

## 生物技术专业本科培养计划

### Undergraduate Program for Specialty in Biotechnology

#### 一、培养目标

##### I. Program Objective

本专业培养适应我国社会主义现代化建设需要，德、智、体、美、劳全面发展，具有较强的自然科学基础、科学素养和国际视野，较全面地掌握现代生命科学的基本知识、基本理论和实验技能，熟悉生物技术的现状、前沿及其在生产实践中的应用，具备人文社科和经济管理科学的基本素质，受到严格的科学思维和工程应用能力的训练，在教学、科研、科技开发及管理等方面具有良好素质的生物技术专业高素质复合型拔尖人才。

毕业生可到国内外知名高校和科研院所继续深造，也可到生物技术领域国际知名生物医药产业、大健康产业，以及食品轻工、环保工业等企事业单位或管理部门从事研究、科技开发或行政管理等工作。

The aim of the professional training is to educate the socialist builders and successors with an all-round development of morality, intelligence, physics, arts and Labor. The student will have a strong natural science foundation, scientific literacy and international vision, master the basic knowledge, basic theory and experimental skills of modern life science, familiar with the status and frontier of biotechnology and its application in production practice, Hold the basic qualities of Humanities and Social Sciences and economic management science, subject to strict scientific thinking and application ability training, and become biotechnology professional top-notch talents with good quality in teaching, scientific research, technology development and management etc..

Graduates can continue to study at well-known universities and research institutes of all over the world. They can also engaged in research, scientific and technological development or administrative management in the enterprises or institutions, such as the world's leading bio pharmaceutical industry, one health industry, as well as food and light industry, environmental protection industry.

#### 二、基本规格要求

##### II. Learning Outcomes

1. 具有爱国敬业精神、社会责任感和追求卓越的态度；以及良好职业道德、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；
2. 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；
3. 具备人文社科和经济管理科学的基本知识和综合素质；
4. 系统掌握生命科学技术的基础理论知识和实验技能；
5. 熟练掌握基因工程、细胞工程、蛋白质与酶工程、生化分离与分析等生物科学原理与实践技能，并掌握较扎实的生物工程相关原理与技术应用；
6. 掌握本专业所需的数学、物理学、化学、信息学和工程学等学科的基本知识和实践能力；
7. 了解生物技术发展趋势及应用前景，熟悉生物技术及其产业的相关方针、政策和法规，初步掌握生物技术研究的方法和手段，初步具备发现、提出、分析和解决生物技术相关问题的能力，具有从事本专业的科学研究、科技开发、科技管理与教学等方面的初步能力；
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。

1. Possess the spirit of patriotic dedication, the social responsibility and the attitude of pursuing excellence; Possess the professional ethics, good team spirit and coordination ability, and could undertake the role of individual, team members, and team leader under the background of multidisciplinary;

2. 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;

3. Gain basic knowledge and comprehensive quality of humanities, social sciences and economic management;

4. Master the basic theoretical knowledge and experimental skills of life science and technology;

5. Master the principles of biological science, such as genetic engineering, cell engineering, protein and enzyme engineering, biochemical separation and analysis, etc., and have a solid understanding of the principles and applications of biotechnology;

6. Master the basic knowledge and practical ability of mathematics, physics, chemistry, information science and Engineering;

7. Understanding the biological technology development trend and application prospect, grasp the means to study biological technology, have the ability to identify, analyze, and solve problems related to biotechnology, and with the ability to engage in scientific research, scientific and technological development, science and technology management and teaching;

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.

### 三、培养特色

#### III. Program Highlights

坚持理工医交叉，科教协同及产教协同育人，突出现代生物技术前沿发展及其在生物医药、大健康产业、生物基产品绿色制造及环境保护中的应用。

Talent training mode consists of cross-disciplinary in science, technology, and medicine, combining advantage of industry-university-research collaborations. This program is characterized by highlighting the frontier development of modern biotechnology and its application in biomedicine, large health industry, green manufacturing of bio-based products and environmental protection.

### 四、主干学科

#### IV. Main Disciplines

生物科学 Biology、生物技术 Biotechnology

### 五、学制与学位

#### V. Program Length and Degree

学制：四年，实行 1+3 培养模式，第 1 学年实行专业大类培养，2-4 学年实行专业分流培养，其中毕业设计持续第四学年。

Duration: 4 years. 1 + 3 training mode, collective training in the first year, separated training from the second to the fourth year, and the graduation project lasts for the Fourth academic year.

授予学位: 理学学士

Degrees Conferred: Bachelor of Science

## 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: 160 学分。其中, 专业核心课程学分不允许用其他课程学分进行冲抵和替代。

Minimum Credits of Curricular (comprising course system and intensified internship practical training): 160 credits. Major-related Core courses cannot be offset and replaced by 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: 5credits.

#### 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	20.6 (22)
		选修	160/10	6.3 (5.6)
学科基础课程		必修	1256/67.5	42.2 (43.4)
专业课程	专业核心课程	必修	160/8	5.0 (5.5)
	专业选修课程	选修	432/26	16.3 (14.9)
集中性实践教学环节		必修	31w/15.5	9.7 (8.6)
其中, 总实验 (实践)			488+31w	26.6
合计			2892/160	100

Course Type		Required/Elective	Hrs/Crs	Percentage (%)
Essential-qualities-oriented Education General Courses		Required	636/33	20.6 (22)
		Elective	160/10	6.3 (5.6)
Discipline-related General Courses		Required	1256/67.5	42.2 (43.4)
Courses in Specialty	Common Core Courses	Required	160/8	5.0 (5.5)
	Specialty-Oriented Courses	Required	432/26	16.3 (14.9)
Internship and Practical Training		Required	31w/15.5	9.7 (8.6)
Practicum Credits			488+31w	26.6
Total			2892/160	100

#### 2. 集中性实践教学环节周数与学分

##### Weeks/Credits of Intensified Internship and Practical Training

实践教学环节名称	课程性质	周数/学分	占实践教学环节学分比例 (%)
军事训练	必修	2w /1	6.5
工程训练 (三) (金工实习)	必修	2w /1	6.4
工程训练 (八) (电工实习)	必修	1w /0.5	3.2
认知实习	必修	2w /1	6.5
生物学野外实习	必修	3w /1.5	9.6
生产实习	必修	3w /1.5	9.7
专业创新创业训练	必修	2w /1	6.5
毕业设计 (论文)	必修	16w /8	51.6
合计		31w /15.5	100

华中科技大学 2023 级本科专业培养计划

Course Title	Required/Elective	Wks/Crs	Percentage(%)
Military Training	Required	2w /1	6.5
Engineering Training III (Metalworking Practice)	Required	2w /1	6.4
Engineering Training VIII (Electrical Engineering Practice)	Required	1w /0.5	3.2
Perceive Practice	Required	2w /1	6.5
Biological Field Practice	Required	3w /1.5	9.6
Engineering Internship	Required	3w /1.5	9.7
Innovation and Entrepreneurship Training	Required	2w /1	6.5
Undergraduate Thesis	Required	16w /8	51.6
Total		31w /15.5	100

3. 课外学分

Extracurricular Credits

序号	课外活动名称	课外活动和社会实践的要求		课外学分	
1	社会实践活动	思政课社会实践		2	
		安全教育		0.5	
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
				获高级程序员证书者	3
				获系统分析员证书者	4
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
		全国		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	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	具体得分情况 由专业教学指 导小组评判	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
			视创新情况、成果和参与度	每项	1~3
7	大学生创新科研课题				
8	企业培训	全国	获企业鉴定或录用证明	2	

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	Activities of Social Practice (Required)	Ideological and political course Social Practice	2
		Safety Education	0.5
2	Public service work	(Labor education) (required 32 Hours/2Credits)	2

续表

No.	Activities	Requirements		Extracurricular Credits		
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	
		Qualifications for Computer and Software Technology Proficiency		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	5					
Third Prize	4					
5	Academic Papers	The specific score is judged by the professional teaching steering group	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	
8	Enterprise Training	Nationwide		Acquire evaluation or employment admission from enterprise	2	

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) Courses

#### (一) 主要课程 Main Courses

生命科学与技术导论 Life Science and Technology、普通生物学 General Biology、细胞生物学 Cellular Biology、生物化学 Biochemistry、遗传学 Genetics、分子生物学 Molecular Biology、生物信息学 bio-informatics、微生物学 Microbiology、生物化工原理与设备 Principle and Equipment of Biochemical Industry、基因工程原理 Principle of Gene Engineering、细胞工程原理 Principle of Cell Engineering、蛋白质与酶工程 Protein and Enzyme Engineering、发酵工程 Fermentation Engineering、解剖与生理学 Anatomy and Physiology、代谢生理与代谢工程 Metabolic Physiology and Metabolic Engineering、生物分离与分析技术 Technology of Biological Separation and Analysis、天然产物化学 Natural Products Chemistry、免疫学 Immunology、基因组学 Genomics、代谢组学 Metabolomics、生物统计学 Biostatistics 等。

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

创新意识启迪课程 Innovative Awareness Enlightenment Course: 生命科学与技术导论 Life Science and Technology、认知实习 Perceive Practice、生物学野外实习 Biological Field Practice

创新能力培养课程 Innovative Ability Training Course: 生物技术大实验 Experiments of

Biotechnology

创新实践训练课程 Innovative Practice Training Course: 专业创新创业训练 Professional Innovation and Entrepreneurship Training、学科竞赛(课外学分) Discipline Competition (Extracurricular Credit)

### 八、主要实践教学环节

#### VIII. Practicum Module (Experiments Included)

生命科学与技术实验 Life Science and Technology Experiment、工程训练(三) Engineering Training III、工程训练(八) Engineering Training VIII、物理实验 Physical Experiment、无机及分析化学实验 Experiments in Inorganic and Analytical Chemistry、有机化学实验 Experiment in Organic Chemistry、普通生物学实验 Experiment in General Biology、生物化学实验 Experiments in Biochemistry、细胞生物学实验 Experiments in Cellular Biology、分子生物学实验 Experiments in Molecular Biology、遗传学实验 Experiments of Genetics、微生物学实验 Experiments in Microbiology、发酵工程实验 Experiments in Fermentation Engineering、解剖与生理学实验 Experiments in Anatomy and Physiology、生物技术大实验 Experiments of Biotechnology、军事训练 Military Training、认知实习 Perceive Practice、生物学野外实习 Biological Field Practice、生产实习 Engineering Internship、专业创新创业训练 Professional Innovation and Entrepreneurship Training、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: 生物技术

School(Department): School of Life Science & Technology

Major: Biotechnology

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-qualities-oriented Education General Courses 素质教育通识课程	必修 Required	MAX0022	思想道德修养与法律基础 Morals & Ethics & Fundamentals 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概论 Basic Principles 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	3.0			3
	必修 Required	MAX0063	毛泽东思想和中国特色社会主义理论体系概论 General Introduction to Mao Zedong Thought and Socialist Theory with Chinese Characteristics	48	3.0			4
	必修 Required	MAX0032	形势与政策 Situation and Policy	48	1.5			5-7
	必修 Required	RMWZ0002	军事理论 Military Theory	36	2			1
	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

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 - qualities- oriented General Courses 素质教育 通识课程	必修 Required	PHE0012	大学体育（二） Physical Education（II）	60	1.5			3-4
	必修 Required	PHE0022	大学体育（三） Physical Education（III）	24	1			5-6
	必修 Required	NCC0001	计算机与程序设计基础（C++） Fundamentals of Object-oriented Programming in C++	48	3		8	1
	必修 Required	CHI0001	中国语文 Chinese	32	2			2
				从不同的课程模块中修读若干课程，美育类课程不低于 2 学分，《大学生心理健康》为必选课程，总学分不低于 10 学分 General Education Courses(elective)	160	10		
学科基础课程 Discipline-related General Courses	必修 Required	MAT0551	微积分（一）（上） Calculus（I）	88	5.5			1
	必修 Required	MAT0531	微积分（一）（下） Calculus（I）	88	5.5			2
	必修 Required	MAT0591	概率论与数理统计 Probability and Statistics	40	2.5			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	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 Experiments in Inorganic and Analytical Chemistry	32	1.0	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 Experiments in Organic Chemistry	32	1	32		2
	必修 Require	CHE0761	物理化学 Physical Chemistry	32	2			3
	必修 Require	CHE0781	物理化学实验 Experiments in Physical Chemistry	32	1	32		3
	必修 Required	BIO0621	生命科学与技术导论 Introduction to Life Science and Technology	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	16		1	

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	BIO0561	普通生物学(上) General Biology Part ( I )	40	2.5			3
	必修 Required	BIO0601	普通生物学实验(上) Experiment in General Biology Part I	16	0.5	16		3
	必修 Required	BIO0571	普通生物学(下) General Biology Part II	32	2			4
	必修 Required	BIO0611	普通生物学实验(下) Experiment in General Biology Part II	16	0.5	16		4
	必修 Required	BIO0651	生物化学(一) Biochemistry ( I )	48	3			3
	必修 Required	BIO0671	生物化学实验(一) Experiments in Biochemistry ( I )	24	0.8	24		3
	必修 Required	BIO0641	生物化学(二) Biochemistry ( II )	40	2.5			4
	必修 Required	BIO0661	生物化学实验(二) Experiments in Biochemistry ( II )	24	0.8	24		4
	必修 Required	BIO0782	细胞生物学 Cellular Biology	56	3.5			3
	必修 Required	BIO0792	细胞生物学实验 Experiments in Cellular Biology	24	0.8	24		3
	必修 Required	BIO2331	微生物学 Microbiology	48	3			4
	必修 Required	BIO2341	微生物学实验 Experiments in Microbiology	32	1	32		4
	必修 Required	BIO0521	分子生物学 Molecular Biology	56	3.5			5
	必修 Required	BIO0531	分子生物学实验 Experiments in Molecular Biology	24	0.8	24		5
	必修 Required	BIO0891	遗传学 Genetics	48	3			5
必修 Required	BIO0901	遗传学实验 Experiments in Genetics	32	1	32		5	
专业核心课程 Major-specific Core Courses	必修 Required	BIO2021	发酵工程 Fermentation Engineering	32	2			5
	必修 Required	BIO2101	蛋白质与酶工程 Protein and Enzyme Engineering	32	2			5
	必修 Required	BIO2071	基因工程原理 Principle of Gene Engineering	32	2			6
	必修 Required	BIO2191	生物技术大实验 Experiments in Biotechnology	64	2	64		7



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 Major-specific Electives	须完成 2 学分跨专业选修课程，带*号课程为本专业限选课程。				26			
	选修 Elective	BIO2181	生物化工原理与设备* Principle & Equipments of Biochemical Industry*	48	3			4
	选修 Elective	BIO2231	生物信息学* Bioinformatics*	56	3.5		16	6
	选修 Elective	BIO2061	合成生物学与细胞工厂* Synthetic Biology and Cell Factory*	32	2			6
	选修 Elective	BIO5071	代谢生理与代谢工程* Metabolic Physiology and Metabolic Engineering*	32	2			6
	选修 Elective	BIO5391	生物分离与分析技术* Technology of Biological Separation and Analysis*	48	3			6
	选修 Elective	BIO2381	仪器分析 Instrumental Analysis	32	2			4
	选修 Elective	BIO0721	生物统计学 Biostatistics	32	2			5
	选修 Elective	BIO5541	细胞工程原理* Principle of Cell Engineering*	32	2			6
	选修 Elective	BIO2351	系统生物学 Systems Biology	32	2			7
	选修 Elective	BIO2041	发育生物学 Developmental Biology	40	2.5			6
	选修 Elective	BIO0551	基因组学 Genomics	32	2			6
	选修 Elective	BIO5082	代谢组学 Metabonomics	32	2			6
	选修 Elective	BIO2031	发酵工程实验* Experiments in Fermentation Engineering*	32	1	32		5
	选修 Elective	BIO5381	生物产品制造工艺学 Biological Products Manufacturing Technology	32	2			6
	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			6
	选修 Elective	BIO0831	药理学基础 Fundamentals of Pharmacology	32	2			7
	选修 Elective	BIO5481	天然产物化学* Natural Products Chemistry*	32	2			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	
专业选修课程 Major-specific Electives	选修 Elective	BIO5581	新药研发 Drug Discovery and Development	16	1			7
	选修 Elective	BIO5021	FDA 药物审批规范 Regulations on Drug Approval by FDA	24	1.5			5
	选修 Elective	BIO5171	环境生态学 Environmental Ecology	32	2			6
	选修 Elective	BIO5191	环境污染及生态毒理学 Environmental Pollution and Ecotoxicology	32	2			6
	选修 Elective	BIO5181	环境生物工程 Environmental Bioengineering	32	2			7
	选修 Elective	BIO5421	生物炼制与生物能源 Biorefinery and Bioenergy	32	2			6
实践环节 Practical Training Items	必修 Required	RMWZ351 1	军事训练 Military Training	2w	1			1
	必修 Required	BIO3551	认知实习 Perceive Practice	2w	1			1
	必修 Required	ENG3541	工程训练（三） Engineering Training (III)	2w	1			3
	必修 Required	ENG3571	工程训练（八） Engineering Training (VIII)	1w	0.5			4
	必修 Required	BIO3571	生物学野外实习 Biological Field Practice	3w	1.5			4
	必修 Required	BIO3601	专业创新创业训练 Professional Innovation and Entrepreneurship Training	2w	1			5
	必修 Required	BIO3561	生产实习 Engineering Internship	3w	1.5			6
	必修 Required	BIO3511	毕业设计（论文） Undergraduate Thesis	16w	8			7-8