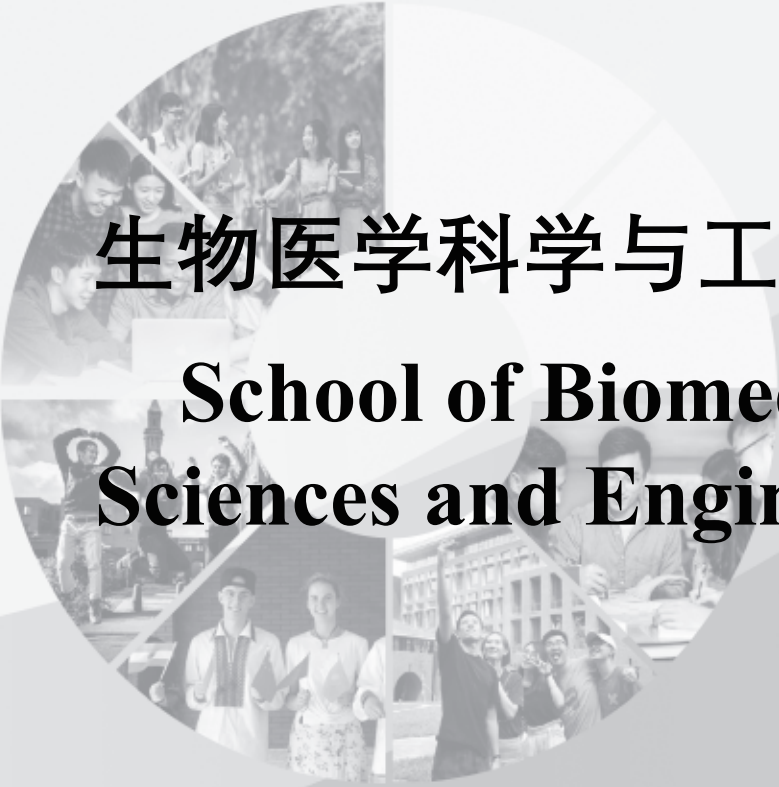




生物医学科学与工程学院

**School of Biomedical
Sciences and Engineering**

生物医学工程

Biomedical Engineering

专业代码: 082601

学 制: 4 年

Program Code: 082601

Duration: 4 years

培养目标 (Educational Objectives) :

面向医疗健康及国家战略需求, 培养兼具家国情怀与全球视野, “三力” (学习力、思想力、行动力) 卓越、德智体美劳全面发展, 掌握坚实的物理学、生物医学、化学、计算机科学等基础理论知识及前沿生物医学工程专业知识, 在生物材料、再生医学、医学人工智能、体外诊断及智慧诊疗等领域具备国际竞争力、创新思维、科研素养和组织领导才能的“三创型” (创新、创造、创业) 研究、开发、管理类拔尖人才。

经过本科阶段培养及毕业之后约 5 年的工作或学习深造, 本专业学生能够达到以下目标:

目标 1: 具有优良的职业道德及社会责任感, 成为在生物医学工程相关领域从事科学研究、教育、技术开发与创新、以及管理的拔尖人才。

目标 2: 能运用生物医学工程前沿理论、专业知识和创新思维创造性地解决生命科学、医学中的复杂工程问题。

目标 3: 具有全球化视野和跨文化交流与合作的能力, 能准确把握所从事行业的特点和趋势, 推动行业发展。

To meet the needs of medical health and national strategies, we aim to cultivate top-notch innovative, creative and entrepreneurial talents with a strong sense of patriotism and global perspective, with outstanding power of learning, thinking, and action, as well as with comprehensive development in morality, intelligence, physical fitness, aesthetics, and labor skills. Students are expected to develop solid foundational knowledge in physics, biomedical science, chemistry, computer science, as well as cutting-edge expertise in biomedical engineering. Our graduates should be internationally competitive and equipped with innovative thinking, research literacy, and organizational leadership abilities in fields such as biomaterials, regenerative medicine, medical artificial intelligence, in vitro diagnostics, and intelligent diagnosis and treatment.

The graduates will be able to fulfil the following objectives in five years of work or further education after graduation:

Objective №1: To become top talents engaged in scientific research, education, technological

development, and innovation, as well as management in the field of biomedical engineering, with excellent professional ethics and a strong sense of social responsibility.

Objective №2: To creatively apply cutting-edge theories, professional knowledge, and innovative thinking in biomedical engineering to solve complex engineering problems in life sciences and medicine.

Objective №3: To possess a global perspective and the ability for cross-cultural communication and cooperation, one can accurately grasp the characteristics and trends of the industry they are engaged in and drive the industrial development.

毕业要求 (Student Outcomes) :

№1.工程知识：运用数学、自然科学、计算和工程基础知识以及工程专业知识，制定复杂工程问题的解决方案。

№2.问题分析：利用数学、自然科学和工程科学的第一原理，识别、制定、研究并分析复杂的工程问题，得出有根据的结论，对可持续发展进行整体考虑。

№3.设计/开发解决方案：为生命科学及医学中复杂的工程问题设计创造性的解决方案，并设计系统、部件或流程，以满足确定的需求，同时适当考虑公共健康和安全、整个生命周期的成本、净零碳以及资源、文化、 社会和环境因素。

№4.研究：使用研究方法对生命科学及医学中复杂的工程问题和系统进行研究，包括基于研究的知识、设计实验、分析和解释数据，以及综合信息以提供有效结论。

№5.工具的使用：创造、选择、应用适当的技术、资源以及现代工程和信息技术工具，包括预测和建模，认识其局限性，以解决生命科学及医学中复杂的工程问题。

№6.工程师与世界：分析和评估可持续发展的成果，社会、经济、可持续性和健康与安全、法律和环境在解决复杂工程问题中的影响。

№7.品德及伦理：认同并践行社会主义核心价值观；运用伦理原则，致力于职业伦理工程实践和规范；并遵守相关的国家和国际法律。表现出理解多元化和包容性的必要性。

№8.个人和协作的团队工作：在多元化和包容性的团队中，以及多学科、远程和分布式的环境中，作为个人、成员或领导有效地发挥作用。

№9.沟通：在复杂的工程活动中与工程界和整个社会进行有效和包容的沟通，包括撰写和理解有效的报告和设计文件，并进行有效的介绍；考虑到文化、语言和学习差异。

№10.项目管理和财务：应用对工程管理原则和经济决策的知识和理解，并将其应用于自己的工作，作为团队的成员和领导者，管理项目和多学科环境。

№11.持续的终身学习：认识到需要并有准备和能力从事：i)独立和终身学习 ii) 适应新技术和新兴技术，以及 iii) 在最广泛的技术变革背景下进行批判性思考。

№1. Engineering Knowledge: An ability to use basic knowledge of mathematics, natural science, calculation and engineering as well as engineering expertise to develop solutions to complex engineering problems.

№2. Problem Analysis: An ability to use the first principle of mathematics, natural science and engineering science to identify, formulate, study and analyze complex engineering problems, draw valid conclusions and consider sustainable development as a whole.

№3. Design/Development of Solutions: An ability to design creative solutions for complex engineering problems in life sciences and medicine, and design systems, components or processes to meet identified needs, taking due account of public health and safety, the cost of the entire life cycle, net zero carbon, and resource, cultural, social and environmental factors.

№4. Research: An ability to use research methods to study complex engineering problems and systems in life sciences and medicine, including research-based knowledge, design experiments, analysis and interpretation of data, and synthesis of information to provide effective conclusions.

№5. Use of Tools: An ability to create, select, and apply appropriate technologies, resources, and modern engineering and information technology tools, including prediction and modeling, and recognize their limitations to solve complex engineering problems in life sciences and medicine.

№6. Engineers and The World: An ability to analyze and evaluate the results of sustainable development, and the impact of society, economy, sustainability, health and safety, law and environment in solving complex engineering problems.

№7. Character and Ethics: Agree with and practice the core values of Chinese socialism in daily life; An ability to apply ethical principles to the practice and standardization of professional ethics projects; and comply with relevant national and international laws. Demonstrate the need to understand diversity and inclusion.

№8. Individual and Collaborative Team Work: An ability to Effectively play a role as an individual, member or leader in a diverse and inclusive team, as well as in a multidisciplinary, remote and distributed environment.

№9. Communication: An ability to effective and inclusive communication with the engineering community and the whole society in complex engineering activities, including writing and understanding effective reports and design documents, and effective introduction; Consider cultural, language and learning differences.

№10. Project Management and Finance: An ability to apply the knowledge and understanding of engineering management principles and economic decisions, and apply them to their own work. As a team member and leader, manage projects and multidisciplinary environments.

№11. Continuous Lifelong Learning: An ability to recognizing the need and being prepared and able to engage in: i) independent and lifelong learning, ii) adapting to new and emerging technologies,

and iii) critical thinking in the broadest context of technological change.

培养目标与毕业要求关系矩阵：

培养目标 毕业要求	培养目标 1	培养目标 2	培养目标 3
毕业要求 1	●	●	
毕业要求 2	●	●	
毕业要求 3	●	●	
毕业要求 4	●	●	
毕业要求 5	●	●	
毕业要求 6	●		●
毕业要求 7	●		●
毕业要求 8	●		●
毕业要求 9	●		●
毕业要求 10	●		●
毕业要求 11	●	●	●

Relationship Matrix between Educational Objectives and Student Outcomes:

Educational Objectives Student Outcomes	Educational Objective 1	Educational Objective 2	Educational Objective 3
Student Outcome 1	●	●	
Student Outcome 2	●	●	
Student Outcome 3	●	●	
Student Outcome 4	●	●	
Student Outcome 5	●	●	
Student Outcome 6	●		●
Student Outcome 7	●		●
Student Outcome 8	●		●
Student Outcome 9	●		●
Student Outcome 10	●		●
Student Outcome 11	●	●	●

专业简介（Program Profile）：

华南理工大学生物医学工程学科始建于 20 世纪九十年代，是我校“双一流”的重点建设学科，为广东省一级学科优势重点学科。生物医学工程专业是国家级一流本科专业建设点，是我校重点建设的理、工、医等学科高度交叉的新工科专业，依托生物医学工程学科优势和高水平科研平台，打造创新型实践教学新体系，强化对学生科学素养和创新能力的培养，旨在综合工程学、生物学和医学的理论和方法，运用现代工程学、应用科学手段解决生物学、医学等领域基础科学问题与临床应用，发展用于预防、诊断、治疗及改善健康的高端医疗装备、创新植入器械、基因药物与疫苗、智慧医疗系统。

The discipline of Biomedical Engineering at South China University of Technology was established in the 1990s and is a key discipline in the "Double First-Class" initiative of our university. It ranks among the top ten in the fifth round of national discipline evaluations and is a key discipline with advantages at the provincial level in Guangdong Province. The Biomedical Engineering program is a national first-class undergraduate program and is a new interdisciplinary program that combines science, engineering, and medicine. With the support of the discipline's strengths and high-level research platforms in biomedical engineering, we have established an innovative practical teaching system, aiming to cultivate students' scientific literacy and innovation capabilities. The program integrates theories and methods from engineering, biology, and medicine to address fundamental scientific issues and clinical applications in fields such as biology and medicine, and to develop advanced medical equipment, innovative implantable devices, gene drugs and vaccines, and intelligent medical systems for prevention, diagnosis, treatment, and health improvement.

专业特色（Program Features）：

依托广州国际校区，开展在地国际化教育。采用世界一流大学专业课程及实践体系，特色鲜明，拥有以院士领衔的国际化高水平师资队伍。利用粤港澳大湾区优势，构建“产-学-研-医-监”协作育人机制，全方位协同育英才。

Based on the Guangzhou International Campus, one key characteristic of our education is the internalization at home (IaH). We adopt world-class university curriculum and practical teaching systems with distinctive features. We have an internationally renowned faculty team led by academicians of Chinese Academy of Engineering. Taking advantage of the Guangdong-Hong Kong-Macao Greater Bay Area, we have established a collaborative system for talent cultivation that involves cooperation between industry, universities, research institutions, hospitals, and regulatory authorities.

授予学位 (Degree Conferred) :

工学学士学位 Bachelor of Engineering

核心课程 (Core Courses) :

大学分专业核心课：生物医学基础（细胞生物学、生物力学、生物化学）、生物材料科学基础、智能医学工程基础（电路与电子技术、生物医学信号与系统、智能医学图像分析）

Integrated Core Courses: Fundamentals of Biomedical Sciences (Cell Biology, Biomechanics, Biochemistry), Fundamental Science of Biomaterials, Fundamentals of Intelligent Biomedical Engineering (Electric Circuit and Electronics Technology, Biomedical Signal and System, Intelligent Medical Image Analysis)

特色课程 (Featured Courses) :

新生研讨课：生物医学工程与人类健康

基于项目（设计、案例）的课程：生物医学工程探索与设计、生物材料综合实验、生物医学综合实验

国际化特色课程：人工智能与深度学习

学科前沿课：组织工程学和人工器官

跨学科交叉课程：生物医学信号与系统

本研共享课：高等生物材料分析技术 I、高等生物材料分析技术 II、生物大分子药物、纳米医学、生物材料表界面工程、癌症生物学、计算神经科学、分子影像学、生物医学检测与诊断技术、计算神经科学、生物医学仪器原理与仿真操作

校企合作课：生物医学工程职业规划与个人发展、医疗器械监管科学、生物医学工程创新与创业

创新实践课：工程创新训练 I、生物医学工程创新与创业（“三个一”课程）、国际交流与科研

创业教育课：生物医学工程创新与创业（“三个一”课程）

专题设计课：智能医学图像分析课程设计与、医学传感器原理与应用课程设计与

竞教结合课：生物医学工程创新与创业

劳动教育课：生物医学综合实验

Freshmen Seminars: Biomedical Engineering and Human Health

Project-based Courses : Exploration and Design of Biomedical Engineering, Comprehensive Experiments of Biomaterials, Comprehensive Experiments of Biomedical Science

Global Education Courses: Artificial Intelligence and Deep Learning

Subject Frontiers Courses: Tissue Engineering and Artificial Organs

Interdisciplinary Courses: Biomedical Signal and System

Baccalaureate-Master's Sharing Courses : Advanced Biomaterial Analysis Technology I, Advanced Biomaterial Analysis Technology II, Biomacromolecule Drugs, Nanomedicine, Surface Engineering of Biological Materials, Cancer Biology, Molecular Imaging, Biomedical Testing and Diagnostics, Computational Neuroscience, Principles and Simulation Operations of Biomedical Instruments

Cooperative Courses with Enterprises: Biomedical Engineering Career Planning and Personal Development, Innovation & Entrepreneurship in Biomedical Engineering, Medical Device Regulatory Science

Innovation Practice : Engineering Innovation Training I, Innovation & Entrepreneurship in Biomedical Engineering (Three "ones") , International Exchange and Research

Entrepreneurship Courses: Innovation & Entrepreneurship in Biomedical Engineering (Three "ones")

Special Designs : Course Project of Intelligent Medical Image Analysis 、 Course Project of Principle and Application of Medical Sensor

Contest-Teaching Integrated Courses: Innovation & Entrepreneurship in Biomedical Engineering Education on The Hard-Working Spirit: Comprehensive Experiments of Biomedical Science

一、各类课程学分登记表（Registration Form of Curriculum Credits）

1.学分统计表（Credits Registration Form）

课程类别 Course Category	课程要求 Requirement			学分 Credits	学时 Academic Hours		备注 Remarks	
公共基础课 General Basic Courses	必修 Compulsory			51.5	1012			
	通识 General Education			10	160			
专业基础课 Specialty Basic Courses	必修 Compulsory			42	760			
选修课 Elective Courses	选修 Elective			21.5	440			
合 计 Total				125	2372			
集中实践教学环节 Practice Training	必修 Compulsory			26	38 周 Weeks			
毕业学分要求 Credits Required for Graduation	125+26 =151							
建议每学期修读学分 Suggested Credits for Each Semester	1	2	3	4	5	6	7	8
	23.5	24	25.5	18	16	15	17	12

备注：学生毕业时须修满专业教学计划规定学分，并取得第二课堂 5 个人文素质教育学分和 4 个创新能力培养学分。

2.类别统计表（Category Registration Form）

学时 Academic Hours					学分 Credits						
总学时数 Total	其中 Include		其中 Include		总学分数 Total	其中 Include		其中 Include			其中 Include
	必修学时 Compulsory	选修学时 Elective	理论教学学时 Theory Course	实验教学学时 Lab		必修学分 Compulsory	选修学分 Elective	集中实践教学环节学分 Practice	理论教学学分 Theory Course	实验教学学分 Lab	创新创业教育学分 Innovation and Entrepreneurship Education
2372	1932	440	1702	670	151	129.5	21.5	26	105	20	2

备注：1.通识课计入选修一项中；
2.实验教学包括“专业教学计划表”中的实验、实习和其它；
3.创新创业教育学分：培养计划中的课程，由各院系教学指导委员会认定，包括竞教结合课程、创新实践课程、创业教育课程等学分；
4.必修学时+选修学时=总学时数；理论教学学时+实验教学学时=总学时数；必修学分+选修学分=总学分数；集中实践教学环节学分+理论教学学分+实验教学学分=总学分数。

二、课程设置表 (Courses Schedule)

类别 Course Category	课程代码 Course No.	课程名称 Course Title	是否必修 C/E	学时数 Total Curriculum Hours					学分 Credits	开课学期 Semester
				总学时 Class Hours	理论 Theoretical class hours	实验 Lab Hours	实习 Practice Hours	其它 Other Hours		
公共基础课 General Basic Courses	031101761	习近平新时代中国特色社会主义思想概论 The Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	必修 /C	48				12	3.0	1
	031101661	思想道德与法治 Ethics and Rule of Law		40				4	2.5	2
	031101371	中国近现代史纲要 Skeleton of Chinese Modern History		40				4	2.5	3
	031101424	毛泽东思想和中国特色社会主义理论体系概论 Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics		40				4	2.5	4
	031101522	马克思主义基本原理 Analysis of the Situation & Policy		40				4	2.5	4
	031101331	形势与政策 Analysis of the Situation & Policy		64					2.0	1-8
	EMP040100011	工程数学：微积分 II (一) Engineering Math: Calculus (1)		80					5.0	1
	EMP040100021	工程数学：线性代数与解析几何 Engineering Math: Linear Algebra & Analytic Geometry		48					3.0	1
	EMP040100012	工程数学：微积分 II (二) Engineering Math: Calculus (2)		80					5.0	2
	EMP040100031	工程数学：概率论与数理统计 Engineering Math: Probability & Mathematical Statistics		48					3.0	2
	AIP045100011	人工智能 I：大学计算机基础 Artificial Intelligence I: Fundamentals of Computer		32				32	0	1
	AIP045100031	人工智能 II：Python 编程基础 Artificial Intelligence II: Fundamentals of Python Programming		48				16	2.5	1
	044104182	学术英语与科技交流 (一) EAP and Technical Communication (1)		32					2.0	1
	044104192	学术英语与科技交流 (二) EAP and Technical Communication (2)		32					2.0	2
	052100332	体育 (一) Physical Education (1)		36				36	1.0	1
	052100012	体育 (二) Physical Education (2)		36				36	1.0	2
	052100842	体育 (三) Physical Education (3)		36				36	1.0	3
	052100062	体育 (四) Physical Education (4)		36				36	1.0	4

	006100112	军事理论 Military Principle		36				18	2.0	2
	041100582	大学物理 I (一) General Physics I (1)		48					3.0	2
	041101391	大学物理 I (二) General Physics I (2)		48					3.0	3
	041100671	大学物理实验 (一) Physics Experiment (1)		32		32			1.0	2
	041101051	大学物理实验 (二) Physics Experiment (2)		32		32			1.0	3
		人文科学、社会科学领域 Humanities, Social Science	通识	128					8.0	
		科学技术领域 Science and Technology	/E	32					2.0	
	合 计 Total			1172					61.5	

备注：学时中其它可以为上机和实践学时。

通识课要求：

- 1.开设党史、新中国史、改革开放史、社会主义发展史等“四史”通识课程，全校本科生从“四史”中选择一门必修；
- 2.学生不能修读本学院开设的通识课程（除在本学院跨学科修读外）；
- 3.除艺术类的学生外，每位学生须修满2学分的公共艺术通识课程，其中美学和艺术史论类、艺术鉴赏和评论类课程至少取得1个学分。

二、课程设置表（续）（Courses Schedule）

类别 Course Category	课程代码 Course No.	课程名称 Course Title	是否必修 C/E	学时数 Total Curriculum Hours					学分 Credits	开课学期 Semester
				总学时 Class Hours	理论 Theoretical class hours	实验 Lab Hours	实习 Practice Hours	其它 Other Hours		
专业基础课 Specialty Basic Courses	081100551	生物医学工程与人类健康 Biomedical Engineering and Human Health	必/C	16					1.0	1
	081100481	生物医学工程探索与设计 Exploration and Design of Biomedical Engineering	必/C	48		32			2.0	2
	AIS081100011	人工智能 III: 人工智能与深度学习 Artificial Intelligence III: Artificial Intelligence and Deep Learning	必/C	40					2.5	2
	FCS081100011	基础化学 I: 无机分析化学 Fundamentals of Chemistry I: Inorganic and Analytic Chemistry	必/C	48					3.0	1
	FCS081100012	基础化学 I: 无机分析化学实验 Fundamentals of Chemistry I: Experiment of Inorganic and Analytic Chemistry	必/C	32		32			1.0	1
	FCS081100021	基础化学 II: 有机化学 II Fundamentals of Chemistry II: Organic Chemistry II	必/C	64					4.0	3
	FCS081100022	基础化学 II: 有机化学实验 II Fundamentals of Chemistry II: Experiment of Organic Chemistry II	必/C	48		48			1.5	3
	FBS081100011	生物医学基础 I: 细胞生物学	必	64					4.0	3



		Fundamentals of Biomedicine I: Cell Biology	/C							
	FBS081100012	生物医学基础 I: 细胞生物学实验 Fundamentals of Biomedicine I: Cell Biology Experiments	必 /C	16		16			0.5	3
	FBS081100021	生物医学基础 II: 生物化学 Fundamentals of Biomedicine II: Biochemistry	必 /C	48					3.0	5
	FBS081100022	生物医学基础 II: 生物化学实验 Fundamentals of Biomedicine II: Biochemistry Experiments	必 /C	16		16			0.5	5
	FBS081100031	生物医学基础 III: 生物力学 Fundamentals of Biomedicine III: Biomechanics	必 /C	32					2.0	6
	081100341	生物材料科学基础 Fundamental Science of Biomaterials	必 /C	64					4.0	4
	IMS081100011	智能医学工程基础 I: 电路与电子技术 Fundamentals of Intelligent Medical Engineering I: Electric Circuit and Electronics	必 /C	64					4.0	3
	IMS081100012	智能医学工程基础 I: 电路与电子技术实验 Fundamentals of Intelligent Medical Engineering I: Experiment of Electric Circuit and Electronics	必 /C	32		32			1.0	3
	IMS081100021	智能医学工程基础 II: 生物医学信号与系统 Fundamentals of Intelligent Medical Engineering II: Biomedical Signal and System	必 /C	64					4.0	4
	IMS081100031	智能医学工程基础 III: 智能医学图像分析 Fundamentals of Intelligent Medical Engineering III: Intelligent Medical Image Analysis	必 /C	32					2.0	5
	081100581	生物医学工程创新与创业 Innovation & Entrepreneurship in Biomedical Engineering	必 /C	16					1.0	6
	081100131	生物医学工程职业规划与个人发展 Biomedical Engineering Career Planning and Personal Development	必 /C	16					1.0	7
	合 计 Total		必 /C	760					42	
选修课 Elective Courses	生物材料与组织工程模块 Biomaterials and Tissue Engineering Module									
	081100541	解剖学 Anatomy	选 /E	16					1.0	4
	081100531	生理学 Physiology	选 /E	32					2.0	4
	081100511	生理学实验 Physiology Experiments	选 /E	32		32			1.0	4
	081100381	国际交流与科研 International Exchange and Research	选 /E	16					1.0	4

081100691	癌症生物学 Cancer Biology	选 /E	32					2.0	4
081100401	分子生物学 Molecular Biology	选 /E	32					2.0	5
081100411	分子生物学实验 Molecular Biology	选 /E	32		32			1.0	5
081100091	组织工程学和人工器官 Tissue Engineering and Artificial Organs	选 /E	32					2.0	5
081100071	高分子物理与化学 Chemistry and Physics of Polymers	选 /E	48					3.0	5
081100081	高分子物理与化学实验 Experiment of Chemistry and Physics of Polymers	选 /E	32		32			1.0	5
081100061	生物医学伦理 Biomedical Ethics	选 /E	16					1.0	6
081100421	微生物与免疫学 Microorganism and Immunology	选 /E	32					2.0	6
081100701	高等生物材料分析技术 I Advanced Biomaterial Analysis Technology I	选 /E	32					2.0	6
081100702	高等生物材料分析技术 II Advanced Biomaterial Analysis Technology II	选 /E	32		32			1.0	7
081100711	生物大分子药物 Biomacromolecule Drugs	选 /E	32					2.0	7
081100731	纳米医学 Nanomedicine	选 /E	32					2.0	7
081100101	生物材料表界面工程 Surface Engineering of Biological Materials	选 /E	32					2.0	8
医学影像与诊断模块 Medical Imaging and Diagnosis Module									
081100541	解剖学 Anatomy	选 /E	16					1.0	4
081100531	生理学 Physiology	选 /E	32					2.0	4
081100511	生理学实验 Physiology Experiments	选 /E	32		32			1.0	4
081100381	国际交流与科研 International Exchange and Research	选 /E	16					1.0	4
081100691	癌症生物学 Cancer Biology	选 /E	32					2.0	4
081100401	分子生物学 Molecular Biology	选 /E	32					2.0	5
081100411	分子生物学实验 Molecular Biology	选 /E	32		32			1.0	5
081100741	医疗器械监管科学 Medical Device Regulatory Science	选	32					2.0	6

			/E							
081100061	生物医学伦理 Biomedical Ethics	选 /E	16					1.0	6	
081100191	医学传感器原理及应用 Principle and Application of Medical Sensor	选 /E	32					2.0	6	
081100201	医学传感器原理及应用课程设计 Course Project of Principle and Application of Medical Sensor	选 /E	32		32			1.0	6	
081100421	微生物与免疫学 Microorganism and Immunology	选 /E	32					2.0	6	
081100751	生物医学检测与诊断技术 Biomedical Testing and Diagnostics	选 /E	16					1.0	7	
081100761	分子影像学 Molecular Imaging	选 /E	32					2.0	7	
081100771	神经科学 Neuroscience	选 /E	32					2.0	7	
081100781	大数据与数据挖掘 Big Data and Data Mining	选 /E	32					2.0	7	
081100791	计算神经科学 Computational Neuroscience	选 /E	32					2.0	8	
081100801	生物医学仪器原理与仿真操作 Principles and Simulation Operations of Biomedical Instruments	选 /E	32		32			1.0	8	
其他										
081100811	跨学院选修课 I Interdisciplinary Elective Courses I	选 /E	32					2.0	1-8	
081100821	跨学院选修课 II Interdisciplinary Elective Courses II	选 /E	32					2.0	1-8	
020100051	创新研究训练 Innovation Research Training	选 /E	32					2.0	7	
020100041	创新研究实践 I Innovation Research Practice I	选 /E	32					2.0	7	
020100031	创新研究实践 II Innovation Research Practice II	选 /E	32					2.0	7	
020100061	创业实践 Entrepreneurial Practice	选 /E	32					2.0	7	
合 计 Total			选 /E	选修课修读最低要求 21.5 学分 Minimum elective course credits required: 21.5						

备注：1.学时中其它可以为上机和实践学时。

2.“生物材料与组织工程”“医学影像与诊断”任一模块修读最低要求 16 学分。

3.学生根据自己开展科研训练项目、学科竞赛、发表论文、获得专利和自主创业等情况申请折算为一定的专业选修课学分（创新研究训练、创新研究实践 I、创新研究实践 II、创业实践等创新创业课程）。每个学生累计申请为专业选修课总学分不超过 4 个学分。经学校批准认定为选修课学分的项目、竞赛等不再获得对应第二课堂的创新学分。

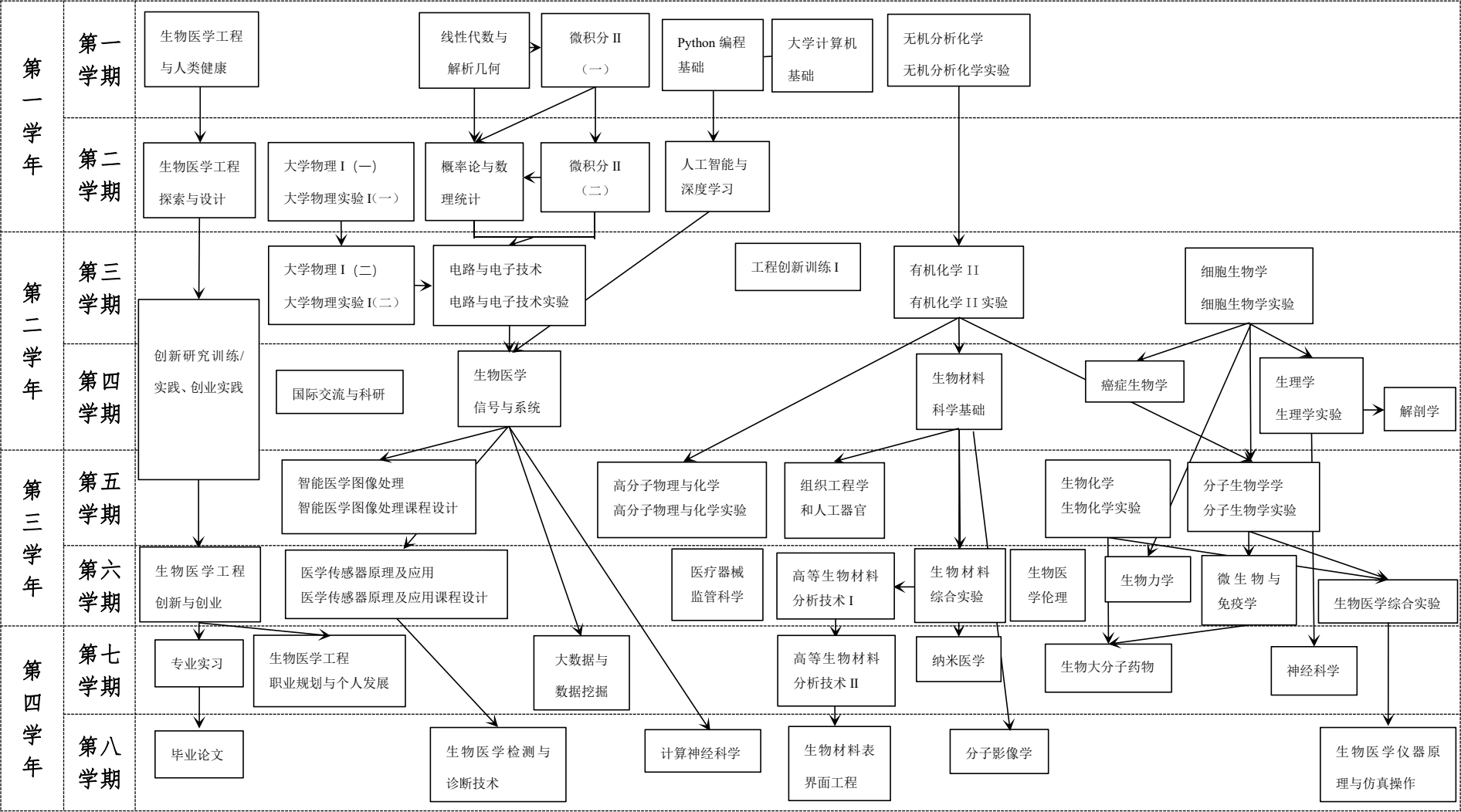
4.学生修读跨学院课程（以教务处公布名单为准），已修读课程学分等于或高于 2 学分的，可以申请认定

为一定的专业选修课学分。每个学生累计申请为专业选修课总学分不超过 4 个学分。

三、集中实践教学环节 (Practice-concentrated Training)

课 程 代 码 Course No.	课 程 名 称 Course Title	是否必 修 C/E	学 时 数 Total Curriculum Hours		学分数 Credits	开课学期 Semester
			实践 Practice weeks	授课 Lecture Hours		
006100151	军事技能 Military Training	必/C	2 周 2 weeks		2.0	1
031101551	马克思主义理论与实践 Marxism Theory and Practice	必/C	2 周 2 weeks		2.0	3
067101782	工程创新训练 I Engineering Innovation Training I	必/C	1 周 1 week		1.0	3
IMS081100032	智能医学工程基础 III: 智能医学 图像分析课程设计 Fundamentals of Intelligent Medical Engineering III : Course Project of Intelligent Medical Image Analysis	必/C	1 周 1 week		1.0	5
081100241	生物材料综合实验 Comprehensive Experiments of Biomaterials	必/C	2 周 2 weeks		2.0	6
081100231	生物医学综合实验 Comprehensive Experiments of Biomedical Science	必/C	2 周 2 weeks		2.0	6
081100621	专业实习 Major Internship	必/C	12 周 12 weeks		6.0	6-7
081100441	毕业设计 (论文) Graduation Project (Thesis)	必/C	16 周 16 weeks		10.0	7-8
合 计 Total		必/C	38 周 38 weeks		26	

四、课程地图（Curriculum Mapping）



五、课程体系与毕业要求关系矩阵（Relation Matrix between Curriculum System and Student Outcomes）

序号 No	课程名 Course Title	生物医学工程专业毕业要求 Biomedical Engineering Major Student Outcomes										
		1	2	3	4	5	6	7	8	9	10	11
1	思想道德与法治 Ethics and Rule of Law			●			●	●				
2	习近平新时代中国特色社会主义思想概论 The Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era						●	●				
3	中国近现代史纲要 Skeleton of Chinese Modern History							●		●		
4	毛泽东思想和中国特色社会主义理论体系概论 Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics						●	●				
5	马克思主义基本原理 Fundamentals of Marxism Principle							●				
6	形势与政策 Analysis of the Situation & Policy							●		●		●
7	学术英语与科技交流（一） EAP and Technical Communication (1)									●		
8	学术英语与科技交流（二） EAP and Technical Communication (2)									●		
9	体育（一） Physical Education (1)							●				●
10	体育（二） Physical Education (2)							●				●
11	体育（三） Physical Education (3)							●				●
12	体育（四） Physical Education (4)							●				●

13	军事理论 Military Principle							•	•			
14	微积分 II (一) Calculus (1)	•	•									
15	线性代数与解析几何 Linear Algebra & Analytic Geometry	•	•									
16	微积分 II (二) Calculus (2)	•	•									
17	概率论与数理统计 Probability & Mathematical Statistics	•	•									
18	人工智能 I: 大学计算机基础 Artificial Intelligence I: Fundamentals of Computer					•						
19	人工智能 II: Python 编程基础 Artificial Intelligence II: Fundamentals of Python Programming	•	•			•						
20	大学物理 I (一) General Physics I (1)	•	•									
21	大学物理 I (二) General Physics I (2)	•	•									
22	大学物理实验 (一) Physics Experiment (1)	•	•		•							
23	大学物理实验 (二) Physics Experiment (2)	•	•		•							
24	生物医学工程与人类健康 Biomedical Engineering and Human Health						•					•
25	生物医学工程探索与设计 Exploration and Design of Biomedical Engineering		•	•	•				•	•	•	
26	人工智能 III: 人工智能与深度学习 Artificial Intelligence III: Artificial Intelligence and Deep Learning			•		•						
27	基础化学 I: 无机分析化学 Fundamentals of Chemistry I: Inorganic and Analytic Chemistry	•	•									
28	基础化学 I: 无机分析化学实验 Fundamentals of Chemistry I: Experiment of Inorganic and Analytic Chemistry				•	•						

29	基础化学 II: 有机化学 II Fundamentals of Chemistry II: Organic Chemistry II	●	●									
30	基础化学 II: 有机化学实验 II Fundamentals of Chemistry II: Experiment of Organic Chemistry II				●	●						
31	生物医学基础 I: 细胞生物学 Fundamentals of Biomedicine I: Cell Biology	●	●									
32	生物医学基础 I: 细胞生物学实验 Fundamentals of Biomedicine I: Cell Biology Experiments				●	●						
33	生物医学基础 II: 生物力学 Fundamentals of Biomedicine II: Biomechanics	●	●									
34	生物医学基础 III: 生物化学 Fundamentals of Biomedicine III: Biochemistry	●	●									
35	生物医学基础 III: 生物化学实验 Fundamentals of Biomedicine III: Biochemistry Experiments				●	●						
36	生物材料科学基础 Fundamental Science of Biomaterials	●	●									
37	智能医学工程基础 I: 电路与电子技术 Fundamentals of Intelligent Medical Engineering I: Electric Circuit and Electronics Technology	●	●									
38	智能医学工程基础 I: 电路与电子技术实验 Fundamentals of Intelligent Medical Engineering I: Experiment of Electric Circuit and Electronics				●	●			●			
39	智能医学工程基础 II: 生物医学信号与系统 Fundamentals of Intelligent Medical Engineering II: Biomedical Signal and System	●	●	●								
40	智能医学工程基础 III: 智能医学图像分析 Fundamentals of Intelligent Medical Engineering III: Intelligent Medical Image Analysis			●	●	●						
41	智能医学工程基础 III: 智能医学图像分析课程设计 Fundamentals of Intelligent Medical Engineering III: Course Project of Intelligent Medical Image Analysis			●		●				●		
42	生物医学工程创新与创业 Innovation & Entrepreneurship in Biomedical Engineering			●				●	●	●		
43	生物医学工程职业规划与个人发展 Biomedical Engineering Career Planning and Personal						●	●				●

	Development											
44	军事技能 Military Training								•			
45	马克思主义理论与实践 Marxism Theory and Practice							•		•		
46	工程创新训练 I Engineering Innovation Training I			•			•	•			•	
47	生物材料综合实验 Comprehensive Experiments of Biomaterials			•	•	•			•	•		
48	生物医学综合实验 Comprehensive Experiments of Biomedical Science			•	•	•			•	•		
49	专业实习 Major Internship			•			•	•			•	
50	毕业设计（论文） Graduation Project (Thesis)		•	•	•	•					•	

六、第二课堂

第二课堂由人文素质教育和创新能力培养两部分组成。

1.人文素质教育基本要求

学生在取得专业教学计划规定学分的同时，还应结合自己的兴趣适当参加课外人文素质教育活动，参加活动的学分累计不少于 5 个学分。其中，大学体育教学团队开设课外体育课程，高年级本科生必修，72 学时，1 学分，纳入第二课堂人文素质教育学分。大学生心理健康教育，2 学分，虚拟第三学期开设，纳入第二课堂人文素质教育学分。

2.创新能力培养基本要求

学生在取得本专业教学计划规定学分的同时，至少参加一项国家创新创业训练计划、广东省创新创业训练计划、SRP（学生研究计划）、百步梯攀登计划或各类课外创新能力培养活动（如学科竞赛等）。学生参加上述活动及创新能力培养相关学术讲座所获学分累计不少于 4 个学分。

6. Second Classroom Activities

“Second Classroom” Activities are comprised of two parts, Humanities Quality Education and Innovative Ability Cultivation.

(1) Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one's subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one's interest, acquiring no less than five credits. The advanced undergraduates must complete one of courses of Humanities Quality Education which has seventy-two class hours (it's equivalent to one credit which belongs to Humanities Quality Education Credit of Extracurricular Class) offered by the College Physical Education Teaching Group. Mental Health Education for College Students (2 credits) is opened in virtual third semester which belongs to Humanities Quality Education Credit of Extracurricular Class.

(2) Basic Requirements of Innovative Ability Cultivation

Besides gaining course credits listed in one's subject teaching curriculum, a student is required to participate in any one of the following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities of Innovative Ability Cultivation that last a certain period of time (e.g. subject contests, academic lectures), acquiring no less than four credits.