

生物制药专业本科培养计划

Undergraduate Program for Specialty in Biopharmaceutics

一、培养目标

I. Program Objective

本着“厚基础、强实践、重创新”的基本原则，以学生为中心，培养德智体美劳全面发展，具有健全人格和国际化视野，具备坚实的化学、生物学和药学基础，较高工程伦理及家国情怀，系统掌握生物技术、纳米技术、现代制药技术的基本技能，熟悉生物制药及其相关领域，具有良好的科学素养和较强的创新能力，面向生物医药新兴产业的高级复合型专业人才。毕业生既可从事生物医药研究、开发、生产、检验、质量控制等工作，也可进一步深造，报考生物化学、生物技术、制药工程等相关专业的研究生。深化立德树人根本任务，大力推进新时代中国特色社会主义思想进教材、进课堂、进头脑，全面推进课程思政建设。

With the principle of emphasizing on “Fundament, Practice, Innovation”, this program is dedicated to educate undergraduates to get comprehensive development in morality, intelligence, physics, arts, and labor. Our goal is to provide students with international vision, and with solid foundation in Chemical, Biological and Pharmaceutical Science; versatile skills in Biotechnology, Nano-technology and Modern Pharmaceutical Technology; and broad knowledge of multiple bio-pharmaceutical related fields as competitive and independent researchers or scientists. Students with training in Biopharmaceutics are highly desirable for pharmaceutical industry in research, development, production, testing and quality control as well as academic research in biochemistry, biotechnology and pharmaceutical engineering. We will deepen the fundamental task of cultivating people through virtue, make great efforts to incorporate Socialism with Chinese Characteristics for a New Era into textbooks, classrooms, and minds, and comprehensively promote the ideological and political construction of the curriculum.

二、基本规格要求

II. Learning Outcomes

本专业学生应牢固掌握化学、生物学和药学的基本理论知识，并受到工程技术方面的良好训练。毕业生能够胜任生物制药相关研究与开发工作，能够在科技成果转化及产业化过程中发挥骨干作用。

毕业生应获得以下几方面的知识和能力：

1. 具有爱国敬业精神、社会责任感和追求卓越的态度；
2. 具有良好职业道德，在科学实践中理解并遵守职业道德和规范；
3. 具有好的团队意识和协作能力，能在多学科背景下的团队合作中承担个体、团队成员以及负责人的角色；
4. 具备健全的心理和健康的体魄，达到国家规定的大学生体育和军事训练合格标准，养成良好的体育锻炼和健康生活方式；
5. 掌握化学、生物学、药学等方面的基本理论和知识；
6. 掌握生物技术、纳米技术、现代制药技术的基本原理和实验技能；
7. 熟悉国家生物医药产业法律法规、指导原则和知识产权政策，了解生物医药技术的最新发展动态和应用前景、生物医药产业的发展状况；

8. 具备良好的自主学习和探索实践能力，以及较好的表达交流能力和计算机及信息技术的应用能力；

9. 具有较好的国际视野、外语应用能力以及跨文化交流合作能力；
10. 具有良好的创新意识和创业精神，以及批判性思维和可持续发展理念；
11. 具有一定的实验设计、实验操作、结果分析、论文撰写、学术交流的能力；
12. 具有一定的研究和开发生物药物的能力。
13. 具有一定的工程管理能力。

Students will have a solid understanding of basic knowledge of chemistry, biology and medicine and receive training in pharmaceutical engineering. Graduates are qualified for jobs in pharmaceutical research and development, and will play a key role in the technology transformation.

Graduates should be given the following knowledge and abilities:

1. Possess the spirit of patriotic dedication, the social responsibility and the attitude of pursuing excellence;
2. Possess the professional ethics, understand and abide the professional ethics and specification in scientific practice;
3. Possess the good team spirit and coordination ability, and could undertake the role of individual, team members, and team leader under the background of multidisciplinary;
4. Have a sound psychological and physical health, to meet the national standards for college students sports and military training, to develop good physical exercise and healthy lifestyle;
5. Master chemistry, biology, medicine and other basic theories and knowledge;
6. Master the basic principle and experimental skills of biotechnology, nanotechnology, and modern pharmaceutical technology.
7. Be familiar with the national laws and regulations, guidelines and intellectual property policies in Biomedical industry, to understand the new developments in biomedical technology, the dynamic and prospects, the development of bio-pharmaceutical industry;
8. Have a good ability to learn and explore independently, as well as good communication skills and the ability to use computer and information technology;
9. Have a good international perspective, foreign language ability and cross-cultural communication and cooperation ability;
10. Have a good sense of innovation and entrepreneurship, and critical thinking and sustainable development concept;
11. Have certain experimental design, experimental operation, result analysis, thesis writing, and academic exchange capacity;
12. Certain research and development capabilities of biological drugs.
13. Get experience in engineering management.

三、培养特色

III. Program Highlights

以学生为中心，以学生的创新、实践、思维等能力培养为主轴，以项目完成和问题解决为目的，以生物技术药物为主要方向，以纳米药物为专业特色，面向生物医药产业培养高级复合型专业人才。自大学二年级开始，采取导师制，学生直接进入实验室参加课题研究和实验工作。

This is a student-oriented-program with the objective to motivate students' interests in biopharmaceutic profession, and maximize students' potential in research and creativity. The goal of the program is to train students for modern professionals in biomedical industry with focus on the

biotechnology medicine and special interest in the nanomedicine. The tutorial system ensures that each student can participate in research work in their mentor's laboratory.

四、主干学科

IV. Main Disciplines

化学 Chemistry、生物学 Biology、药学 Pharmaceutics

五、学制与学位

V. Program Length and Degree

学制：四年

Duration: 4 years

授予学位：工学学士

Degrees Conferred: Bachelor of Engineering

六、学时与学分

VI. Credits Hours and Units

完成学业最低课内学分（含课程体系与集中性实践环节）要求：162.2 学分。其中，专业核心课程学分不允许用其他课程学分进行学分冲抵和替代。

Minimum Curricular Credits for the completion of degree (including courses practical internship): 162.2 credits. Common Core Courses cannot be covered using credits from other courses in the program.

完成学业最低课外学分要求：5 学分。

Minimum Extracurricular Credits: 5 credits.

1. 课程体系学时与学分

Course Credits Hours and Units

课程类别		课程性质	学时/学分	占课程体系比例 (%)
素质教育通识课程		必修	636/33	19.8
		选修	160/10	5
学科基础课程		必修	1120/61.7	35
专业课程	专业核心课程	必修	320/16	10
	专业选修课程	选修	448/25	13.9
集中性实践教学环节		必修	33w/16.5	16.3
总计			2684+33w/162.2	100
其中，总实验（实践）			1168	36.4

Course type		Required/Elective	Hrs/Crs	Percentage (%)
Essential-qualities-oriented Education General Courses		Required	636/33	19.8
		Elective	160/10	5
Discipline-related General Courses		Required	1120/61.7	35
Courses in Specialty	Common Core Courses	Required	320/16	10
	Specialty-Oriented Courses	Elective	448/25	13.9
Intensified Internship Practical Training		Required	33w/16.5	16.3
Total			2684+33w/162.2	100
Practicum Credits			1168	36.4

2. 集中性实践教学环节周数与学分

Weeks/Credits of Intensified Internship and Practical Training

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实践教学环节名称	课程性质	周数/学分	占实践教学环节学时比例 (%)
军事训练	必修	2/1	6
工程训练 (3) (金工实习)	必修	2/1	6
工程训练 (8) (电工实习)	必修	1/0.5	3
认知实习	必修	2/1	6
创新创业训练	必修	2/1	6
生产实习	必修	4/2	12.1
课程设计	必修	4/2	12.1
毕业设计	必修	16/8	48.5
合计		33/16.5	100

Course Title	Required/Elective	Wks/Crs	Percentage (%)
Military Training	Required	2/1	6
Engineering Training III (Metalworking Practice)	Required	2/1	6
Engineering Training VIII (Electrical Engineering Practice)	Required	1/0.5	3
Perceive Practice	Required	2/1	6
Innovation and Entrepreneurship Training	Required	2/1	6
Engineering Internship	Required	4/2	12.1
Course Project	Required	4/2	12.1
Undergraduate Thesis	Required	16/8	48.5
Total		33/16.5	100

3. 课外学分

Extracurricular Credits

序号	课外活动和	课外活动和社会实践的要求		课外学分	
1	社会实践活动 (必选)	思政课社会实践 (必修)		2	
		安全教育		0.5	
		生涯教育 (必修, 16 学时/1 学分)		1	
2	劳动教育 (必修)	劳动教育 (必修, 32 学时/2 学分)		2	
3	英语及计算机考试	全国大学英语六级考试		获六级证书者	2
		托福考试		达 90 分以上者	3
		雅思考试		达 6.5 分以上者	3
		GRE 考试		达 300 分以上者	3
		全国计算机等级考试		获二级以上证书者	2
		全国计算机软件资格、水平考试		获程序员证书者	2
4	竞赛	校级	获一等奖者	3	
			获二等奖者	2	
			获三等奖者	1	
		省级	获一等奖者	4	
			获二等奖者	3	
			获三等奖者	2	
		国家级	获一等奖者	6	
			获二等奖者	4	
			获三等奖者	3	
		国际级	获一等奖者	6	
获二等奖者	5				
获三等奖者	4				
5	论文	具体得分	在全国性刊物发表论文	每篇论文	2~3
6	参与教师科研课题	情况由生物科学专业教学指导小组进行评判	视参与科研项目时间与科研能力	提交有关个人参与情况的课题研究报告 (指导教师签名)	1~3
7	大学生创新科研课题	视创新情况、成果和参与度	每项		1~3

注：参加校体育运动会获第一名、第二名者与校级一等奖等同，获第三名至第五名者与校级二等奖等同，获第六至第八名者与校级三等奖等同。

No.	Activities	Requirements		Extracurricular Credits	
1	Community Engagement	Ideological and Political course Social practice		2	
		Safety Education		0.5	
		Career Education (required 16 Hours/1 Credits)		1	
2	Public service work	(Labor education) (required 32 Hours/2 Credits)		2	
3	Examinations in English and Computer	CET-6	Certificate	2	
		TOEFL	90 Points or Higher	3	
		IELTS	6.5 Points or Higher	3	
		GRE	300 Points or Higher	3	
		National Computer Rank Examinations	Certificate Grade 2 or Higher	2	
		National Compute Software Qualification	Programmer	2	
			Senior Programmer	3	
System Analyst	4				
4	Competitions	University Level	First Prize	3	
			Second Prize	2	
			Third Prize	1	
		Provincial Level	First Prize	4	
			Second Prize	3	
			Third Prize	2	
		National Level	First Prize	6	
			Second Prize	4	
			Third Prize	3	
		International Level	First Prize	6	
			Second Prize	4	
			Third Prize	3	
5	Academic Papers	Judged by a teachers' commity	Published in national-level journals	Each Paper	2~3
6	Teacher's Research Program		Contribution and research capability	Each Program (with report about the personal contribution)	1~3
7	Student's Research Program		Innovation capacity	Each program	1~3

Note: In HUST Sports Meeting, the first and the second prize, and the sixth prize to eighth prize are deemed respectively the first prize, the second prize and the third prize of university level.

七、主要课程及创新（创业）课程

VII. Main Courses and Innovation (Entrepreneurship) Course

(一) 主要课程 Main Courses

生物化学与分子生物学 Biochemistry and Molecular Biology、医学细胞生物学 Medical Cellular Biology、微生物学 Microbiology、发酵工程 Fermentation Engineering、生物制药工艺与设备 Biopharmaceutical technique and Equipment、药理学 Pharmacology、药物化学 Medicinal Chemistry、药剂学 Pharmaceutics、生物药物分析 Biopharmaceutical Analysis、生命科学与技术导论 Introduction to Bioscience and biotechnology、生物制药技术 Preparation Technique of Biomedicines、生物药剂学与药代动力学 Bio-Pharmaceutics and Pharmacokinetics、纳米药物制剂 Nanopharmaceuticals、纳米诊断与检测技术 Nano-diagnostic and Detection Technology 等。

(二) 创新（创业）课程 Innovation (Entrepreneurship) Course

创新意识启迪：生命科学与技术导论 Life Science and Technology
 创新能力培养：生命科学与技术实验 Life Science and Technology Experiment
 创新实践训练：认知实习 Perceive Practice、创新创业训练 Innovation and Entrepreneurship Training。

八、主要实践教学环节

VIII. Practicum Module (Experiments Included)

物理实验 Physical Experiment、有机化学实验 Experiment in Organic Chemistry、无机及分析化学实验 Inorganic and Analytical Chemistry Experiments、生物化学与分子生物学实验 Experiment in Biochemistry and Molecular Biology、医学细胞生物学实验 Experiment of Medical Cellular Biology、纳米生物材料实验 Experiments in Introduction of Nano-biomaterials、生物制药技术实验 Experiments of Technique of Biomedicine、生物药物分析实验 Experiment of Biopharmaceutical Analysis、纳米药物制剂实验 Exp. in Nanopharmaceuticals、纳米诊断与检测技术实验 Exp. of Nano-diagnostic and Detection Technology、军事训练 Military Training、生产实习 Engineering Internship、认知实习 Perceive Practice、创新创业训练 Innovation and Entrepreneurship Training、课程设计 Course Project、毕业设计 Undergraduate Thesis。

九、教学进程计划表

IX. Course Schedule

院(系)：生命科学与技术学院

专业：生物制药

School (Department) : School of Life Science & Technology

Major: Biopharmaceutics

课程类别 course type	课程性质 required/ elective	课程代码 course code	课程名称 course name	学时 hrs	学分 crs	其中 Including		设置学期 semester
						实验 exp.	上机 operation	
素质教育通识课程 Essential-qualities-oriented Education General Courses	必修 Required	MAX0022	思想道德与法治 Ideological morality and rule of law	40	2.5			1
	必修 Required	MAX0042	中国近现代史纲要 Survey of Modern Chinese History	40	2.5			2
	必修 Required	MAX0013	马克思主义基本原理 Basic Theory of Marxism	40	2.5			3
	必修 Required	MAX0072	习近平新时代中国特色社会主义思想概论 Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	48	3			3
	必修 Required	MAX0063	毛泽东思想和中国特色社会主义理论体系概述 General Introduction to Mao Zedong Thought and Socialist Theory with Chinese Characteristics	48	3			4
	必修 Required	MAX0032	形势与政策 Situation and Policy	48	1.5			5-7
	必修 Required	CHI0001	中国语文 Chinese	32	2			2
	必修 Required	SFL0001	综合英语(一) Comprehensive English (I)	56	3.5			1
	必修 Required	SFL0011	综合英语(二) Comprehensive English (II)	56	3.5			2
	必修 Required	PHE0002	大学体育(一) Physical Education (I)	60	1.5			1-2
	必修 Required	PHE0012	大学体育(二) Physical Education (II)	60	1.5			3-4

续表

课程类别 course type	课程性质 required/ elective	课程代码 course code	课程名称 course name	学时 hrs	学分 crs	其中 Including		设置学期 semester
						实验 exp.	上机 operation	
Essential- Education General Courses 素质教育 通识课程	必修 Required	PHE0022	大学体育（三） Physical Education (III)	24	1			5-6
	必修 Required	RMWZ0002	军事理论 Military Theory	36	2			1
	必修 Required	NCC0001	计算机与程序设计基础（C++） Fundamental of Computer Programming (C++)	48	3		8	1
			从不同的课程模块中修读若干课程，美育类、大学生心理健康课程均不低于 2 学分，总学分不低于 10 学分 General Education Courses (elective)	160	10			2-8
Discipline-Related General Courses 学科基础课程	必修 Required	MAT0551	微积分（一）（上） Calculus (I) Part I	88	5.5			1
	必修 Required	MAT0531	微积分（一）（下） Calculus (I) Part II	88	5.5			2
	必修 Required	PHY0511	大学物理（一） Physics (I)	64	4			2
	必修 Required	PHY0521	大学物理（二） Physics (II)	64	4			3
	必修 Required	PHY0551	物理实验（一） Physics Experiments (I)	32	1	32		2
	必修 Required	PHY0561	物理实验（二） Physics Experiments (II)	24	0.8	24		3
	必修 Required	MAT0591	概率论与数理统计 Probability Theory and Mathematical Statistics	40	2.5			2
	必修 Required	CHE0741	无机及分析化学 Inorganic and Analytical Chemistry	64	4			1
	必修 Required	CHE0751	无机及分析化学实验 Inorganic and Analytical Chemistry Experiments	32	1	32		1
	必修 Required	CHE0801	有机化学 Organic Chemistry	64	4			2
	必修 Required	CHE0831	有机化学实验 Exp. Of Organic Chemistry	32	1	32		2
	必修 Required	BIO0621	生命科学与技术导论 Introduction to Bioscience and Biotechnology	24	1.5			1
	必修 Required	BIO0631	生命科学与技术实验 Life Science and Technology Experiment	16	0.5			1
	必修 Required	BIO0691	生物化学与分子生物学（一） Biochemistry and Molecular Biology (I)	56	3.5			3
	必修 Required	BIO0681	生物化学与分子生物学（二） Biochemistry and Molecular Biology (II)	32	2			4
	必修 Required	BIO0711	生物化学与分子生物学实验（一） Experiments in Biochemistry and Molecular Biology (I)	24	0.8	24		3
必修 Required	BIO0701	生物化学与分子生物学实验（二） Experiments in Biochemistry and Molecular Biology (II)	24	0.8	24		4	

续表

课程类别 course type	课程性质 required/ elective	课程代码 course code	课程名称 course name	学时 hrs	学分 crs	其中 Including		设置学期 semester
						实验 exp.	上机 operation	
学科基础课程 Discipline-Related General Courses	必修 Required	BIO0831	药理学基础 Fundamentals of Pharmacology	32	2			3
	必修 Required	BIO0821	药物化学 Medicinal Chemistry	32	2			3
	必修 Required	BIO0871	医学细胞生物学 Medical Cellular Biology	40	2.5			4
	必修 Required	BIO0881	医学细胞生物学实验 Exp. of Medical Cellular Biology	24	0.8	24		4
	必修 Required	BIO0811	药理学 Pharmacology	32	2			4
	必修 Required	BIO0801	药剂学 Pharmaceutics	32	2			4
	必修 Required	BIO0011	微生物学 Microbiology	32	2			4
	必修 Required	BIO2341	微生物学实验 Experiments in Microbiology	32	1	32		4
	必修 Required	BIO2021	发酵工程 Fermentation Engineering	32	2			5
	必修 Required	BIO0731	生物药物分析 Biopharmaceutical Analysis	32	2			5
	必修 Required	BIO0741	生物药物分析实验 Exp. of Biopharmaceutical Analysis	32	1	32		5
专业核心课程 Common Core Courses	必修 Required	BIO2251	生物药剂学与药代动力学 Biopharmaceutics and Pharmacokinetics	32	2			5
	必修 Required	BIO2301	生物制药工艺与设备 Biopharmaceutical Technique and Equipment	32	2			6
	必修 Required	BIO2131	纳米药物制剂 Nanopharmaceuticals	32	2			5
	必修 Required	BIO2131	纳米药物制剂实验 Experiments of Nanopharmaceuticals	32	1	32		5
	必修 Required	BIO2111	纳米生物材料 Introduction of Nano-biomaterials	32	2			5
	必修 Required	BIO2121	纳米生物材料实验 Exp. In Introduction of Nano-biomaterials	32	1	32		5
	必修 Required	BIO2311	生物制药技术 Preparation Technique of Biomedicines	32	2			6
	必修 Required	BIO2321	生物制药技术实验 Experiments of Technique of Biomedicine	32	1	32		6
	必修 Required	BIO2151	纳米诊断与检测技术 Nano-diagnostic and Detection Technology	32	2			6
必修 Required	BIO2161	纳米诊断与检测技术实验 Exp. of Nano-diagnostic and Detection Technology	32	1	32		6	

续表

课程类别 course type	课程性质 required/ elective	课程代码 course code	课程名称 course name	学时 hrs	学分 crs	其中 Including		设置学期 semester
						实验 exp.	上机 operation	
			专业方向选修课程 Elective in Specialty Biopharmaceutics (专业选修课选课前组织选修课程宣讲; 必须选修 2 学分跨学科或外院系课程; 读本院研究生须要选修相关课程或相关学分。)	448	25			
	选修 Elective	BIO2081	解剖与生理学 Anatomy and Physiology	64	4			5
	选修 Elective	BIO2091	解剖与生理学实验 Experiments in Anatomy and Physiology	32	1	32		5
	选修 Elective	BIO5231	免疫学 Immunology	32	2			4
	选修 Elective	BIO5241	免疫学实验 Experiments in Immunology	24	0.8	24		4
	选修 Elective	CHE0761	物理化学 Physical Chemistry	32	2			3
	选修 Elective	CHE0781	物理化学实验 Exp. Of Physical Chemistry	32	1	32		3
	选修 Elective	BIO2071	基因工程原理 Principle of Gene Engineering	32	2			6
	选修 Elective	BIO5651	智能纳米载药系统进展 The Progress of Smart Nano Drug Delivery	32	2			5
	选修 Elective	BIO5471	生物医药前沿 Development of Biomedicine	16	1			6
	选修 Elective	BIO5661	专业信息检索与管理 Scientific Information Retrieval and Management	16	1			5
	选修 Elective	BIO5021	药事管理 Managing of Pharmaceutics	24	1.5			5
	选修 Elective	BIO5221	科技论文写作 Scientific Writing	16	1			5
	选修 Elective	BIO2101	蛋白质与酶工程 Protein and Enzyme Engineering	32	2			5
	选修 Elective	BIO5391	生物分离技术 Bioseparation Technology	32	2			7
	选修 Elective	BIO5491	天然药物化学 Phytochemistry or Chemistry of Natural Products	32	2			6
	选修 Elective	BIO5801	肿瘤免疫 Tumor Immunology	32	2			5
	选修 Elective	BIO5781	细胞信号转导与新药研发 Cell Signaling and Drug Development	16	1			5
	选修 Elective	BIO5281	纳米肿瘤学 Nano-oncology	32	2			7
	选修 Elective	BIO5111	分子医学影像学 Molecular Medical Imaging	32	2			6

 专业选修课程
Elective Courses In Specialty

续表

课程类别 course type	课程性质 required/ elective	课程代码 course code	课程名称 course name	学时 hrs	学分 crs	其中 Including		设置学期 semester
						实验 exp.	上机 operation	
专业选修课程 Elective Courses In Specialty	选修 Elective	BIO5601	药物分子设计 Molecular Design for Pharmaceutical	32	2		16	7
	选修 Elective	BIO5551	先进给药技术 Technologies for Advanced Drug Release	16	1			6
	选修 Elective	BIO5261	纳米生物无机化学 Inorganic Chemistry in Nanobiology	16	1			7
	选修 Elective	BIO5581	新药研发 Drug Discovery and Development	16	1			7
	选修 Elective	BIO5031	GPCR 药理学 GPCR Pharmacology	16	1			7
	选修 Elective	BIO5101	多肽蛋白药物 Peptide and Protein Drugs	16	1			7
	选修 Elective	BIO5541	细胞工程原理 Principle of Cell Engineering	32	2			6
实践环节 Practical Processes	必修 Required	RMWZ3511	军事训练 Military Training	2w	1			1
	必修 Required	ENG3541	工程训练(3) Engineering Training (III) (Metalworking Practice)	2w	1			3
	必修 Required	ENG3571	工程训练(8) Engineering Training (VIII) (Electrical Engineering Practice)	1w	0.5			4
	必修 Required	BIO3551	认知实习 Perceive Practice	2w	1			2
	必修 Required	BIO3521	创新创业训练 Innovation and Entrepreneurship Training	2w	1			5
	必修 Required	BIO3561	生产实习 Engineering Internship	4w	2			6
	必修 Required	BIO3542	课程设计 Course Project	4w	2			7
	必修 Required	BIO3511	毕业设计(论文) Undergraduate Thesis	16w	8			8