Pharmaceutical Engineering

Major Code: 081302

Length of Schooling: Four Years

Degree: Bachelor of Engineering

Time of last Editing: May 2020

Ⅰ. Educational Objectives

This major trains the student to have the correct moral values and social sense of responsibility, chemistry, pharmacy, engineering professional basic theoretical knowledge, be familiar with pharmaceutical engineering frontier technology, forming good innovation consciousness and competition ability, engineering practice, can be in medicine, biology, chemical industry and fine chemical industry in areas such as engaging in production and technology development, application research and management of the senior engineering and technical personnel.

Ⅱ Graduation Requirements

During the cultivation process of the students in this major, emphasize the cultivation of basic theory, basic knowledge, basic ability (skills), healthy personality, comprehensive quality and innovation spirit; create conditions for students to fully participate in the teaching reform, scientific research and social services etc. activities; advocate students to discover and develop own interest and ability, and maximize the intelligence and potential by participation, encourage students to dare to face challenges, constantly explore, strive for progress, pursue the excellence; provide the conditions to encourage students to develop the ability of work independently and team work, help students form the habit of lifelong learning and autonomous learning.

After four years of systematic study, the graduates in this major should acquire the following knowledge and abilities:

1. **Engineering knowledge:** Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified to the solution of pharmaceutical engineering complex engineering problems.

2. **Problem analysis:** Identify, formulate, research literature, and analyze pharmaceutical engineering complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development solutions:** Design solutions for pharmaceutical engineering complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health, and safety, cultural, societal, and environmental considerations.

4. **Study:** Conduct investigations of pharmaceutical engineering complex problems 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. Use of modern tools: Create, select, and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modelling, to pharmaceutical engineering complex engineering problems, with an understanding of the limitations.

6. **Engineering and society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to professional engineering practice and solutions to pharmaceutical engineering complex engineering problems.

7. **Environment and sustainable development:** Understand and evaluate the sustainability and impact of professional engineering work in the solution of pharmaceutical engineering complex engineering problems in societal and environmental contexts.

8. **Professional norms:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

9. **Individual and team:** Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

10. **Communication:** Communicate effectively on pharmaceutical engineering complex engineering activities with the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management:** Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in, independent and life-long learning in the broadest context of technological change.

Ⅲ. Characteristics of the Specialty Education

The distinctive features of this major culture attach great importance to the quality of education, ideological and moral quality, professional quality, cultural quality, physical and mental education, manifests the commonness and individuality of students. To adopt the principle of unity and flexibility in curriculum setting, fully arouse students' enthusiasm and cultivate self-study ability; the professional direction is set up in Guangdong province pillar industries, the principle of foundation and wide aperture is emphasized, and the major basic courses are optional, establishment of an independent practice teaching system, through the engineering training, pharmaceutical enterprise practice, science and technology innovation activities, course design, major experiment, such as graduation design (thesis) practice, through engineering training, pharmaceutical enterprise internship, scientific and technological innovation, course design, professional experiment, graduation design (paper), etc., Strengthen the cultivation of the student beginning ability and practice ability, causes the student to have the science of chemistry, medicine and engineering, pharmaceutical engineering professional knowledge and the engaged in drugs and other chemicals technology development and engineering design ability, in the engineering application research has good pioneering spirit, innovation consciousness and practice ability, can better engaged in drugs and

other chemicals in the fields of design, technology and development, production and management.

Ⅳ. Main Discipline for the Specialty

Chemistry, Engineering and Pharmacy

Ⅴ. Core Courses of the Specialty

Organic Chemistry, Principle of Chemical Engineering, Principles and Equipment of Pharmaceutical Engineering, Pharmacology, Medicinal Chemistry, Industrial Pharmacy, Pharmaceutical Analysis.

Ⅵ. Feature Courses

Safety and Environment Protection for Pharmaceutical Manufacturing Process, Pharmacology, Pharmaceutical Analysis, Medicinal Chemistry, Industrial Pharmacy.

Ⅶ. Credits Required for Graduation

Total curricular credits are not less than 160 credits, practice teaching credits are at least 41 credits.

Ⅷ. Main Components of Practical Teaching

Engineering Training, Production Practice, Graduation Practice, Designing Course for Principles of Chemical Industry, Activity of Technological Innovation, Graduation Project (Thesis or Design) etc.

IX. Structure of the Course System and Proportion of Course Credits

1. Intra-curricular Sector

Course Category		Description	Total Credits	Total Teaching Hours	Percentage	Subtotal
Compulsory Courses	Basic Public Courses	Courses such as Ideological & Political Theories, University Physical Education, College English, Advanced Mathematics, Basic Computer Literary.	50.5	936	31.5%	64.0%
	Basic Specialty Courses	Courses for constructing the basic concepts, theories and knowledge underlying the specialty.	35.5	568	22.2%	
	Specialty Courses	Courses for constructing concepts, theories, and knowledge of the specialty emphasis.	16.5	264	10.3%	
	Experimental and Practical Courses		20.5		12.8%	22.9%
	Design (Thesis)		16.0		10.1%	
Elective Courses	University Wide Public	University wide public elective courses in humanities and social	12	192	7.5%	13.1%

	Courses (A minimum of 12.0 credits required)	sciences, natural sciences, and engineering.				
	Basic specialty courses (A minimum of 4.0 credits required)	Courses for basic theories and knowledge in the main discipline and related disciplines.	4.0	64	2.5%	
	Specialty courses (A minimum of credits required)	Courses for basic theories and knowledge in the disciplinary emphasis and interdisciplinary emphasis.	5.0	80	3.1%	
	Experimental and practical courses (A minimum of credits required)					
	Design (Thesis) (A minimum of credits required)					
Total			160.0	2336		100%

2. Extra-curricular Sector

Course Category		Course Name	Credits	Total Teaching Hours	Teaching Hours for Experiments	Teaching Hours for Practice	Teaching Hours with Computers
Compulsory Part	Public Education	Entrance education	0.5	0.5 week			
		Social work	1.0	16			
		Social practice	2.0	32			
		Extra-curricular guided reading of Introduction of Maoism and the system of Chinese Characteristic Socialism	1.0	16			
		Graduation education	0.5	0.5 week			
		Physical exercise of junior and senior students	1.0	16			
	Specialty Education	Hand-drawing training	1.5	24			
	Subtotal		7.0				

	Extra-curricular activities	Requirements for extra-curricular activity and social practice		Extra-curricular credits
Elective Part	English and computer tests	National College English Test (CET) 6	Meeting score requirement of the university	2
		National Computer Rank Examination (NCRE)	Granted certificate of or above Level 2	2
		National computer software qualification and proficiency tests	Granted programmer's certificate	2
			Granted advanced programmer's certificate	3
			Granted system analyst's certificate	4
	Professional qualification tests	Nationwide uniform professional qualification tests	Granted professional qualification certificate	1
	Contests	University level	Awarded first prize	2
			Awarded second prize	1
			Awarded third prize	0.5
		Provincial level	Awarded first prize	3
			Awarded second prize	2
			Awarded third prize	1
		National level	Awarded first prize	5
			Awarded second prize	4
			Awarded third prize	3
	Serial lectures	Attending serial lectures held on the campus	Attending a minimum of 4 lectures	1
	Academic papers	Having papers published in nationwide average journals	Per paper	1
		Having papers published in nationwide key journals	Per paper	2
	Extra-curricular scientific and technological innovation activities	Participating extra-curricular scientific and technological innovation activities	Per event	1

X. Structure of the Course and Proportion of Course Credits

1. Intra-curricular Sector

Course Category		Course Name	Credits	Total Teaching Hours	Teaching Hours for Experiments	Teaching Hours for Practice	Teaching Hours with Computers
Compulsory Courses		Cultivation of Ethic Thought & Fundamentals of Law	3.0	48		**8**	
		Conspectus of Chinese Modern History	3.0	48		**12**	
		Introduction of Maoism and the System of Chinese Characteristic Socialism	5.0	80		**16**	
		Basic Principles of Marxism	3.0	48		**12**	
		Situation and Policy	2.0	64		**32**	
		Physical Education I	1.0	36		**20**	
		Physical Education II	1.0	36		**20**	
		Physical Education III	1.0	36		**20**	
		Physical Education IV	1.0	36		**20**	
		College English I	4.0	64	**16**		
		College English II	4.0	64	**16**		
		College students' mental health education	1.5	36		**24**	
		College Students' Career Planning and Entrepreneurship Education	1.0	16		**8**	
		College Students Employment and Entrepreneurship Guidance	1.5	24		**16**	
		Military Theory	2.0	36			
		Advanced Mathematics B1	4.0	64			
		Advanced Mathematics B2	4.0	64			
		University Physics B1	2.5	40			
		University Physics B1	2.0	32			
		Linear Algebra	2.0	32			
		Fundamentals of Computer Culture	2.0	32			
		Subtotal	50.5	892			
	Basic Specialty Courses	Inorganic and analytical chemistry I	2.0	32			
		Inorganic and Analytical chemistry II	2.0	32			
		Organic Chemistry I	2.0	32			
		Organic Chemistry II	2.5	40			
		Physical Chemistry	2.5	40			
		Geometric and Engineering Drawings I	2.5	40			**8**
		Geometric and Engineering Drawings II	1.5	24			**8**
		Electrical and Electronic Technology	3.0	48			
		Principles of Chemical Engineering I	2.5	40			
		Principles of Chemical Engineering II	2.5				
		Microbiology and Immunology	1.5	24			
		Biochemistry	3.0	48			

Course Category		Course Name	Credits	Total Teaching Hours	Teaching Hours for Experiments	Teaching Hours for Practice	Teaching Hours with Computers
		Major Introduction	1.0	16			
		Specialized English	1.0	16			
		Literature Retrieval and Thesis Writing	1.0	16			
		Chemical Industry Instrument and Automation	1.5	24	**4**		
		Experimental Design and Data Analysis	1.5	24			
		Subtotal	30.5	488			
	专业课 Specialty Courses	Pharmaceutical Analysis	2.0	32			
		Principles and Equipment of Pharmaceutical Engineering	2.0	32			
		Pharmacology	2.5	40			
		Medicinal Chemistry	2.0	32			
		Industrial Pharmaceutics	2.0	32			
		Good Manufacturing Practice for Drugs	1.0	16			
		Pharmaceutical Engineering Safety and Environmental Protection	1.0	16			
		Drug Registration and Management	1.5	24			
		Subtotal	12.5	768			
	实验实习 实训 Experimental and Practical Courses	Military Training	2.0	2 weeks		**32**	
		Electrician and Electron Technology Training	1.0	1 week		**16**	
		Electrician and Electronic Technology Experiment	1.0	16			
		Engineering Training	3.0	48		**48**	
		Experiment of Chemical Engineering Principles	1.0	32			
		Pharmaceutical Internship	2.0	4 weeks		**64**	
		Experiments for College Physics I	1.0	16			
		Experiments for College Physics II	0.5	8			
		Experiments for Inorganic and Analytical Chemistry I	0.5	16			
		Experiments for Inorganic and Analytical Chemistry II	1.0	21			
		Experiments for Organic Chemistry I	0.5	16			
		Experiments for Organic Chemistry II	0.5	16			
		Experiments for Physical Chemistry	1.0	32			
		Perceptual Practice	1.0	1 week		**16**	
		Science and Technology Innovation Activity	1.0	1 week		**32**	
		Experiments for Biochemistry	0.5	16			
		Basic Experiments for Pharmaceutical Engineering	1.0	32			
		Integral Experiments for Pharmaceutical Engineering	2.5	80	**72**		
		Experiments for Microbiology	0.5	16			
		Subtotal	21				
Compulsory Courses	Design (Thesis)	Graduation Project (Thesis or Design)	12.0	12 weeks			
		Designing Course for Principles of Chemical Industry	2.0	2 weeks			
		Designing Course for Principles of Pharmaceutical Engineering	2.0	2 weeks			
		Subtotal	16				
Elective			3.0	48			

Course Category		Course Name	Credits	Total Teaching Hours	Teaching Hours for Experiments	Teaching Hours for Practice	Teaching Hours with Computers
Courses	University Wide Public Courses	Natural Sciences and Engineering					
		Humanities and Social Sciences	9.0	144			
		Subtotal (12.0 credits required at minimum)	12.0	192			
	Basic Specialty Courses	Pharmaceutic Adjuvant	1.5	24			
		Drug Spectrum Analysis	1.5	24			
		Pharmacognosy	1.0	16			
		Biomaterials and Tissue Engineering	1.0	16			
		Modernization of Traditional Chinese Medicine	1.0	16			
		Pharmaceutical Instrumental Analysis	1.0	16			
		Drug Synthesis	2	32			
		Subtotal (5.0 credits required at minimum)	5.0	80			
	Specialty Courses	Chemistry of Natural Products	2.0	32			
		Drug Discovery from Natural Products	1.5	24			
		Proteomics in Drug Development	1.5	24			
		Drug Screening and Animal models	1.5	24			
		Biotechnological Pharmaceutics	1.5	24			
		Natural Product Extraction Technology	1.5	24			
		Chemical Pharmaceutical Technology	1.5	24			
		Computer-Aided Drug Design	1.5	24			
		Pharmaceutical Engineering Leading-Edge Lecture	0.5	8			
		Cell Culture and Drug Production	1.0	16			
		Elective Courses for Interdisciplinary Subjects	2.0	32			
		AI for Drug Discovery and Python for Data Science	1.5	24			
		Introduction of Traditional Chinese Medicine	1	16			
		Chemical Labeling and Molecular Diagnosis	1	16			
		Subtotal (5.0 credits required at minimum)	7.5	120			