

制药工程

Pharmaceutical Engineering

专业代码：081302

学 制：4 年

Program Code: 081302

Duration: 4 years

培养目标：

培养德、智、体全面发展，适应国家现代化建设和社会经济发展需要，具有良好的道德和人文素养、扎实的基础和专业知识、富有探索创新精神、团队合作精神、自我提升能力和解决制药工程领域相关技术问题的能力，能在制药、精细化工、大健康产业等领域的企事业单位从事生产、研究、开发、经营与管理、教学的高水平复合型人才。

Educational Objectives:

The speciality aims to cultivate the high level of comprehensive talents, who make great progress on virtue, wisdom and health body, adapt to the requirement of national modernization construction and social economic development, possess noble moral and humanities accomplishment, solid basic and professional knowledge, innovation spirit, teamwork spirit, the ability of self promotion and solving the technical problems in the pharmaceutical engineering related field, can undertake manufacture, research, development, management and teaching in the enterprises and institutions in the fields of industry of pharmaceuticals, fine chemicals, great healthy industry, etc.

毕业要求：

№1.工程知识：具备扎实的基础知识、专业知识和实验操作技能，能够将数学、自然科学、工程基础和专业知识用于解决实际制药过程相关问题，为解决复杂制药工程问题奠定基础。

№2.问题分析：能够应用数学、自然科学和制药工程科学的基本原理和方法手段，识别、表达、并通过文献研究分析制药工程的复杂问题，以获得有效结论。

№3.设计/开发解决方案：能够设计针对制药工程复杂问题的解决方案，设计满足特定需求的药物生产系统、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制药工程复杂问题进行研究，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：能够针对制药工程复杂问题，开发、选择与使用恰当的技术、资源、现代制药工程相关工具和信息技术工具，包括对制药工程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：能够基于制药工程相关背景知识进行合理分析，评价专业工程实践和制药工程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制药工程复杂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，能够在制药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：能够就制药工程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：理解并掌握制药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 to solve practical pharmaceutical process related problems relying on solid basic knowledge, professional knowledge and experimental skills, and provide the bases for the solution of complex pharmaceutical engineering problems.

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

№3.Design / Development Solutions: An ability to design solutions for complex pharmaceutical engineering problems and innovatively design drug producing 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 pharmaceutical 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 pharmaceutical engineering activities, with an understanding of the limitations.

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

本专业于 2003 年设置, 是基于化学、药学和工程学等学科的交叉学科, 依托我校化学和化学工程与技术的学科优势, 以解决制药工业的共性问题。本校是国内早期设立制药工程专业的院校之一, 具有雄厚的教学和科研资源, 为学生就业提供更强的竞争力, 为学生继续深造提供了更好的平台。本专业集合了我校化学、化工和药学的强势科研力量、场地设备资源和师资力量, 充分实现资源共享。拥有专业教师队伍, 大多数具有药物生产、科研或管理经验。拥有专业实验室和省级重点实验室平台, 配备一流的实验分析和检测仪器供学生实验。学术氛围浓厚, 不仅经常开展学术讲座, 与国内外优秀学者面对面交流, 而且均可参与科研项目, 切身感受创新带来的乐趣。具有多家制药企业实践基地, 更好地实现所学理论与实践的有机结合。毕业生就业面宽、就业率高, 面向大中型企业和事业单位, 已遍布省内外, 成为重要的生力军。

Program Profile:

The speciality was set up in 2003, based on the interdiscipline of chemistry, pharmacy and engineering, etc, and supported by subject dominant position of chemistry and chemical engineering in our university to solve the generic issues in pharmaceutical industry, Our university is one of the domestic academies early founding pharmaceutical engineering speciality, has abundant resources of education and scientific research, can provide strong competitive power for students' employment and platform for students' further study. The speciality gathers strong scientific research strength, site equipment resources and teachers in the field of chemistry, chemical engineering and pharmacy, fully shares the resources, and has a professional team of teachers with the ratio of student to teacher less than 3 to 1. All of them are PhD graduates and most of them have the experience in pharmaceutical production, research or management. All core courses are taught by teachers with high professional title. Students can do experiments in speciality laboratory and provincial key laboratory platform equipped with first class experimental analysis and testing instruments. Under strong academic atmosphere, they can not only communicate with domestic and oversea outstanding

scholars in frequent academic forum, but also participate in research programs feeling closely the joy of innovation. In a number of pharmaceutical enterprises practice bases, students can better realize organic combination of learned theory and practice. Graduates could get a job easily at wider vocation, meeting the need of large and medium sized enterprises and institutions spreading all over inside and outside Guangdong province, and have become the important new force. Alternatively, they could choose further study easily, being recommended to domestic top universities or oversea universities for master or doctor degree.

专业特色:

本专业基于我校化学和化学工程与技术强势学科, 在化学制药、中药制药工程领域药物分离合成新工艺技术、设备研发和制造技术上具有突出优势。培养学生具有知识面广、适应性和工程化能力强的特点。

Program Features:

The speciality is based on strong disciplines of chemistry and chemical engineering in our university, has the prominent advantages in medicinal separation and synthesis new technology, equipment research and development technology in the fields of pharmaceutical engineering of chemicals and traditional Chinese medicines, and cultivates the students with broad scope of knowledge, strong adaptability and engineering ability.

授予学位: 工学学士学位

Degree Conferred: Bachelor of Engineering

主干课程:

有机化学、生物化学、物理化学、化工原理、药物化学、药剂学、制药工艺学、药物分析、制药工程设备及设计、制药过程安全与环保。

Core Courses:

Organic Chemistry, Biochemistry, Physical Chemistry, Chemical Engineering Theory, Medicinal Chemistry, Industrial Pharmacy, Pharmaceutical Technology, Pharmaceutical Analysis, Equipment and Design of Pharmaceutical Engineering, Pharmaceutical Process Safety and Environmental Protection.

特色课程:

全英语教学课程: 世界名企讲座

双语教学课程: 流体力学与传热III、传质与分离工程III、生物化学、药物化学

研究型课程: 学科前沿讲座

专题研讨课：走进神奇的药物世界、新材料科学导论

MOOC：微机化工应用

专题设计课：化工课程设计、制药工程课程设计

创新实践课程：仿真实习

创业教育课程：工程设计、产业模式与创业

Featured Courses:

Courses Taught in English: Lectures of Global Famous Enterprises

Bilingual Courses: Fluid Mechanics and Heat Transfer III, Mass Transfer and Separation Process III, Biochemistry, Medicinal Chemistry

Research Courses: Lectures on Frontier of the Disciplines

Special Topics: Freshmen Seminars, Introduction of New Material Science

MOOCs: Application of Computer on Chemical Engineering

Special Designs: Chemical Engineering (course) Design, Course Design of Pharmaceutical Technology & Equipment

Innovation Practice: Simulation Training, Innovation Research Training, Innovation Practice I, Innovation Practice II

Entrepreneurship Courses: Pharmaceutical Industrial Model & Pioneering Career

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	大 作 业	工 程 训 练	电 子 实 验	综 合 实 践	社 会 实 习	生 产 实 习	毕 业 实 习	其 它 合 作 项 目	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	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	A	B	B	B	18	2															20			
二	3	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	18	2															20				
	4	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	G	G	16	2			2											20				
三	5	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	H	M	16	2			1				1							20				
	6	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	E	E	16	2		2												20				
四	7	A	A	A	A	A	A	A	A	B	B	I	I	E	E	E	K	K	K	K	9	2		3			2		4							20				
	8	L	L	E	E	O	O	O	O	O	O	O	O	O	O	O	O	O	O	P					2					2			15	1			20			
合 计 (周)																					107	13	1	3	7		2	1	2		4	2	1		15	1				159

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	60.0	924	
	通识 General Education	10.0	160	
学科基础课 Disciplinary Basic Courses	必修 Compulsory	41.0	760	
	选修 Elective	7.0	112	
专业领域课 Specialty-related Courses	必修 Compulsory	9.0	176	
	选修 Elective	10.0	160	
合 计 Total		137.0	2292	
集中实践教学环节 (周) Practice Training (Weeks)	必修 Compulsory	39.0	39 周	
毕业学分要求 Credits Required for Graduation	137.0+39.0=176.0			

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
2292	1860	432	2024	472	176	149	27	39	122	15	9

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 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 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	1	№8
	143091	中国近现代史纲要 Skeleton of Chinese Modern History		(32) 24				2.0	2	№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	3	№8
	143090	马克思主义基本原理 Fundamentals of Marxism Principle		(40) 36				2.5	4	№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
	145269	VB 语言程序设计 VB Language Program Designing		48				3.0	2	№5
	130139	工程制图 (一) Engineering Drawing 1		48				3.0	1	№1
	130140	工程制图 (二) Engineering Drawing 2		32				2.0	2	№1
	140189	微积分 I(一) Calculus (1)		80				5.0	1	№1
	140190	微积分 I(二) Calculus (2)		64				4.0	2	№1
	140197	线性代数与解析几何 Linear Algebra & Analytic Geometry		48				3.0	1	№1
	140019	概率论与数理统计 Probability & Mathematical Statistics		48				3.0	2	№1
141001	大学物理 I (一) General Physics (1)	48				3.0	2	№1		
141002	大学物理 I (二) General Physics (2)	48				3.0	3	№1		

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 Hours			
	141007	大学物理实验（一） Physics Experiment (1)		32		32		1.0	2	No2
	141008	大学物理实验（二） Physics Experiment (2)		32		32		1.0	3	No2
		人文科学领域 Humanities	通识 课 E	96				6.0		No8
		社会科学领域 Social Science		64				4.0		No8
		合 计 Total		1084		64	128	70.0		

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-ai ded Class Hours	实验 Lab Hours	实践 Practice Hours			
学科基础课 Disciplinary Basic Courses	147002	无机化学 II Inorganic Chemistry	必 C	40				2.5	1	No1
	147034	无机化学实验（工科）（一） Experiment of Inorganic Chemistry(1)	必 C	16		16		0.5	1	No2
	147035	无机化学实验（工科）（二） Experiment of Inorganic Chemistry(2)	必 C	16		16		0.5	2	No2
	147021	有机化学 II Organic Chemistry	必 C	64				4.0	2	No1
	147016	有机化学实验 II Organic Chemistry Experiments	必 C	48		48		1.5	3	No2
	147009	分析化学 II Analytical Chemistry	必 C	40				2.5	3	No1
	147013	分析化学实验 II Analytical Chemistry Experiment	必 C	32		32		1.0	3	No2
	147059	物理化学 II Physical Chemistry	必 C	64				4.0	4	No1
	169011	物理化学实验IV Physical Chemistry Experiment	必 C	40		40		1.0	5	No2
	137115	流体力学与传热 III Fluid Mechanics and Heat Transfer	必 C	56				3.5	5	No1
	137065	传质与分离工程 III Mass Transfer and Separation Process	必 C	48				3.0	6	No1
	137063	化工原理实验（一） Experiment of Chemical Engineering Principles(1)	必 C	16	4	12		0.5	5	No2

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			
	137064	化工原理实验（二） Experiment of Chemical Engineering Principles(2)	必 C	16	4	12		0.5	6	№2
	135092	电工与电子技术 II Electrical Engineering and Electrontechnics	必 C	64				4.0	4	№1
	135081	电工与电子技术实验 Experiment of Electrical Engineering and Electrontechnics	必 C	24		24		1.0	5	№2
	137001	生物化学 Biochemistry (Bilingual)	必 C	48		8		3.0	4	№1
	137118	药物化学 Medicinal chemistry	必 C	48				3.0	5	№1
	137090	药剂学（含中药药剂学） Industrial Pharmacy	必 C	48				3.0	5	№1,2
	137012	药物分析 Pharmaceutical Analysis	必 C	32				2.0	4	№1,2
	137089	药理学（含中药药理学） Pharmacology	选 E	48				3.0	4	№1
	137045	学科前沿讲座 Lectures on Frontier of the Disciplines	选 E	16				1.0	4(2周)	№4,12
	137120	世界名企讲座 Lectures of Global Famous Enterprises (English)	选 E	16				1.0	6(2周)	№6,10
	137141	走进神奇药物世界 Walking into magical medicine world	选 E	16				1.0	2	№6,8
	137128	工程设计、产业模式与创业 Introduction to engineering design, industrial model and entrepreneurship	选 E	16				1.0	5	№11,12
	137086	解剖生理学 Physiology	选 E	32				2.0	3	№4
	137102	药物毒理学 Toxicology	选 E	32				2.0	5	№2,4
	合 计 Total			必 C	760	8	208		41.0	
				选 E	选修课修读最低要求 7.0 学分 minimum elective course credits required:7					
Special ty- related	137016	制药工程设备及设计 Equipment and Design of Pharmaceutical Engineering	必 C	48				3.0	6	№2,3

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			
				137017	制药工艺学 Pharmaceutical Technology	必 C	32			
137020	专业实验 Specialty Experiment	必 C	64		64		2.0	7	№2,4	
137143	制药过程安全与环保 Pharmaceutical Process Safety and Environmental Protection	必 C	32				2.0	6	№6,7	
137107	制药工程学 Pharmaceutical Engineering	选 E	32				2.0	7	№2,3	
137013	药物合成反应 Pharmaceutical Synthesis Reaction	选 E	32				2.0	5	№2,4	
137004	制药分离工程 Pharmaceutical Separation Engineering	选 E	32				2.0	7	№2,4	
137009	新药研究与开发 Research &Development of New Drugs	选 E	32				2.0	6	№4	
137008	生物制药 Biopharmaceuticals	选 E	32				2.0	3	№2,4	
170027	中药化学 Chinese Medicinal Chemistry	选 E	32				2.0	6	№2,4	
137011	药事管理与法规 Medicine Business Management & Regulations	选 E	32				2.0	7	№6,8	
137002	药品营销 Product Marketing	选 E	32				2.0	4	№9,11	
137005	制药过程控制原理与仪表 Pharmaceutical Control Theory and Instrument of Process	选 E	32				2.0	7	№2,3	
137035	精细化学工艺学 Fine Chemical Technology	选 E	32				2.0	6	№2,4	
137044	新材料科学导论 Introduction of New Material Science	选 E	32				2.0	3	№2,4	
137041	微机化工应用 Application of Computer on Chemical Engineering	选 E	32	16			2.0	3	№4,5	
137150	药品生产质量管理规范 Good Manufacture Procedure of Drugs	选 E	32				2.0	3	№6,8	
120003	创新研究训练 Innovation Research Training	选 E	32				2.0		№3,4	
120004	创新研究实践 I Innovation Practice I	选 E	32				2.0		№3,4	

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			
				120005	创新研究实践 II Innovation Practice II	选 E	32			
120006	创业实践 Entrepreneurial Practice	选 E	32				2.0		№11,12	
合计 Total			必 C	176		64		9.0		
			选 E	选修课修读最低要求 10.0 学分 minimum elective course credits required:10						

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
147076	化工原理课程设计 Course Design for Chemical Engineering Principle	必 C	2 周		2.0	6	№2,3
137144	制药工程课程设计 Course Design of Pharmaceutical Engineering	必 C	3+2 周		5.0	7,8	№3,6
130356	工程训练 I Engineering Training	必 C	2 周		2.0	4	№3,4
141075	电子工艺实习 I Practice of Electronic	必 C	1 周		1.0	5	№2,3
137053	生产实习 Productive Practice	必 C	4 周		4.0	7	№6,8,9
137055	仿真实习 Graduation Practice	必 C	2 周	8	2.0	8	№4,5,11
137056	文献检索与实践 Literature Research & Practice	必 C	1 周		1.0	5	№4,5,12
137074	制药综合实验 Pharmaceutical Comprehensive Experiments	必 C	2 周		2.0	7	№3,4
137149	毕业设计（论文） Graduation Design (Thesis)	必 C	15 周		15.0	8	№1-12
合计 Total		必 C	39 周	8	39.0		

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.