, and gain project management abilities in the field of materials science and engineering. The graduates are competent to engage in design, manufacturing, R&D, and quality control of electronic materials and devices including their application in electronic information engineering, automation, and intelligent systems in the industrial enterprise, as well as to engage in research and teaching in scientific research departments and in higher educational institutions, and acquire the ability of lifelong learning.

毕业要求:

№1.工程知识: 掌握扎实的基础知识、专业基本原理、方法和手段, 能够将数学、自然科学、本专业基础知识和专业知识用于解决复杂工程问题。

№2.问题分析: 能够应用数学、自然科学、本专业基本原理、方法和手段, 识别、表达、并通过文献研究分析电子材料与元器件制备技术及其应用电路技术的复杂问题, 以获得有效结论。

№3.设计/开发解决方案: 能够设计针对电子材料与元器件复杂问题的解决方案, 设计满足特定需求的电子系统、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。

№4.研究：能够基于科学原理并采用科学方法对电子材料与元器件复杂问题进行研究，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：能够针对电子材料与元器件复杂问题，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，包括对电子材料与元器件复杂问题的预测与模拟，并能够理解其局限性。

№6.工程与社会：能够基于电子材料与元器件相关背景知识进行合理分析，评价电子材料与元器件实践和电子材料与元器件复杂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电子材料与元器件复杂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：能够就电子材料与元器件复杂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。

Student Outcomes:

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

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

№3. Design / Development Solutions: An ability to design solutions for complex engineering problems of electrical materials and devices 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 engineering problems of electrical materials and devices 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 of electrical materials and devices, with an understanding of the limitations.

№6. Engineering and Society: An ability to apply reasoning informed by contextual knowledge of

electrical materials and devices to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

№7. Environment and Sustainable Development: An ability to understand and evaluate the impact of professional engineering solutions of electrical materials and devices 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 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 engineering problems of electrical materials and devices 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 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:

电子科学与技术专业为广东省名牌专业,本专业侧重于电子材料与元器件方向,前身创立于1958年,现设于电子材料科学与工程系。电子科学与技术专业电子材料与元器件方向设在电子材料科学与工程系,属于电子技术与材料学交叉学科,也是目前广东省内高等院校中唯一的电子材料与元器件方向的专业。主要培养从事电子材料、功能元器件及其应用电子技术研究和开发综合知识的高级工程技术人才。设有微电子学与固体电子学专业、材料学专业硕士点和博士点,具有完善的专业人才培养体系,已培养逾百名硕士、博士生。拥有一支学历结构、年龄结构、职称结构、学缘结构合理的师资队伍。目前共有教职人员20名,全部为30岁至50岁的中青年教师,其中教授4人、副教授8人。所有教师具有硕士以上学历,其中具有博士学位教师17人。拥有约800平方米教学科研实验室,本专业工艺与测试设备仪器齐全;拥有1个省级校外实践基地及多个校级校外实践基地;并共享材料科学与工程学院实验平台和华南理工大学完备的分析测试平台以及丰富的图书资料和便利的网络资源。

Program Profile:

Electronic Science & Technology is conferred the title of “Famous Brand Program of Guangdong Province”. This major focus on electronic materials and devices. Its predecessor was founded in 1958 and now is set up in the Department of Electronic Materials Science & Engineering. It is an interdisciplinary

discipline integrating electronic technology & materials science, and is currently the only one among all higher educational institutions in Guangdong Province. This major is designed to cultivate comprehensive senior scientists and engineers who are engaged in the investigation and development of electronic materials, functional devices and their applied electronic technology. With Microelectronics & Solid Electronics and Materials science master's and doctoral degree programs, the major has a sound professional training system, and has trained more than 100 master's and doctoral students. The age, professional title and academic credentials of the teaching staff in this department are of rational structure. Currently the number of teaching and experimental staff members is 20. All are young and middle-age backbone teachers from 30 to 50 years old, including 4 professors, 8 associate professors. And all teachers have a master's degree or higher, including 17 doctoral teachers. The major owns 800 square meter well-equipped teaching and research laboratory, one provincial and more college out-school practice bases, and a lot of shareable resources, including the professional experiment platform of School of Materials Science & Engineering, the comprehensive analysis and test platform of South China University of Technology, the well-stocked library and convenient network resource of the university.

专业特色:

本专业属于多学科交叉渗透的边缘学科, 特色在于兼跨电子与新材料两大重点发展领域。以电子功能材料和元器件研究为目标, 要求学生具有电子科学与技术以及材料科学宽厚理论基础, 精通电子材料的制备、工艺、电磁性能、分析和表征, 以及元器件的设计和应用开发。主要培养具有从事电子材料、功能元器件及其应用电子技术研究和开发综合知识的高级工程技术人才。

Program Features:

This major is an interdisciplinary discipline integrating electronic technology, materials science and chemistry, which is the feature of it and makes it span two key developing fields, electronics and new materials. The major aims to provide students with an education in electronic materials and devices as well as a good knowledge of their applied electronic circuits technology, and in the meantime, to equip students with solid professional knowledge and skills, as well as the fabrication, design, processing, analyzing, production and characterization of electronic materials and components. This major is designed to cultivate comprehensive senior scientists and engineers who are engaged in the investigation and development of electronic materials, functional devices and their applied electronic technology.

授予学位: 工学学士学位

Degree Conferred: Bachelor of Engineering

主干课程:

电路、模拟电子技术、数字电子技术、电磁场与电磁波、固体物理、电介质物理基础、半导体

物理、传感器及其应用电子技术、无源电子元件导论、介电材料与器件。

Core Courses:

Electric Circuits, Analog Electronics, Digital Electronics, Electromagnetic Fields and Magnetic Waves, Solid State Physics, Dielectric Physics Basis, Semiconductor Physics, Sensors and Their Applied Electronic Techniques, Introduction to Passive Electronic Components, Dielectric Materials and Devices

特色课程:

双语教学课程：材料科学与工程导论、纳米材料与纳米结构、薄膜物理与技术

新生研讨课：电子材料与元器件的应用与发展

创新实践课程：电子功能材料设计及实验技术、纳米材料制备与表征综合实验、无源电子元件实验、信号检测系统设计及制作、电子元器件课程设计

创业教育课程：先进材料产业模式与创新发

Featured Courses:

Bilingual Courses: Introduction to Materials Science & Engineering, Nanomaterials and Nanostructure, Thin Film Physics and Technology

Freshmen Seminars: The Development & Application of Electronic Materials & Devices

Special Designs: Course Project for signal detection systems design and fabrication, Course Project of Electronic Components

Innovation Practice: Laboratory of Electronic Functional Materials, Laboratory of Nano-materials preparation and characterization, Passive Electronic Components Laboratory

Entrepreneurship Courses: Advanced Material Industry Model and Innovation Development

一、教学计划总体安排表 (General Teaching Schedule)

学 年	学 期	教 学 进 度 安 排 (周)																		理 论 教 学	考 试	入 学 教 育	军 训	课 程 设 计	工 程 训 练	电 子 实 习	综 合 实 验	社 会 实 践	生 产 实 习	毕 业 实 习	其 它 实 习	中 外 合 作 项 目	毕 业 设 计	就 业 安 排	机 动	假 期	小 计		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18																			19	20
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R																				
一	1		C	A	A	A	A	A	A	A	A	A	A	A	A	B	D	D	D	14	1	1	3												19				
	2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	Q	B	B	16	2											2		20					
二	3	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	K	K	16	2					2								20					
	4	A	A	A	A	A	A	A	A	G	G	A	A	A	A	A	A	B	B	16	2				2										20				
三	5	A	A	A	A	A	A	A	A	A	A	A	A	A	A	H	A	B	B	16	2					1	1								20				
	6	A	A	A	A	A	A	A	A	A	A	A	A	A	E	B	B	I	I	14	2		1												20				
四	7	E	E	A	A	A	A	A	A	A	A	A	A	A	B	B	I	I	13	2			2												20				
	8	L	L	L	O	O	O	O	O	O	O	O	O	O	O	O	O	P	P									3				15	2			20			
合 计 (周)																		10	13	1	3	3		2	1	7		2	3			15	2	2			15		

二、各类课程学分登记表 (Registration Form of Curriculum Credits)

1. 学分统计表 (Credits Registration Form)

课程类别 Course Category	课程要求 Requirement	学分 Credits	学时 Academic Hours	备注 Remarks
公共基础课 General Basic Courses	必修 Compulsory	65.5	1020	
	通识 General Education	10.0	160	
学科基础课 Disciplinary Basic Courses	必修 Compulsory	37.5	632	
	选修 Elective	7.0	120	
专业领域课 Specialty-related Courses	必修 Compulsory	10.0	160	
	选修 Elective	11.0	176	
合 计 Total		141.0	2268	
集中实践教学环节 (周) Practice Training (Weeks)		38.0	38 周	
毕业学分要求 Credits Required for Graduation	141.0 + 38.0 = 179.0			

备注：学生在取得专业教学计划规定学分的同时，还必须取得第二课堂 2 个人文素质教育学分和 4 个创新能力培养学分。

2. 类别统计表 (Category Registration Form)

学时 Academic Hours			学分 Credits			
总	其中 Include	其中 Include	总	其中 Include	其中 Include	其中 Include

学时数 Total	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	学分数 Total	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
2268	1812	456	1988	280	179	151	28	38	132	9	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 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 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 C	(40) (36)				2.5	2	№8
	143091	中国近现代史纲要 Skeleton of Chinese Modern History		(32) 24				2.0	1	№8
	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	№8
	143090	马克思主义基本原理 Fundamentals of Marxism Principle		(40) 36				2.5	3	№8
	143094	形势与政策 Analysis of the Situation & Policy		(128)				2.0	1-8	№8
	144001	大学英语 (一) College English (1)		64				4.0	1	№10
	144002	大学英语 (二) College English (2)		64				4.0	2	№10
	145223	大学计算机基础 Foundations of Computer		32				2.0	1	№5
	152001	体育 (一) Physical Education (1)		32			32	1.0	1	№12
	152002	体育 (二) Physical Education (2)		32			32	1.0	2	№12
	152003	体育 (三) Physical Education (3)		32			32	1.0	3	№12
	152004	体育 (四) Physical Education (4)		32			32	1.0	4	№12
	106001	军事理论 Military Principle		(16)				1.0	2	№9
	140191	微积分 II (一) Calculus (1)		80				5.0	1	№1,2
	140192	微积分 II (二) Calculus (2)		80				5.0	2	№1,2
	140197	线性代数与解析几何 Linear Algebra & Analytic Geometry		48				3.0	1	№1,2
	140019	概率论与数理统计 Probability & Mathematical Statistics		48				3.0	2	№1,2
	140015	复变函数 I Complex Variable		32				2.0	3	№1,2
	130009	工程制图 Engineering Drawing		48				3.0	1	№1,3
	141005	大学物理 III (一) General Physics (1)		64				4.0	2	№1,2

141006	大学物理 III (二) General Physics (2)		64				4.0	3	№1,2
141007	大学物理实验 (一) Physics Experiment (1)		32		32		1.0	2	№1,2,4
141008	大学物理实验 (二) Physics Experiment (2)		32		32		1.0	3	№1,2,4
147045	大学化学 General Chemistry		32				2.0	1	№1,2
147036	大学化学实验 General Chemistry Experiment		16		16		0.5	2	№1,2,4
145268	C++程序设计基础 C++ Program Designing Basics		48				3.0	2	№5
	人文科学领域 Humanities	通识课 E	96				6.0		№8
	社会科学领域 Social Science		64				4.0		№8
合 计 Total			1180		80	128	75.5		

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 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	135020	电路 II Electric Circuits	必 C	64				4.0	3	№1,2
	135005	电路实验 Experiment of Electric Circuits	必 C	16		16		0.5	4	№1,3
	135034	模拟电子技术 II Analog Electronics	必 C	64				4.0	4	№1,2
	135043	模拟电子技术实验 Experiment of Analog Circuits	必 C	16		16		0.5	4	№1,3
	155081	数字电子技术 II Digital Electronics	必 C	64				4.0	5	№1,2
	135045	数字电子技术实验 Experiment of Digital Electronics	必 C	16		16		0.5	5	№1,3
	136259	电磁场与电磁波 Electromagnetic Fields and Waves	必 C	48				3.0	4	№1,2
	136001	固体物理 Solid State Physics	必 C	64				4.0	4	№1,2,3,4
	136002	压电物理 Piezoelectric Physics	必 C	32				2.0	5	№1,2
	136003	电介质物理基础 Dielectric Physics Basis	必 C	48				3.0	4	№1,2
	136004	磁性物理学 Magnetic Physics	必 C	32				2.0	3	№1,2
	136357	半导体物理与器件 Semiconductor Physics & Devices	必 C	56				3.5	4	№1,2,3
	136358	电子器件微纳加工技术 Micro-nanofabrication Technologies for Electronic Devices	必 C	32				2.0	5	№1,2,3,5
	136121	电子材料测试技术 Testing Technology for Electronic Materials	必 C	72		24		4.0	5	№4,5
	136296	实验室安全规范 Laboratory safety regulations	必 C	8				0.5	3	№6,8
141017	信号与系统 Signal & Systematic	选 E	64				4.0	4	№1、№2	

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 Semest er	毕业 要求 Student Outcomes
				总学 时 Class Hours	上机 Computer-ai ded Class Hours	实验 Lab Hours	实践 Practice			
	136260	电子材料与元器件的应用与发展 The Development & Application of Electronic Materials & Devices	选 E	16				1.0	2	№1,2,6,7
	136191	材料科学与工程导论 An Introduction to Materials Science and Engineering	选 E	48				3.0	3	№4
	136238	薄膜物理与技术 Thin Film Physics and Technology	选 E	32				2.0	5	№1,2,4
	136331	材料科学基础 I Fundamentals of materials science I	选 E	64		4		4.0	4	№1
	136332	材料科学基础 II Fundamentals of materials science II	选 E	48		4		3.0	5	№1
	136085	材料物理性能 Physical Property of Materials	选 E	48				3.0	6	№1,4
	136353	激光原理 Principles of Lasers	选 E	32				2.0	5	№1、№3 №4
	136355	光电显示技术 Optoelectronic Display Technology	选 E	48				3.0	5	№2、№6
	合计 Total		必 C	632		72		37.5		
			选 E	选修课修读最低要求 7.0 学分 minimum elective course credits required:7.0						
专业领域课 Specialty- related Courses	136007	介电材料与器件 Dielectric Materials & Devices	必 C	48				3.0	6	№1,2,3,4,5
	136008	传感器及其应用电子技术 Sensors and Their Applied Electronic Techniques	必 C	48				3.0	6	№1,2,3,6
	136261	无源电子元件导论 Introduction to Passive Electronic Components	必 C	32				2.0	5	№1,2,3
	136006	压电陶瓷材料及器件 Piezoelectric Ceramic Materials & Devices	必 C	32				2.0	6	№1,2,3
	136111	专业英语与文献检索 Document Retrieval & Reading in Specialty English	选 E	40	8			2.5	6	№2,5,9,10,1 2
	136359	电子元件测试方法 Test Methods for Electronic Materials Component	选 E	16				1.0	7	№1,2,3 №4,5
	136012	厚膜混合集成电路 Thick Films Hybrid Integrated Circuit	选 E	32				2.0	7	№1,3,5
	136013	磁性材料 Magnetic Materials	选 E	16				1.0	4	№1,2
	136237	电子信息材料及应用 Electronic Information Materials and Their Application	选 E	32				2.0	5	№1,2,3,4
	136222	纳米电子材料与器件 Nano Electronic Materials and Devices	选 E	32				2.0	5	№1,2,3,4,5
	136114	粉体的液相化学制备 Wet Chemical Preparation for Fine Inorganic Powders	选 E	16				1.0	6	№1,2,3,4
	136131	纳米材料与纳米结构 Nanomaterials and Nanostructure	选 E	32				2.0	7	№2,4
	136294	光伏太阳能电池器件 Photovoltaic Solar Cells Device	选 E	32				2.0	6	№2、№5

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-ai ded Class Hours	实验 Lab Hours	实践 Practice			
	130025	复合材料 Composite Materials	选 E	32				2.0	6	№1, №3, №4
	136146	专业日语基础 Basic Special Japanese	选 E	32				2.0	6	№10
	136224	电子封装与制造概论 Introduction to Electronic Packaging and Manufacturing	选 E	32				2.0	6	№3,6
	136145	高分子材料基础 Fundamentals of Polymer Materials	选 E	32				2.0	7	№1,2
	136295	科技论文写作 Academic Writing	选 E	16				1.0	5	№10,12
	136298	先进材料产业模式与创新 Advanced Material Industry Model and Innovation Development	选 E	32				2.0	6	№6,7,9,10,1 1
	120003	创新研究训练 Innovation Research Training	选 E	32				2.0		№3,4,11
	120004	创新研究实践 I Innovation Research Practice I	选 E	32				2.0		№4
	120005	创新研究实践 II Innovation Research Practice II	选 E	32				2.0		№3
	120006	创业实践 Entrepreneurial Practice	选 E	32				2.0		№3,4,11
	合计 Total			必 C	160			10.0		
				选 E	选修课修读最低要求 11.0 学分 minimum elective course credits required:11.0					

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 数 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	№8
130356	工程训练 I Engineering Training	必 C	2 周		2.0	4	№3,6,8,10
136142	生产实习 Productive Internship	必 C	2 周		2.0	3	№6,7,8,10
141075	电子工艺实习 I Practice of Electronic	必 C	1 周		1.0	5	№3,6
136263	无源电子元件实验 Passive Electronic Components Laboratory	必 C	1 周		1.0	5	№3,4,5
136264	信号检测系统设计与制作 Course Project for signal detection systems design and fabrication	必 C	1 周		1.0	6	№3,4,5

136190	纳米材料制备与表征综合实验 Laboratory of Nano-materials preparation and characterization	必 C	3 周		3.0	6	№3,4,5
136010	电子元器件课程设计 Course Project of Electronic Components	必 C	2 周		2.0	7	№1,2,3,5,10
136265	电子功能材料设计及实验技术 Laboratory of Electronic Functional Materials	必 C	3 周		3.0	7	№3,4,9,10
136163	毕业实习 Practice on Diploma Project	必 C	3 周		3.0	8	№2,8,9,10
136162	毕业设计（论文） Diploma Projects (thesis)	必 C	15 周		15.0	8	№2,3,4,10
合 计 Total		必 C	38 周		38.0		

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.