

生物技术专业培养方案

Curriculum for Undergraduate of Biotechnology Major

一、培养目标

培养德、智、体、美全面发展具有深厚的人文底蕴、宽厚的自然科学基础、扎实的生物学和生物技术专业知识和技能、强烈的创新意识、宽广的国际视野，融知识和能力全面协调发展的有理想、有抱负的高素质应用型人才。

期待毕业生 5 年左右达到以下目标：

1. 掌握扎实的数学、物理、化学、生物学等自然科学基础知识；具备良好的人文素养、社会责任感和职业道德；
2. 掌握生物技术专业领域的基础理论、基本知识和相关技术，具有强烈的创新意识，能够综合应用所掌握的理论知识和技能解决生物技术领域相关问题，从事生物技术领域产品研发；
3. 具有文献检索和资料查询的能力，了解生物技术前沿动态和发展趋势；
4. 具有良好的表达和沟通能力以及团队合作和组织管理能力；
5. 具有终身学习的意识和能力，能够不断适应专业领域知识的更新和社会的发展；
6. 具有宽广的国际视野和良好的外语应用能力。

I. Training objectives

This major trains undergraduate students to be highly-competent practical talents with a solid academic knowledge and skills in natural science specifically in biotechnological field, with creative spirit, strong international perspective, lofty ideals and ambitious. Graduates are expected to reach the following goals within 5 years or so.

1. To master solid basic knowledge of mathematics, physics, chemistry, biology and other natural sciences; Having rich humanistic accomplishment, high sense of social responsibility and good professional ethics;
2. To master basic theories, basic knowledge and relevant technologies in the field of biotechnology; Having a strong sense of innovation; Being able to apply a combination of theoretical knowledge and skills to solve relevant problems and engage in product research and development in the field of biotechnology.

3. Having proficient literature retrieval and data query skills, understanding the frontier trends and development of biotechnology;
4. Having good presentation and communication skills, as well as teamwork and organization management skills;
5. Having the consciousness and ability of lifelong learning, can adapt to the renewal of professional knowledge and social development.
6. Having a broad international vision and good command of foreign language application.

二、毕业要求

1. 自然科学知识：能够熟练掌握数学、物理、化学、生物学等基础知识，通过文献检索和资料查询了解生物技术前沿动态和发展趋势扩大知识领域，并识别和发现生物技术领域的问题。
2. 生物技术基本技能：掌握生物学、生物化学及分子生物学、遗传学、微生物学等现代生物技术相关学科的理论框架及技术体系；能够运用现代生物技术分离、纯化、检测生物分子，并进行定量分析、结构分析和分子（基因）操作；
3. 专业应用能力：能够基于生物学原理，选择与使用恰当的生物技术工具、仪器设备和信息技术工具，对生物技术领域的问题进行基础的研究，包括实验设计、数据分析、论文撰写和信息处理。
4. 团队合作和沟通能力：具备一定的国际视野及跨文化交流、竞争和合作能力，能够就现代生物科学和生物技术中的问题与同行及社会公众进行有效沟通。
5. 终身学习意识：具有一定的创新意识、批判性思维和终身学习的能力。
6. 思想政治和德育方面：具有良好的思想道德修养；能够利用生物技术工具解决一定的人类健康和社会安全问题，理解生物技术发展和应用对人类健康、生态环境以及社会安全的影响，遵守职业道德规范。
7. 体育方面：掌握体育运动的一般知识和基本方法，形成良好的体育锻炼习惯，达到国家规定的大学生体育锻炼合格标准。

II.Requirements

1. Natural science knowledge: Mastering basic knowledge of mathematics, physics, chemistry, biology, etc.; Finding and identifying problems in the field of biotechnology through literature search and data query about biotechnology frontier dynamic and development trend of expanding areas of knowledge.
2. Basic skills of biotechnology: To master the theoretical framework and technical system of biology, biochemistry, molecular biology, genetics, microbiology and other modern biotechnology related disciplines; being able to use modern biotechnology to isolate, purify

and detect biological molecules, and conduct quantitative analysis, structural analysis and molecular (gene) operation;

3. Professional application ability: Based on biological and biotechnical theories, being able to select and use appropriate biotechnical tools, equipment and information technology to solve the problems and conduct experimental design, data analysis, the thesis writing and information processing.

4. Teamwork and communication skills: Having a strong international vision and cross-cultural communication, competition and cooperation ability; being able to effectively communicate with the public on the problems in modern biological science and biological technology.

5. Lifelong learning awareness: Having a sense of innovation, critical thinking and lifelong learning consciousness and ability.

6. Ideological, political and moral education: Ideologically and morally accomplished; able to take advantage of biotechnology tools to solve certain human health and social security problems, understand the biological technology development and application to human health, ecological environment and the influence of social security, abide by the professional ethics

7. Sports: Mastering general knowledge and basic methods of sports, forming good habits of physical exercise; and meeting the national standards for college students' physical exercise.

六、毕业学分要求：175 学分

课程类型		学分要求	课程类型	学分要求	
1、公共课程平台		45	3、专业课程模块	0	
公共基础课程		0	专业必修课程	0	
通识教育课程	必修	0	专业选修课程	0	
	选修	0	4、实践教学模块	0	
2、学科基础平台		0	专业实践课程	必修	0
专业学科基础课程	必修	0		选修	0
		选修	0	5、素质拓展模块	6

VI、Credits required for graduation: 175 credits

Type of courses	Academic credits	Type of courses	Academic credits
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1.Common Courses		45	3. Specialized Courses		0	
Common Basic Courses		0	Required Courses		0	
General Education Courses	Required Courses	0	Elective Courses		0	
	Elective Courses	0	4.Practicum and Internship Courses		0	
2.General Disciplinary Courses		0	Disciplinary Practical Courses	Required Courses	0	
Disciplinary Basic Courses	Required Courses	0		Elective Courses	0	
			Elective Courses	0	5.Quality Development Courses	

七、学分比例

VII、Ratio of Credits

1. 必修选修学分比例

The proportion of compulsory elective credits

类别	学分	占总学分比例
必修	148.5	84.9%
选修	26.5	15.1%

2. 实践教学环节学分比例

The proportion of credits in practice teaching

类别	学分	占总学分比例
实践教学环节	实验教学学时	26.7
	实践教学模块	0
	素质拓展模块	6
		18.686%

十、教学环节设置及学分分布表

课程类型	课程性质	课程编码	课程名称	学分	合计	课内学时			实践学时	学期	是否辅修/ 双学位课程	先修课程/ 备注			
						讲课	实验	上机							
平台	公共课程	平台课程	通识教育平台课程	必修	1306001	大学计算机基础 A Computer Foundation A	3	48	30	0	18	0	1		
					1401840	大学英语(一) College English (I)	3	48	48	0	0	0	1		
					1501882	体育(一) Physical Education(I)	1	26	26	0	0	0	1		
					2502001	大学生心理健康教育 Mental Health Education	1	16	16	0	0	0	1		
					2504002	军事理论与训练 Military Theory and Training	3	3(周)	0	0	0	3(周)	1		
					5105001	思想道德修养与法律基础 Moral Cultivation and Basics of Law	3	48	42	0	0	6	1		
					5106001	形势与政策 World Affairs and State Policy	2	64	64	0	0	0	1, 2, 3, 4, 5, 6, 7, 8		
					1401841	大学英语(二) College English (II)	3	48	48	0	0	0	2		
					1501883	体育(二) Physical Education(II)	1	34	34	0	0	0	2		
					2503002	职业生涯规划与就业创业指导 Career Planning and Employment Entrepreneurial Guidance	1	16	16	0	0	0	2		

				5103001	中国近现代史纲要 An Outline of Modern and Contemporary History of China	3	48	42	0	0	6	2		
				1401842	大学英语(三) College English (III)	3	48	48	0	0	0	3		
				1501884	体育(三) Physical Education(III)	1	34	34	0	0	0	3		
				5102001	马克思主义基本原理 Fundamentals of Marxism	3	48	44	0	0	4	3		
				1401843	大学英语(四) College English (IV)	3	48	48	0	0	0	4		
				1501885	体育(四) Physical Education(IV)	1	34	34	0	0	0	4		
				2501002	公益劳动 Community Service	1	16	0	0	0	16	4		
				5101001	毛泽东思想与中国特色社会主义理论体系概论 Theoretical System of Socialism with Chinese Characteristics	5	80	64	0	0	16	4		
模块	素质拓展模块	创新创业教育	必修	创新创业实践 3 学分 Innovation Practices 3 Academic Credits										
		第二课堂	必修	第二课堂 3 学分 Second Classroom 3 Academic Credits										
		学科基础平台课程	必修	0702603	高等数学 B(一) Advanced Mathematics B(I)	4	64	64	0	0	0	1		
	2206006			普通化学 General Chemistry	2	32	32	0	0	0	1			
	2253017			普通化学实验 Experiments in General Chemistry	1	16	0	16	0	0	1			

			0702604	高等数学 B(二) Advanced Mathematics B(II)	5	80	80	0	0	0	2		
			0703605	大学物理 B(一) College Physics B(I)	2.5	40	40	0	0	0	2		
			0703607	大学物理实验 B Experiments of College Physics B	1.5	24	0	24	0	0	2		
			1306004	计算机程序设计基础(C) Basics of Computer Programming(C)	4	64	40	0	24	0	2		
			2206681	分析化学 B Analytical Chemistry B	2	32	32	0	0	0	2		
			2206693	医学有机化学 Medical Organic Chemistry	2.5	40	40	0	0	0	2		
			2253028	分析化学实验 B Analytical Chemical Experiment B	1.5	24	0	24	0	0	2		
			2253031	医学有机化学实验 Experiments in Medical Organic Chemistry	1.5	24	0	24	0	0	2		
			0702026	线性代数 Linear Algebra	2	32	32	0	0	0	3		
			0703606	大学物理 B(二) College Physics B(II)	2	32	32	0	0	0	3		
			1601006	医学文献检索 Medical Literature Retrieval	1	18	18	0	0	0	4		
		选修	0101088	技术经济与投资分析 Technical Economy and Investment Analysis	2	32	32	0	0	0	3		
			0702303	概率论与数理统计 A Probability and Mathematical Statistics(A)	3	48	48	0	0	0	3		
			0502004	管理学原理 Principles of Management	3	48	48	0	0	0	4		
			1401043	中级英语听力与写作 Intermediate English Listening & Writing	3	48	48	0	0	0	4		
			0602032	知识产权法 Intellectual Property Law	2	32	32	0	0	0	5		

			1306005	数据库技术及应用 Database Technology and Applications	3	48	30	0	18	0	5		
	专业 核心 课程	必修	1801016	生物技术导论 Introduction to Biotechnology	2	32	32	0	0	0	1		
			1801001	动物学 Animal Sciences	3	48	48	0	0	0	3		
			1801024	生物化学（一） Biological chemistry（一）	4.5	72	72	0	0	0	3		
			1850001	动物学实验 Experiments in Animal Sciences	1.5	24	0	24	0	0	3		
			1850007	生物化学实验 Experiments in Biological Chemistry	3	48	0	48	0	0	3		
			1801003	分子生物学 Molecular Biology	4	64	64	0	0	0	4		
			1801011	生理学 Physiology	3	48	48	0	0	0	4		
			1801037	生物化学（二） Biological chemistry（二）	3	48	48	0	0	0	4		
			1850002	分子生物学实验 Experiments in Molecular Biology	1.5	24	0	24	0	0	4		
			1850006	生理学实验 Experiments in Physiology	1	16	0	16	0	0	4		
			1801005	免疫学基础 Immunology	3	48	48	0	0	0	5		
			1801009	遗传学 Genetics	3	48	48	0	0	0	5		
			1801026	细胞生物学 Cell Biology	3	48	48	0	0	0	5		
			1850003	免疫学基础实验 Experiments in Immunology	1	16	0	16	0	0	5		
			1850005	遗传学实验 Experiments in Genetics	1	16	0	16	0	0	5		

			1850008	细胞生物学实验 Experiments in Cell Biology	1.5	24	0	24	0	0	5		
			1801007	微生物学 Microbiology	3	48	48	0	0	0	6		
			1801014	生物统计学 Biostatistics	3	48	32	16	0	0	6		
			1801015	发育生物学 Developmental Biology	2	32	32	0	0	0	6		
			1801019	基因组学技术 Genomics Technology	1.5	24	24	0	0	0	6		
			1850004	微生物学实验 Experiments in Microbiology	1.5	24	0	24	0	0	6		
	专业 任 选 课 程	选修	1801023	生物信息学 Bioinformatics	2	32	32	0	0	0	4		
			1801030	食品化学 Food chemistry	1.5	24	24	0	0	0	4		
			1801031	植物学 Phytology	2	32	32	0	0	0	4		
			1801013	现代生物仪器分析 Modern Biological Instrument Analysis	2	32	20	0	12	0	5		
			1801017	酶工程 Enzyme engineering	2	32	32	0	0	0	5		
			1801018	发酵工程 Fermentation Engineering	2	32	32	0	0	0	5		
			1801020	蛋白质组学技术 Proteomics Technology	1.5	24	24	0	0	0	6		
			1801021	生物材料与组织工程 Biomaterials and tissue engineering	2	32	32	0	0	0	6		
			1801028	神经生物学 Neurobiology	2	32	32	0	0	0	6		
			1801029	系统生物学 Systems Biology	2	32	32	0	0	0	6		
			1801033	抗体工程 Antibody engineering	2	32	32	0	0	0	6		

			1801041	生物制品 Biological products	2	32	32	0	0	0	6		
实践教学模块	必修		1801070	认识实习 Introductory Practice	2	2(周)	0	0	0	2(周)	3		
			1850009	生物技术开放实验设计 Open Experiment Design for Biotechnology	2	2(周)	0	0	0	2(周)	7		
			1850010	分子生物学实验设计与实践 Design and Practice for Molecular Biology Experiment	1	1(周)	0	0	0	1(周)	7		
			1850011	细胞生物学实验设计与实践 Design and Practice for for Cell Biology Experiment	1	1(周)	0	0	0	1(周)	7		
			1801097	毕业实习 Pre-graduation Practice Experience	4	4(周)	0	0	0	4(周)	8		
			1801099	毕业设计(论文) Pre-graduation Internship	8	12	0	0	0	12(周)	8		