

# Bioengineering

## I . Degree

Bachelor of Engineering (*B.Eng.*)

## II . Normal Period of Study

4 years

## III. Objectives

This major aims to foster interdisciplinary talents with fundamental knowledge in biology, engineering, natural science and humanities. Graduates are capable of engaging in the production of biological products, process design, production management, the research and development of new technologies and products in the domains of biotechnology and engineering. After about 5 years career practice, the graduates are expected to get the relative qualifications or technical titles, and become the technical backbones.

## IV. Requirements

Students are required to acquire fundamentals, theories, knowledge about bioengineering. Students are expected to have abilities to carry out bioengineering design, scientific research, problem analysis and solving in the research and manufacture of biological products.

Graduates should acquire a variety of knowledge and abilities as followings:

1. Engineering knowledge WA1: Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to the solution of complex engineering problems.

2. Problem analysis WA2: Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences (WK1 to WK4).

3. Design/ development of solutions WA3: Design solutions for 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 (WK5).

4. Investigation WA4: Conduct investigations of complex problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

5. Modern tool usage WA5: Create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modeling, to complex engineering problems, with an understanding of the limitations (WK6).

6. The engineer and society WA6: 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 complex engineering problems (WK7).

7. Environment and sustainability WA7: Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts (WK7).

8. Ethics WA8: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice (WK7).

9. Individual and teamwork WA9: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

10. Communication WA10: Communicate effectively on 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 and finance WA11: 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 multi-disciplinary environments.

12. Life-long learning WA12: 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.

## V. Core courses

Biochemistry, Principles of Chemical Engineering, Microbiology, Biochemistry, Cell Biology, Fermentation and Metabolic Engineering, Molecular Biology and Genetic Engineering, Enzyme and Protein Engineering, Bioseparation Engineering, etc.

## VI. Components of the 4-year Curriculum

Category	Credits
1. General Education Courses	22
2. Discipline Education Courses	36
3. Specialized Courses	85
<b>Total</b>	<b>143</b>

### VII. Table of Teaching Plan for Major of Bioengineering

课程编码 Course No	课程名称    Course Name	学 分	总学 时	讲 课	实 验	上 机	实 践	学年-学期 Academic Year-Semester								开课 单位		
								I-0	I-1	I-2	II-0	II-1	II-2	III-0	III-1		III-2	IV-0
必修课程●通识教育课 (22 学分)    Compulsory Course●Course of General Education																		
140228E1	中国概况【英】    Introduction to China[E]	2	32	32					2									114
210206E1	太极拳【英】    Tai Chi[E]	2	32	32					2									122
581113E2	汉语入门 (I)【英】    Fundamental Chinese (I) [E]	4	64	64					4									371
580116E1	中国历史与文化【英】    Chinese History and Culture[E]	2	32	32						2								371
582113E2	汉语入门 (II)【英】    Fundamental Chinese (II) [E]	4	64	64						4								371
581114E1	汉语进阶 (I)【英】    Chinese for Specific Purpose (I)	4	64	64							4							371
582114E1	汉语进阶 (II)【英】    Chinese for Specific Purpose (II)	4	64	64							4							371
必修课程●学科教育课 (36 学分)    Compulsory Course●Course of Discipline Education																		
050217E1	工程制图【英】    Engineering Drawing[E]	3	48	48					3									101
060006E2	Visual Basic 程序设计【英】    Visual Basic Programming[E]	3	48	32		16			3									106
111233E4	高等数学 (I)【英】    Advanced Mathematics (I) [E]	6	96	96					6									113
060010E1	Visual Basic 课程设计【英】    Course Design of Visual Basic[E]	1	40				40			1								106
111208E6	大学物理 (I)【英】    College Physics (I) [E]	4.5	72	72					4.5									113
111209E4	大学物理实验 (I)【英】    Experiments on College Physics (I) [E]	1.5	24		24				1.5									113
112233E4	高等数学 (II)【英】    Advanced Mathematics (II) [E]	5	80	80					5									113
110312E3	线性代数【英】    Linear Algebra[E]	3	48	48							3							113
112208E6	大学物理 (II)【英】    College Physics (II) [E]	4.5	72	72							4.5							113

课程编码 Course No	课程名称    Course Name	学 分	总学 时	讲 课	实 验	上 机	实 践	学年-学期 Academic Year-Semester										开课 单位				
								I-0	I-1	I-2	II-0	II-1	II-2	III-0	III-1	III-2	IV-0		IV-1	IV-2		
112209E4	大学物理实验 (II) 【英】    Experiments on College Physics (II) [E]	1.5	24		24							1.5										113
110226E1	概率与统计 【英】    Probability and Statistics[E]	3	48	48									3									113
必修课程●专业基础课 (85 学分)    Compulsory Course●Fundamental Specialized Course																						
031326E2	无机化学 (I) 【英】    Inorganic Chemistry(I) [E]	3	48	48							3											103
030222E4	分析化学 【英】    Analytical Chemistry[E]	3	48	48								3										103
032326E2	无机化学 (II) 【英】    Inorganic Chemistry (II) [E]	2	32	32								2										103
020400E1	生命科学导论 【英】    Introduction to Life Sciences[E]	3	48	40	8								3									102
030223E2	分析化学实验 【英】    Experiments on Analytical Chemistry[E]	3	48		48								3									103
031328E1	物理化学 (I) 【英】    Physical Chemistry (I) [E]	3	48	48									3									103
031329E2	物理化学实验 (I) 【英】    Physical Chemistry Experiment (I) [E]	1	16		16								1									103
031347E1	有机化学 (I) 【英】    Organic Chemistry(I) [E]	3	48	48									3									103
031348E2	有机化学实验(I) 【英】    Organic Chemistry Experiment (I) [E]	1	16		16								1									103
100213E1	电工学 【英】    Electrical Engineering[E]	3	48	40	8								3									104
021381E1	专业综合实践(I) 【英】    Professional Comprehensive Practice (I) [E]	3	48				48							3								102
032328E1	物理化学 (II) 【英】    Physical Chemistry (II) [E]	2.5	40	40									2.5									103
032347E1	有机化学 (II) 【英】    Organic Chemistry(II) [E]	2	32	32									2									103
022381E1	专业综合实践(II) 【英】    Professional Comprehensive Practice (II) [E]	3	48				48								3							102
030302E2	酶与蛋白质工程 【英】    Enzyme & Protein Engineering[E]	3	48	48												3						102

课程编码 Course No	课程名称    Course Name	学 分	总学 时	讲 课	实 验	上 机	实 践	学年-学期 Academic Year-Semester										开课 单位			
								I-0	I-1	I-2	II-0	II-1	II-2	III-0	III-1	III-2	IV-0		IV-1	IV-2	
030313E1	生物化学【英】    Biochemistry[E]	4	64	64										4							102
030315E2	生物化学实验【英】    Biochemistry Experiment[E]	3	48		48									3							102
031268E3	化工原理（I）【英】    Principles of Chemical Engineering (I) [E]	2.5	40	40										2.5							103
020401E1	生物工程技术【英】    Bioengineering Technology[E]	3	48	48											3						102
023381E1	专业综合实践(III)【英】    Professional Comprehensive Practice (III) [E]	3	48				48								3						102
030381E2	分子生物学【英】    Molecular Biology[E]	3	48	48											3						102
030382E1	分子生物学实验【英】    Experiments on Molecular Biology[E]	2	32		32										2						102
030437E1	化工原理实验【英】    Experiments on Principles of Chemical Engineering[E]	1	16		16										1						103
032268E3	化工原理（II）【英】    Principles of Chemical Engineering (II) [E]	2	32	32											2						103
020226E1	生物传感器【英】    Biosensor[E]	3	48	48															3		102
030217E2	发酵与代谢工程【英】    Fermentation and Metabolic Engineering[E]	4	64	64																4	102
030316E2	生物分离工程【英】    Bioseparation Engineering[E]	3	48	48																3	102
030399E2	细胞生物学【英】    Cytobiology[E]	3	48	48																3	102
020208E3	毕业设计【英】    Graduation Project[E]	10	560				560													10	102
	必修课程汇总    Compulsory Courses Total	143	2712	1712	240	16	744	0	23	23	0	30	14.5	3	12.5	14	0	13	10		

注：学期为“0”的表示夏季学期，“1”秋季学期，“2”春季学期。

Notes: semester '0' stands for Summer semester, '1' and '2' stands for Autumn semester and Spring semester.

