

# 生物医学工程

## Biomedical Engineering

专业代码: 082601

学 制: 4 年

Program Code:082601

Duration: 4years

### 培养目标:

培养具有良好的人文科学素养, 具有社会责任感和职业道德, 适应社会与经济发展需要, 较系统地掌握专业基础知识(数、理、化、生、医), 以及生物医学材料学或生物医学电子学的基本理论和基本技能, 具备坚实的专业知识与生物医学工程多学科交叉的知识体系结构, 具有综合分析和解决问题的能力、实践技能和创新能力, 能够在生物医学工程相关领域从事科研、设计、技术开发和管理的优秀人才。

### Educational Objectives:

To cultivate undergraduates with a good humanities and scientific literacy, social responsibility and professional ethics, to meet the needs of social and economic development, a more systematic grasp of professional knowledge (mathematics, physics chemistry, biology and medicine), and the basic theory and basic skills in biomedical materials or biomedical electronic, with solid professional knowledge and multidisciplinary knowledge structure, the ability in comprehensive analysis and problem-solving, practice skill, and the creative ability. The graduate will have the opportunity in scientific research, technology development, engineering and management in related fields of biomedical engineering.

### 毕业要求

№1. (工程知识) 掌握扎实的基础知识、专业基本原理、方法和手段, 能够将数学、自然科学、工程基础和专业知用于解决复杂工程问题。

№1.1 掌握数学及相关领域的基础理论知识, 为解决复杂工程问题奠定坚实的理论基础。

№1.2 掌握物理、化学、电子、生物、医学相关领域的基础理论知识, 为解决复杂工程问题奠定坚实的理论基础。

№1.3 掌握工程基础及相关领域的基础理论知识, 为解决复杂工程问题奠定坚实的理论基础。

№1.4 掌握专业基础及相关领域的基础理论知识, 为解决复杂工程问题奠定坚实的理论基础。

№1.5 掌握工程基础及相关领域的基础理论知识, 为解决复杂工程问题奠定坚实的理论基础。

№2. (问题分析) 能够应用数学、自然科学和工程科学的基本原理, 识别、表达、并通过文献研究分析复杂工程问题, 以获得有效结论。

№2.1 能够应用数学基础知识, 识别、表达、研究分析复杂工程问题。

№2.2 能够应用自然科学基础知识, 识别、表达、研究分析复杂工程问题。

№2.3 能够应用专业基础知识, 识别、表达、研究分析复杂工程问题。

№2.4 能够应用工程基础知识, 识别、表达、研究分析复杂工程问题。

№2.5 能够通过多种途径获取知识，识别、表达、并通过文献研究分析复杂工程问题。

№3.（设计/开发解决方案）能够设计针对复杂工程问题的解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

№3.1 掌握设计针对复杂工程问题的解决方案的从事专业工程工作所必须的专业基础知识。

№3.2 掌握设计针对复杂工程问题的解决方案的从事专业工程工作所必须的专业核心知识。

№3.3 掌握设计针对复杂工程问题的解决方案的从事专业工程工作所必须的工程基本技能知识与工程实践技能。

№3.4 掌握设计针对复杂工程问题的解决方案的从事专业工程工作所必须的专业工程基本技能。

№3.5 掌握设计针对复杂工程问题的解决方案的从事专业工程工作所必须的专业基本实践技能。

№3.6 掌握设计针对复杂工程问题的解决方案的从事专业工程工作所必须的专业综合研究技能。

№3.7 了解专业现状、发展前沿与趋势。

№4.（研究）能够基于科学原理并采用科学方法对复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

№4.1 掌握基于科学原理并采用科学方法对复杂工程问题进行研究的基本理论。

№4.2 掌握基于科学原理并采用科学方法对复杂工程问题进行分析研究的技能。

№4.3 掌握基于科学原理并采用科学方法对复杂工程问题进行研究对实验结果具有整理、归纳和分析的能力。

№4.4 掌握基于科学原理并采用科学方法对复杂工程问题进行研究所必需的实验设计和研究能力，对实验内容有全面的认识 and 了解。

№5.（使用现代工具）能够针对复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。

№5.1 掌握计算机、电子信息等方面的技术和相关工具。

№5.2 开发、选择与使用现代工程工具和信息技术工具，对复杂工程问题进行分析、预测与模拟。

№6.（工程与社会）能够基于工程相关背景知识进行合理分析，评价专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

№6.1 掌握将工程相关背景知识用于工程技术问题分析及解决方案制定的基本知识。

№6.2 掌握将工程相关背景知识用于工程技术问题分析及解决方案制定的基本技能。

№6.3 评价专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响。

№7.（环境和可持续发展）能够理解和评价针对复杂工程问题的专业工程实践对环境、社会可持续发展的影响。

№7.1 理解针对复杂工程问题的专业工程实践对环境、社会可持续发展的影响。

№7.2 掌握针对复杂工程问题的专业工程实践对环境、社会可持续发展的影响的评价方法。

№8.（职业规范）具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。

№8.1 具备良好的人文社会科学素养与高度社会责任感。

№8.2 在工程实践中理解并遵守工程职业道德和规范。

№9.（个人和团队）能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

№9.1 培养在多学科背景下团队中个体的责任意识与奉献精神。

№9.2 培养在多学科背景下团队中的沟通、协作能力与团队精神。

№9.3 培养在多学科背景下团队中的规划、协调、管理和引领能力。

№10. (沟通) 能够就复杂工程问题与业界同行及社会公众进行有效沟通和交流, 包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野, 能够在跨文化背景下进行沟通和交流。

№10.1 培养有效交流与沟通的技能(撰写报告和设计文稿、陈述发言、清晰表达或回应指令)。

№10.2 培养专业领域知识发展相关的国际化视野。

№10.3 培养多学科、跨文化背景下的沟通交流技术及实践能力。

№11. (项目管理) 理解并掌握工程管理原理与经济决策方法, 并能在多学科环境中应用。

№11.1 掌握工程管理的基本原理和方法。

№11.2 掌握工程中的经济决策的基本理论与方法。

№11.3 掌握将工程原理与经济决策方法, 应用于多学科环境的实践技能。

№12. (终身学习) 具有自主学习和终身学习的意识, 有不断学习和适应发展的能力。

№12.1 具有自主学习和终身学习的意识, 掌握自我评价的方法。

№12.2 具有不断提高自身人文素养的意识, 掌握学习方法与技能。

№12.3 具有不断提高自身专业素养的意识, 掌握学习方法与技能。

## **Student Outcomes:**

**№1. Engineering Knowledge: An ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to the solution of complex engineering problems.**

№1.1 Master the basic theoretical knowledge of mathematics and related fields, and lay a solid theoretical foundation for solving complex engineering problems.

№1.2 Master the basic theoretical knowledge of physics, chemistry, electronics, biology and medicine related fields, and lay a solid theoretical foundation for solving complex engineering problems.

№1.3 Master the basic theoretical knowledge of engineering related fields, and lay a solid theoretical foundation for solving complex engineering problems.

№1.4 Master the basic theoretical knowledge of biomedical engineering and related fields, and lay a solid theoretical foundation for solving complex engineering problems.

**№2. Problem Analysis: An ability to identify, formulate and analyze complex engineering problems, reaching to substantiated conclusions using basic principles of mathematics, science, and engineering.**

№ 2.1 Apply basic principles of mathematics to identify, formulate and analyze complex engineering problems.

№ 2.2 Apply basic principles of science to identify, formulate and analyze complex engineering problems.

№ 2.3 Apply basic principles of biomedical engineering to identify, formulate and analyze complex

engineering problems.

№ 2.4 Apply basic principles of engineering to identify, formulate and analyze complex engineering problems.

**№3. Design / Development Solutions: An ability to design solutions for complex engineering problems and innovatively design systems, components or process that meet specific needs with societal, public health, safety, legal, cultural and environmental considerations.**

№ 3.1 Master the necessary basic knowledge to design professional solutions for complex engineering problems.

№ 3.2 Master the necessary core knowledge to design professional solutions for complex engineering problems.

№ 3.3 Master the basic skills knowledge and engineering practice skills necessary for professional engineering work to design solutions for complex engineering problems..

№ 3.4 Master the necessary basic skills of biomedical engineering for professional engineering work to design solutions for complex engineering problems.

№ 3.5 Master the necessary basic practical skills for professional engineering work to design solutions for complex engineering problems..

№ 3.6 Master the necessary basic skills of professional comprehensive research for professional engineering work to design solutions for complex engineering problems.

№ 3.7 Understand the status, frontier development and trends.

**№4. Research: An ability to conduct investigations of complex engineering problems based on scientific theories and adopting scientific methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.**

№ 4.1 Master the basic theory of scientific research based on scientific principles and the use of scientific methods to explore complex engineering problems.

№ 4.2 Master the scientific principles and the use of scientific methods for analysis and research skills on complex engineering problems.

№ 4.3 Master the scientific principles and the use of scientific methods to explore the complex engineering problems, possess the ability to organize, summarize and analyze the experimental results.

№ 4.4 Master the scientific principles and the use of scientific methods to solve the complex engineering issues for experimental design and research capabilities, has a comprehensive understanding of experiments.

**№5. Applying Modern Tools: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.**

№ 5.1 Master technology and related tools in computer, electronic information.

№ 5.2 Develop, select and use modern tools in engineering and information technology to analyze, predict

and simulate complex engineering problems.

**№6. Engineering and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.**

№ 6.1 Master the background knowledge for analysis and solution on engineering and technical problem.

№ 6.2 Master the basic skills for analysis and solution on engineering and technical problem.

№ 6.3 Evaluate the impact of professional engineering practices and complex engineering problem solutions on society, health, safety, law and culture.

**№7. Environment and Sustainable Development: An ability to understand and evaluate the impact of professional engineering solutions in environmental and societal contexts and demonstrate knowledge of and need for sustainable development.**

№ 7.1 Understand the impact of professional engineering practice in environmental and social sustainable development.

№ 7.2 Master the evaluation methods of the impact of professional engineering practice in environmental and social sustainable development.

**№ 8. Professional Standards: An understanding of humanity science and social responsibility, being able to understand and abide by professional ethics and standards responsibly in engineering practice.**

№ 8.1 Posses the humanity science and social responsibility

№ 8.2 Understand and abide by professional ethics and standards responsibly in engineering practice.

**№ 9. Individual and Teams: An ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.**

№ 9.1 Cultivate the responsibility and dedication spirit of the individual in diverse teams and in multi-disciplinary settings.

№ 9.2 Cultivate the responsibility and dedication spirit of the individual in diverse teams and in multi-disciplinary settings.

№ 9.3 Develop the ability in communication, collaboration and teamwork in multi-disciplinary settings.

**№10. Communication: An ability to communicate effectively on complex engineering problems with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions, and communicate in cross-cultural contexts with international perspective.**

№ 10.1 Cultivate skills on effective communication (write effective reports and design documentation, make effective presentations, give and receive clear instructions)

№ 10.2 Cultivate the international perspective of knowledge development in the field of major.

№ 10.3 Cultivate the skills on communication and practice in cross-cultural contexts and cross-cultural contexts.

№ 11. Project Management: Demonstrate knowledge and understanding of engineering management principles and methods of economic decision-making, to function in multidisciplinary environments.

№ 11.1 Master the basic principles and methods in engineering management.

№ 11.2 Master the basic theory and methods of economic decision-making.

№ 11.3 Master the practical skills to apply engineering principles and economic decision-making methods in multidisciplinary environment.

**№ 12. Lifelong Learning: A recognition of the need for, and an ability to engage in independent and life-long learning with the ability to learn continuously and adapt to new developments.**

№ 12.1 Have the awareness of independent and life-long learning, master the self-evaluation method.

№ 12.2 Have awareness in continuous improvement of their own humanistic, master learning methods and skills.

№ 12.3 Have awareness in continuous improvement of their own professionalism, master learning methods and skills.

## **专业简介**

生物医学工程学科始建于20世纪九十年代，是我校“985工程”和“211工程”的重点建设学科专业，拥有生物医学工程本科、硕士、博士、博士后的完整人才培养体系，2002年设置本科专业并招收首届本科生。本专业拥有一支积极向上、年龄与知识结构合理、教学与科研水平高的教师队伍。依托国家与省部级高水平学科建设平台，建立了12个先进规范的人才培养与科学研究实验室，并与行业骨干企业与医疗机构共同建立了多个实践与创新创业基地。潜心培养优秀专业人才、培育优秀教学与科研成果，力争将生物医学工程建设成为一级学科国家重点学科。

## **Program Profile:**

Biomedical engineering discipline was founded in the 90s of the 20th century, it is key construction disciplines supported by the "985 project" and "211 project", with complete education system including undergraduate, master, doctorate and postdoctoral cultivation, and the undergraduate education began in 2002.

There are a positive group with reasonable age distribution and knowledge structure, high level in either teaching or research, including 24 senior titles, 9 doctoral tutors, 1 Chinese Academy of Engineering (CAE) academician, 2 lifetime members (fellows) of international society biomedical materials and engineering, 2 Pearl River scholars, and 5 talents of the Ministry of Education in new century.

Relying on the high level platforms supported by Ministry of Science and Technology, Guangdong province and Ministry of Education, established 12 advanced education and scientific research laboratories, establish a number of practical and innovative bases collaborated with the outstanding enterprises and medical institutions, devote great efforts to cultivate outstanding professionals, perform excellent teaching and scientific research, and aims to facilitate biomedical engineering into the national key disciplines with

top level.

## 专业特色

注重“深厚”基础理论与知识，体现生物、医学、工程等学科交叉渗透的“宽”知识体系结构；依托国家及省部级高水平科研平台，重点围绕生物医学材料与生物医学电子两个核心方向，密切跟踪学科前沿、以高水平科研带动优质教学，与行业产业密切联系，强化学生的自我学习、综合分析问题与实践能力；学生从低年级开始实行导师制，有机会参与高水平的科研项目，利用工程学方法解决医疗与人类健康问题；与国外一流高校联合培养国际化人才，着力培养学生的“创新、创造与创业”能力与国际化视野。

## Program Features:

Emphasize on "strong" basic theory and knowledge, reflecting "wide" multi-disciplinary knowledge system in combination with biological, medical, engineering and other disciplines. Relying on the high level platforms supported by Ministry of Science and Technology, Guangdong province and Ministry of Education, Focus on two core areas such as biomedical materials and biomedical electronics, track the frontiers and development, high-level scientific research promotes quality teaching, and closely collaborate with enterprises and hospital, improve the ability in self-learning, comprehensive analysis of problems and practice for undergraduates. Provides a broad pathway for students to pursue a wide variety of research opportunities to participate in high-level research projects, and apply engineering methods to solve problems in medical and human health. Collaborate with foreign first-class colleges and universities to cultivate international talents, focus on the ability of "innovation, creativity and entrepreneurship" and international perspective

**授予学位：**工学学士学位

**Degree Conferred:** Bachelor of Engineering

## 主干课程

**生物医学材料方向：**高分子材料学、无机材料科学基础、材料现代测试方法、生物化学与分子生物学、细胞生物学、解剖与生理学、生物医学工程导论、生物医学工程与人类健康、组织工程概论、生物医用高分子材料、材料工艺原理、生物力学。

**生物医学电子方向：**电路、模拟电子技术、数字电子技术、信号与系统、数字信号处理、微机原理及应用、解剖与生理学、生物医学工程导论、生物医学工程与人类健康、医学仪器设计、医学传感器原理及应用、医学图像处理、计算神经科学基础。

## Core Courses:

**Biomedical material:**

Polymer Materials Science, Fundamental of Inorganic Materials Science, Modern Testing Methods for Materials, Biochemistry and Molecular Biology, Cell Biology, Anatomy and Physiology, Introduction to Biomedical Engineering, Biomedical Engineering and Human Health, Introduction to Tissue Engineering, Biomedical Polymer Materials, Materials Process Principle, Polymer Material Processing Foundation, Biomaterial Surface Engineering, Bio-Micro fabrication and Applications, Biomechanics.

### **Biomedical electronics:**

Electric Circuits, Analog Electronics, Digital Electronics, Signal and System, Digital Signal Processing, Principles and Applications of Microcomputer, Anatomy and Physiology, Introduction to Biomedical Engineering, Biomedical Engineering and Human Health, Medical Instrument Design, Principle and Application of Medical Sensor, Medical Imaging, Medical Image Processing, Biomechanics, Physiological System Modeling and Simulation, Computational Neuroscience.

### **特色课程**

全英语教学课程：生物力学、Matlab 分析与建模

双语教学课程：医学图像处理、生物化学与分子生物学

研究型课程：医学图像处理、医学仪器设计、计算神经科学基础、生物微加工和生物芯片

新生研讨课：生物医学工程与人类健康

竞教结合课程：生物医学工程创新与竞赛

创业教育课程：生物医学工程创新与创业

### **Featured Courses:**

**Courses Taught in English:** Biomechanics, Matlab Analysis and Modeling

**Bilingual Courses:** Biochemistry and Molecular Biology, Medical Image Processing

**Research Courses:** Medical Image Processing, Medical Instrument Design, Computational Neuroscience, Bio-Micro fabrication and its Applications

**Freshmen Seminars:** Biomedical Engineering and Human Health

**Contest-Teaching Integrated Courses:** Innovation & Contest in Biomedical Engineering

**Entrepreneurship Courses:** Innovation & Entrepreneurship in Biomedical Engineering



# 生物医学材料方向

## 一、教学计划总体安排表 (General Teaching Schedule)

| 学<br>年    | 学<br>期 | 教 学 进 度 安 排 ( 周 ) |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |     |    | 理<br>论<br>教<br>学 | 考<br>试 | 入<br>学<br>教<br>育 | 军<br>训 | 课<br>程<br>设<br>计 | 大<br>作<br>业 | 工<br>程<br>训<br>练 | 电<br>子<br>实<br>习 | 综<br>合<br>实<br>验 | 社<br>会<br>实<br>践 | 生<br>产<br>实<br>习 | 毕<br>业<br>实<br>习 | 其<br>它<br>实<br>习 | 中<br>外<br>合<br>作<br>项<br>目 | 毕<br>业<br>设<br>计 | 就<br>业<br>安<br>排 | 机<br>动 | 假<br>期 | 小<br>计 |    |
|-----------|--------|-------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|-----|----|------------------|--------|------------------|--------|------------------|-------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|----------------------------|------------------|------------------|--------|--------|--------|----|
|           |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18  | 19 |                  |        |                  |        |                  |             |                  |                  |                  |                  |                  |                  |                  |                            |                  |                  |        |        |        | 20 |
|           |        | A                 | B | C | D | E | F | G | H | I | J  | K  | L  | M  | N  | O  | P  | Q  | R   |    |                  |        |                  |        |                  |             |                  |                  |                  |                  |                  |                  |                  |                            |                  |                  |        |        |        |    |
| 一         | 1      |                   | C | A | A | A | A | A | A | A | A  | A  | A  | A  | A  | A  | B  | D  | D   | D  | 14               | 1      | 1                | 3      |                  |             |                  |                  |                  |                  |                  |                  |                  |                            | 19               |                  |        |        |        |    |
|           | 2      | A                 | A | A | A | A | A | A | A | A | A  | A  | A  | A  | A  | A  | Q  | Q  | B   | B  | 16               | 2      |                  |        |                  |             |                  |                  |                  |                  |                  |                  |                  | 2                          | 20               |                  |        |        |        |    |
| 二         | 3      | A                 | A | A | A | A | A | A | A | A | A  | A  | A  | A  | A  | A  | Q  | Q  | B   | B  | 16               | 2      |                  |        |                  |             |                  |                  |                  |                  |                  |                  |                  | 2                          | 20               |                  |        |        |        |    |
|           | 4      | A                 | A | A | A | A | A | A | A | G | G  | A  | A  | A  | A  | A  | Q  | B  | B   | 15 | 2                |        |                  | 2      |                  |             |                  |                  |                  |                  |                  |                  | 1                | 20                         |                  |                  |        |        |        |    |
| 三         | 5      | A                 | A | A | A | A | A | A | A | A | A  | A  | A  | A  | I  | I  | K  | B  | B   | 15 | 2                |        |                  |        |                  | 2           | 1                |                  |                  |                  |                  |                  |                  | 20                         |                  |                  |        |        |        |    |
|           | 6      | A                 | A | A | A | A | A | A | A | A | A  | A  | A  | A  | A  | Q  | Q  | B  | B   | 16 | 2                |        |                  |        |                  |             |                  |                  |                  |                  |                  |                  | 2                | 20                         |                  |                  |        |        |        |    |
| 四         | 7      | A                 | A | A | A | A | A | A | A | A | E  | E  | E  | E  | L  | L  | L  | B  | B   | 11 | 2                |        |                  |        |                  | 4           |                  | 3                |                  |                  |                  |                  |                  | 20                         |                  |                  |        |        |        |    |
|           | 8      | O                 | O | O | O | O | O | O | O | O | O  | O  | O  | O  | O  | O  | Q  | Q  | P   | P  |                  | 14     | 1                | 3      |                  |             | 2                | 6                | 1                | 3                |                  |                  | 16               | 2                          | 2                | 20               |        |        |        |    |
| 合 计 ( 周 ) |        |                   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    | 103 | 14 | 1                | 3      | 5                |        | 4                | 2           |                  |                  |                  |                  | 3                |                  |                  | 16                         | 2                | 9                | 159    |        |        |    |

## 二、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<br>Course Category                   | 课程要求<br>Requirement     | 学分<br>Credits | 学时<br>Academic Hours | 备注<br>Remarks |
|---|-------------------------|---------------|----------------------|---------------|
| 公共基础课<br>General Basic Courses            | 必修<br>Compulsory        | 58.0          | 892                  |               |
|   | 通识<br>General Education | 10.0          | 160                  |               |
| 学科基础课<br>Disciplinary Basic Courses       | 必修<br>Compulsory        | 40.5          | 696                  |               |
|   | 选修<br>Elective          | 0             | 0                    |               |
| 专业领域课<br>Specialty-related Courses        | 必修<br>Compulsory        | 9.0           | 144                  |               |
|   | 选修<br>Elective          | 25.5          | 408                  |               |
| 合 计<br>Total                              |                         | 143.0         | 2300                 |               |
| 集中实践教学环节 (周)<br>Practice Training (Weeks) | 必修<br>Compulsory        | 35.0          | 35 周                 |               |
| 毕业学分要求<br>Credits Required for Graduation | 143.0 + 35.0 = 178.0    |               |                      |               |

备注：学生在取得专业教学计划规定学分的同时，还必须取得第二课堂 2 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<br>Academic Hours |                    |                  |                         |               | 学分<br>Credits |                    |                  |  |                                 |               |   |
|----------------------|--------------------|------------------|-------------------------|---------------|---------------|--------------------|------------------|--|---------------------------------|---------------|---|
| 总学时数<br>Total        | 其中<br>Include      |                  | 其中<br>Include           |               | 总学分数<br>Total | 其中<br>Include      |                  | 其中<br>Include                                |                                 |               | 其中<br>Include   |
|                      | 必修学时<br>Compulsory | 选修学时<br>Elective | 理论教学学时<br>Theory Course | 实验教学学时<br>Lab |               | 必修学分<br>Compulsory | 选修学分<br>Elective | 集中实践教学环节学分<br>Practice-concentrated Training | 理论教学学分<br>Theory Course Credits | 实验教学学分<br>Lab | 创新创业教育学分<br>Innovation and Entrepreneurship Education |
| 2300                 | 1732               | 568              | 2000                    | 300           | 178           | 142.5              | 35.5             | 35   | 134                             | 9.5           | 6   |

### 三、专业教学计划表 (Teaching Schedule)

| 类别<br>Course<br>Category       | 课程<br>代码<br>Course No. | 课程名称<br>Course Title   | 是否<br>必修<br>C/E | 学时数<br>Total Curriculum Hours |   |                    |                         | 学分<br>数<br>Credits | 开课<br>学期<br>Semester | 毕业<br>要求<br>Student<br>Outcomes |
|--------------------------------|------------------------|--|-----------------|-------------------------------|---|--------------------|-------------------------|--------------------|----------------------|---------------------------------|
|                                |                        |  |                 | 总学<br>时<br>Class<br>Hours     | 上机<br>Computer-ai<br>ded Class<br>Hours | 实验<br>Lab<br>Hours | 实践<br>Practice<br>Hours |                    |                      |                                 |
| 公共基础课<br>General Basic Courses | 143091                 | 中国近现代史纲要<br>Skeleton of Chinese Modern History   |                 | (32)<br>24                    |   |                    |                         | 2.0                | 1                    | №8.1                            |
|                                | 143093                 | 思想道德修养与法律基础<br>Cultivation of Thought and Morals & Fundamental of Law                              |                 | (40)<br>(36)                  |   |                    |                         | 2.5                | 2                    | №8.2                            |
|                                | 143090                 | 马克思主义基本原理<br>Fundamentals of Marxism Principle   |                 | (40)<br>36                    |   |                    |                         | 2.5                | 3                    | №8.1                            |
|                                | 143106                 | 毛泽东思想和中国特色社会主义理论体系概论<br>Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics |                 | (80)<br>48                    |   |                    |                         | 5.0                | 4                    | №8.1                            |
|                                | 143094                 | 形势与政策<br>Analysis of the Situation & Policy  |                 | (128)                         |   |                    |                         | 2.0                | 1-8                  | №8.1                            |
|                                | 144001                 | 大学英语 (一)<br>College English(1)   |                 | 64                            |   |                    |                         | 4.0                | 1                    | №10                             |
|                                | 144002                 | 大学英语 (二)<br>College English(2)   |                 | 64                            |   |                    |                         | 4.0                | 2                    | №10                             |
|                                | 152001                 | 体育 (一)<br>Physical Education (1)   |                 | 32                            |   |                    | 32                      | 1.0                | 1                    | №12                             |
|                                | 152002                 | 体育 (二)<br>Physical Education (2)   |                 | 32                            |   |                    | 32                      | 1.0                | 2                    | №12                             |
|                                | 152003                 | 体育 (三)<br>Physical Education (3)   |                 | 32                            |   |                    | 32                      | 1.0                | 3                    | №12                             |
|                                | 152004                 | 体育 (四)<br>Physical Education (4)   |                 | 32                            |   |                    | 32                      | 1.0                | 4                    | №12                             |
|                                | 106001                 | 军事理论<br>Military Principle   |                 | (16)                          |   |                    |                         | 1.0                | 2                    | №9                              |
|                                | 140189                 | 微积分 I (一)<br>Calculus (1)  |                 | 80                            |   |                    |                         | 5.0                | 1                    | №1.1                            |
|                                | 140190                 | 微积分 I (二)<br>Calculus(2)   |                 | 64                            |   |                    |                         | 4.0                | 2                    | №1.1                            |
|                                | 130139                 | 工程制图<br>Engineering Drawing  |                 | 48                            |   |                    |                         | 3.0                | 2                    | №1.3                            |
|                                | 141001                 | 大学物理 I (一)<br>General Physics (1)  |                 | 48                            |   |                    |                         | 3.0                | 2                    | №1.2                            |
|                                | 141002                 | 大学物理 I (二)<br>General Physics (2)  |                 | 48                            |   |                    |                         | 3.0                | 3                    | №1.2                            |
|                                | 141007                 | 大学物理实验 (一)<br>Physics Experiment(1)  |                 | 32                            |   | 32                 |                         | 1.0                | 2                    | №1.2                            |
|                                | 141008                 | 大学物理实验 (二)<br>Physics Experiment(2)  |                 | 32                            |   | 32                 |                         | 1.0                | 3                    | №1.2                            |
|                                | 145223                 | 大学计算机基础<br>College Computer Basis  |                 | 32                            |   |                    |                         | 2.0                | 1                    | №5                              |
|                                | 140197                 | 线性代数与解析几何<br>Linear Algebra & Analytic Geometry  |                 | 48                            |   |                    |                         | 3.0                | 1                    | №1                              |
|                                | 140019                 | 概率论与数理统计<br>Probability & Mathematical Statistics  |                 | 48                            |   |                    |                         | 3.0                | 2                    | №1                              |
|                                | 145268                 | C++程序设计基础<br>C++ Programming Foundations   |                 | 48                            |   |                    |                         | 3.0                | 2                    | №5.1,5.2                        |
|                                |                        | 人文科学领域<br>Humanities   | 通识课 E           | 96                            |   |                    |                         | 6.0                | 1 或 2                | №8                              |
|                                |                        | 社会科学领域<br>Social Science   |                 | 64                            |   |                    |                         | 4.0                | 3 或 4                | №6,7                            |

|                     |  |      |  |    |     |      |  |  |
|---------------------|--|------|--|----|-----|------|--|--|
| <b>合 计</b><br>Total |  | 1052 |  | 64 | 128 | 68.0 |  |  |
|---------------------|--|------|--|----|-----|------|--|--|

### 三、专业教学计划表（续）（Teaching Schedule）

| 类别<br>Course<br>Category            | 课程<br>代码<br>Course No. | 课 程 名 称<br>Course Title                                      | 是<br>否<br>必<br>修<br>C/E | 学 时 数<br>Total Curriculum Hours |   |                    |                | 学<br>分<br>数<br>Credits | 开<br>课<br>学<br>期<br>Semester | 毕<br>业<br>要<br>求<br>Student<br>Outcomes |
|-------------------------------------|------------------------|--|-------------------------|---------------------------------|---|--------------------|----------------|------------------------|------------------------------|---|
|                                     |                        |  |                         | 总学时<br>Class<br>Hours           | 上机<br>Computer-ai<br>ded Class<br>Hours | 实验<br>Lab<br>Hours | 实践<br>Practice |                        |                              |   |
| 学科基础课<br>Disciplinary Basic Courses | 147001                 | 无机化学 I<br>Inorganic Chemistry                                | 必<br>C                  | 32                              |   |                    |                | 2.0                    | 1                            | №1.4                                    |
|                                     | 147003                 | 无机化学实验 I<br>Inorganic Chemistry Experiments                  | 必<br>C                  | 16                              |   | 16                 |                | 0.5                    | 1                            | №1.4                                    |
|                                     | 147020                 | 有机化学 I<br>Organic Chemistry                                  | 必<br>C                  | 48                              |   |                    |                | 3.0                    | 2                            | №1.4                                    |
|                                     | 147007                 | 有机化学实验 I<br>Organic Chemistry Experiments                    | 必<br>C                  | 32                              |   | 32                 |                | 1.0                    | 2                            | №1.4                                    |
|                                     | 147008                 | 分析化学 I<br>Analytic Chemistry                                 | 必<br>C                  | 32                              |   |                    |                | 2.0                    | 3                            | №1.4                                    |
|                                     | 147013                 | 分析化学实验 II<br>Analytic Chemistry Experiments                  | 必<br>C                  | 32                              |   | 32                 |                | 1.0                    | 3                            | №1.4                                    |
|                                     | 147058                 | 物理化学 I<br>Physical Chemistry                                 | 必<br>C                  | 48                              |   |                    |                | 3.0                    | 3                            | №1.4                                    |
|                                     | 147012                 | 物理化学实验 I<br>Physical Chemistry experiment                    | 必<br>C                  | 16                              |   | 16                 |                | 0.5                    | 4                            | №1.4                                    |
|                                     | 136273                 | 生物医学工程导论<br>Introduction of Biomedical engineering           | 必<br>C                  | 32                              |   |                    |                | 2.0                    | 1                            | №1.4                                    |
|                                     | 136301                 | 生物医学工程与人类健康<br>Biomedical Engineering and Human Health       | 必<br>C                  | 32                              |   |                    |                | 2.0                    | 2                            | №1,2,2.3                                |
|                                     | 136296                 | 实验室安全规范<br>Lab Safety  | 必<br>C                  | 8                               |   |                    |                | 0.5                    | 3                            | №1.3                                    |
|                                     | 136309                 | 解剖与生理学<br>Anatomy and Physiology                             | 必<br>C                  | 48                              |   |                    |                | 3.0                    | 3                            | №1.2                                    |
|                                     | 170026                 | 细胞生物学<br>Cell Biology  | 必<br>C                  | 48                              |   |                    |                | 3.0                    | 3                            | №1.2                                    |
|                                     | 170195                 | 生物化学与分子生物学<br>Biochemistry and Molecular Biology             | 必<br>C                  | 48                              |   |                    |                | 3.0                    | 6                            | №1.2                                    |
|                                     | 136278                 | 无机材料科学基础<br>Fundamental of Inorganic materials science       | 必<br>C                  | 48                              |   |                    |                | 3.0                    | 4                            | №1                                      |
|                                     | 136316                 | 生物力学<br>Biomechanics   | 必<br>C                  | 48                              |   |                    |                | 3.0                    | 4                            | №1                                      |
|                                     | 136303                 | 高分子材料学<br>Polymer Materials Science                          | 必<br>C                  | 48                              |   |                    |                | 3.0                    | 4                            | №1                                      |
|                                     | 136058                 | 材料现代测试方法<br>Modern Testing Methods for Materials             | 必<br>C                  | 48                              |   |                    |                | 3.0                    | 5                            | №1                                      |
|                                     | 136317                 | 生物医学工程专业英语<br>Professional English in Biomedical Engineering | 必<br>C                  | 32                              |   |                    |                | 2.0                    | 5                            | №10                                     |
|                                     | 170062                 | 医学概论<br>Introduction of Clinical Medicine                    | 选<br>E                  | 32                              |   |                    |                | 2.0                    | 4                            | №1.2                                    |
| 合 计<br>Total                        |                        |  | 必<br>C                  | 696                             |   | 96                 |                | 40.5                   |                              |   |

| 类别<br>Course<br>Category           | 课程<br>代码<br>Course No. | 课程名称<br>Course Title   | 是否<br>必修<br>C/E | 学时数<br>Total Curriculum Hours |   |                    |                | 学分<br>数<br>Credits | 开课<br>学期<br>Semester | 毕业<br>要求<br>Student<br>Outcomes |  |
|------------------------------------|------------------------|--|-----------------|-------------------------------|---|--------------------|----------------|--------------------|----------------------|---------------------------------|--|
|                                    |                        |  |                 | 总学时<br>Class<br>Hours         | 上机<br>Computer-ai<br>ded Class<br>Hours                             | 实验<br>Lab<br>Hours | 实践<br>Practice |                    |                      |                                 |  |
| 专业领域课<br>Specialty-related Courses | 136280                 | 生物医用高分子材料<br>Biomedical Polymer Materials  | 必<br>C          | 48                            |   |                    |                | 3.0                | 6                    | №2                              |  |
|                                    | 136274                 | 组织工程概论<br>Introduction of Tissue Engineering   | 必<br>C          | 32                            |   |                    |                | 2.0                | 5                    | №2,3,5                          |  |
|                                    | 136310                 | 材料工艺原理<br>Material process principle   | 必<br>C          | 64                            |   |                    |                | 4.0                | 5                    | №2                              |  |
|                                    | 136049                 | 高分子材料成型加工基础<br>Fundamental of Polymer material<br>forming processing                 | 选<br>E          | 32                            |   |                    |                | 2.0                | 4                    | №2                              |  |
|                                    | 136287                 | 脑科学前沿导论<br>Instruction of Brain Science Frontier                                     | 选<br>E          | 32                            |   |                    |                | 2.0                | 5                    | №2,3,5                          |  |
|                                    | 170065                 | 医学成像技术<br>Medical Imaging Technology   | 选<br>E          | 32                            | 4   |                    |                | 2.0                | 4                    | №2,3                            |  |
|                                    | 170077                 | 医学超声学<br>Biomedical ultrasonic   | 选<br>E          | 32                            |   |                    |                | 2.0                | 5                    | №2,3                            |  |
|                                    | 170063                 | 医学传感器原理及应用<br>Principle and Application of Medical<br>Sensor                         | 选<br>E          | 32                            |   |                    |                | 2.0                | 6                    | №2,3,5                          |  |
|                                    | 136388                 | Matlab 分析与建模<br>Matlab Analysis and Modeling   | 选<br>E          | 24                            |   |                    |                | 1.5                | 6                    | №2,3,5                          |  |
|                                    | 170068                 | 生物系统建模与仿真<br>Emulation and Modeling of<br>Physiological System                       | 选<br>E          | 32                            |   |                    |                | 2.0                | 4                    | №2,3,5                          |  |
|                                    | 170074                 | 生物医学信号处理 I<br>Biomedical Signal Processing   | 选<br>E          | 32                            | 8   |                    |                | 2.0                | 6                    | №2,3,5                          |  |
|                                    | 136304                 | 生物微加工在生物医用材料中的应用<br>Bio-Micro Fabrication and Applications<br>in Biomedical Material | 选<br>E          | 32                            |   |                    |                | 2.0                | 7                    | №2,3                            |  |
|                                    | 136284                 | 生物材料表面工程<br>Surface Engineering of Biological<br>Materials                           | 选<br>E          | 32                            |   |                    |                | 2.0                | 6                    | №2                              |  |
|                                    | 136290                 | 生物医学工程创新与创业<br>Innovation & Entrepreneurship in<br>Biomedical Engineering            | 选<br>E          | 32                            |   |                    |                | 2.0                | 6                    | №3-7                            |  |
|                                    | 120003                 | 创新研究训练<br>Innovation Research Training   | 选<br>E          | 32                            |   |                    |                | 2.0                |                      | №3-12                           |  |
|                                    | 120004                 | 创新研究实践 I<br>Innovation Research Practice 1   | 选<br>E          | 32                            |   |                    |                | 2.0                |                      | №3-12                           |  |
|                                    | 120005                 | 创新研究实践 II<br>Innovation Research Practice 2  | 选<br>E          | 32                            |   |                    |                | 2.0                |                      | №3-12                           |  |
|                                    | 120006                 | 创业实践<br>Entrepreneurial practice   | 选<br>E          | 32                            |   |                    |                | 2.0                |                      | №3-12                           |  |
|                                    | <b>合计<br/>Total</b>    |  |                 | 必<br>C                        | 144   |                    |                |                    | 9.0                  |                                 |  |
|                                    |                        |  |                 | 选<br>E                        | 选修课修读最低要求 25.5 学分<br>minimum elective course credits required: 25.5 |                    |                |                    |                      |                                 |  |

备注：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。

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

| 课程代码<br>Course No   | 课程名称<br>Course Title   | 是否必修<br>C/E | 学时数<br>Total Curriculum Hours |                     | 学分<br>Credits | 开课学期<br>Semester | 毕业要求<br>Student Outcomes |
|---------------------|--|-------------|-------------------------------|---------------------|---------------|------------------|--------------------------|
|                     |  |             | 实践<br>Practice weeks          | 授课<br>Lecture Hours |               |                  |                          |
| 106002              | 军训<br>Military Training  | 必<br>C      | 3 周                           |                     | 3.0           | 1                | №9                       |
| 143197              | 马克思主义理论与实践<br>Marxism Theory and Practice  | 必<br>C      | 2 周                           |                     | 2.0           | 假期               | №8                       |
| 130043              | 工程训练 I<br>Engineering Training   | 必           | 2 周                           |                     | 2.0           | 4                | №2                       |
| 170203              | 细胞生物学实验<br>Cell Biology Experiment   | 必           | 1 周                           |                     | 1.0           | 3                | №3-4                     |
| 136311              | 解剖与生理学实验<br>Anatomy and Physiological Experiments                                | 必           | 1 周                           |                     | 1.0           | 3                | №3                       |
| 136312              | 材料测试综合试验<br>Comprehensive Experiments of Material Test                           | 必           | 1 周                           |                     | 1.0           | 7                | №3-6,9-10                |
| 136142              | 认识实习<br>Cognition Internship   | 必           | 1 周                           |                     | 1.0           | 4                | №3-6,7,10                |
| 136314              | 生物医学工程综合实验（材料）<br>Comprehensive Experiments of Biomedical Engineering (Material) | 必           | 3 周                           |                     | 3.0           | 7                | №3-6,9-10                |
| 136389              | 生物化学与分子生物学实验<br>Experiments of Biochemistry and Molecular Biology                | 必           | 2 周                           |                     | 2.0           | 6                | №3-6,9-10                |
| 136163              | 毕业实习<br>Graduation Internship  | 必           | 3 周                           |                     | 3.0           | 8                | №3-6,7,10                |
| 136162              | 毕业设计（论文）<br>Graduation Project (Thesis)  | 必           | 16 周                          |                     | 16.0          | 7-8              | №2-12                    |
| <b>合计<br/>Total</b> |  | 必<br>C      | 35 周                          |                     | 35.0          |                  |                          |

#### 五、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 2 个学分。

##### 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，还必须参加国家创新创业训练计划或广东省创新创业训练计划或 SRP（学生研究计划）或百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于 4 个学分。

#### 5.“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 two credits.

#### 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.

# 生物医学电子方向

## 一、教学计划总体安排表 (General Teaching Schedule)

| 学<br>年    | 学<br>期 | 教 学 进 度 安 排 ( 周 ) |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |     | 理<br>论<br>教<br>学 | 考<br>试 | 入<br>学<br>教<br>育 | 军<br>训 | 课<br>程<br>设<br>计 | 大<br>作<br>业 | 工<br>程<br>训<br>练 | 电<br>子<br>实<br>习 | 综<br>合<br>实<br>验 | 社<br>会<br>实<br>践 | 生<br>产<br>实<br>习 | 毕<br>业<br>实<br>习 | 其<br>它<br>实<br>习 | 中<br>外<br>合<br>作<br>项<br>目 | 毕<br>业<br>设<br>计 | 就<br>业<br>安<br>排 | 机<br>动 | 假<br>期 | 小<br>计 |    |
|-----------|--------|-------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|-----|------------------|--------|------------------|--------|------------------|-------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|----------------------------|------------------|------------------|--------|--------|--------|----|
|           |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19  |                  |        |                  |        |                  |             |                  |                  |                  |                  |                  |                  |                  |                            |                  |                  |        |        |        | 20 |
|           |        | A                 | B | C | D | E | F | G | H | I | J  | K  | L  | M  | N  | O  | P  | Q  | R  |     |                  |        |                  |        |                  |             |                  |                  |                  |                  |                  |                  |                  |                            |                  |                  |        |        |        |    |
| 一         | 1      |                   | C | A | A | A | A | A | A | A | A  | A  | A  | A  | A  | A  | B  | D  | D  | D   | 14               | 1      | 1                | 3      |                  |             |                  |                  |                  |                  |                  |                  |                  |                            |                  |                  | 19     |        |        |    |
|           | 2      | A                 | A | A | A | A | A | A | A | A | A  | A  | A  | A  | A  | A  | Q  | Q  | B  | B   | 17               | 2      |                  |        |                  |             |                  |                  |                  |                  |                  |                  | 1                |                            |                  | 20               |        |        |        |    |
| 二         | 3      | A                 | A | A | A | A | A | A | A | A | A  | A  | A  | A  | A  | A  | Q  | Q  | B  | B   | 17               | 2      |                  |        |                  |             |                  |                  |                  |                  |                  |                  | 1                |                            |                  | 20               |        |        |        |    |
|           | 4      | A                 | A | A | A | A | A | A | A | G | G  | A  | A  | A  | A  | A  | A  | B  | B  | 13  | 2                |        | 1                | 2      |                  |             |                  | 1                |                  |                  |                  | 1                |                  |                            | 20               |                  |        |        |        |    |
| 三         | 5      | A                 | A | A | A | A | A | A | A | A | A  | A  | A  | A  | I  | I  | K  | B  | B  | 15  | 2                |        | 2                |        |                  |             |                  |                  |                  |                  |                  | 1                |                  |                            | 20               |                  |        |        |        |    |
|           | 6      | A                 | A | A | A | A | A | A | A | A | A  | A  | A  | A  | A  | Q  | Q  | B  | B  | 13  | 2                |        | 1                |        |                  | 3           |                  |                  |                  |                  |                  | 1                |                  |                            | 20               |                  |        |        |        |    |
| 四         | 7      | A                 | A | A | A | A | A | A | A | A | E  | E  | E  | E  | L  | L  | L  | B  | B  | 15  | 2                |        |                  |        |                  |             |                  | 3                |                  |                  |                  |                  |                  |                            | 20               |                  |        |        |        |    |
|           | 8      | O                 | O | O | O | O | O | O | O | O | O  | O  | O  | O  | Q  | Q  | Q  | P  | P  |     |                  |        |                  |        |                  |             |                  |                  |                  | 15               | 2                | 3                |                  |                            | 20               |                  |        |        |        |    |
| 合 计 ( 周 ) |        |                   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    | 104 | 13               | 1      | 3                | 4      |                  | 2           | 3                |                  | 1                | 3                |                  |                  | 15               | 2                          | 8                |                  |        |        | 159    |    |

## 二、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<br>Course Category                   | 课程要求<br>Requirement     | 学分<br>Credits | 学时<br>Academic Hours | 备注<br>Remarks |
|---|-------------------------|---------------|----------------------|---------------|
| 公共基础课<br>General Basic Courses            | 必修<br>Compulsory        | 59            | 908                  |               |
|   | 通识<br>General Education | 10.0          | 160                  |               |
| 学科基础课<br>Disciplinary Basic Courses       | 必修<br>Compulsory        | 36.0          | 600                  |               |
|   | 选修<br>Elective          | 2.0           | 32                   |               |
| 专业领域课<br>Specialty- related Courses       | 必修<br>Compulsory        | 9.0           | 144                  |               |
|   | 选修<br>Elective          | 27.0          | 432                  |               |
| 合 计<br>Total                              |                         | 143.0         | 2276                 |               |
| 集中实践教学环节 (周)<br>Practice Training (Weeks) | 必修<br>Compulsory        | 35.0          | 35 周                 |               |
| 毕业学分要求<br>Credits Required for Graduation | 143.0 + 35.0 = 178.0    |               |                      |               |

备注：学生在取得专业教学计划规定学分的同时，还必须取得第二课堂 2 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<br>Academic Hours |                    |                  |                         |               | 学分<br>Credits |                    |                  |  |                                 |               |   |
|----------------------|--------------------|------------------|-------------------------|---------------|---------------|--------------------|------------------|--|---------------------------------|---------------|---|
| 总学时数<br>Total        | 其中<br>Include      |                  | 其中<br>Include           |               | 总学分数<br>Total | 其中<br>Include      |                  | 其中<br>Include                                |                                 |               | 其中<br>Include   |
|                      | 必修学时<br>Compulsory | 选修学时<br>Elective | 理论教学学时<br>Theory Course | 实验教学学时<br>Lab |               | 必修学分<br>Compulsory | 选修学分<br>Elective | 集中实践教学环节学分<br>Practice-concentrated Training | 理论教学学分<br>Theory Course Credits | 实验教学学分<br>Lab | 创新创业教育学分<br>Innovation and Entrepreneurship Education |
| 2276                 | 1652               | 624              | 2012                    | 264           | 178           | 139                | 39               | 35   | 131.5                           | 8.5           | 6   |

## 三、专业教学计划表 (Teaching Schedule)

| 类别<br>Course Category          | 课程代码<br>Course No. | 课程名称<br>Course Title   | 是否必修<br>C/E | 学时数<br>Total Curriculum Hours |                                  |                 |                      | 学分<br>Credits | 开课学期<br>Semester | 毕业要求<br>Student Outcomes |
|--------------------------------|--------------------|--|-------------|-------------------------------|----------------------------------|-----------------|----------------------|---------------|------------------|--------------------------|
|                                |                    |  |             | 总学时<br>Class Hours            | 上机<br>Computer-aided Class Hours | 实验<br>Lab Hours | 实践<br>Practice Hours |               |                  |                          |
| 公共基础课<br>General Basic Courses | 143091             | 中国近现代史纲要<br>Skeleton of Chinese Modern History   |             | (32)<br>24                    |                                  |                 |                      | 2.0           | 1                | №8.1                     |
|                                | 143093             | 思想道德修养与法律基础<br>Cultivation of Thought and Morals & Fundamental of Law                              |             | (40)<br>(36)                  |                                  |                 |                      | 2.5           | 2                | №8.2                     |
|                                | 143090             | 马克思主义基本原理<br>Fundamentals of Marxism Principle   |             | (40)<br>36                    |                                  |                 |                      | 2.5           | 3                | №8.1                     |
|                                | 143106             | 毛泽东思想和中国特色社会主义理论体系概论<br>Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics |             | (80)<br>48                    |                                  |                 |                      | 5.0           | 4                | №8.1                     |
|                                | 143094             | 形势与政策<br>Analysis of the Situation & Policy  |             | (128)                         |                                  |                 |                      | 2.0           | 1-8              | №8.1                     |
|                                | 144001             | 大学英语 (一)<br>College English(1)   |             | 64                            |                                  |                 |                      | 4.0           | 1                | №10                      |
|                                | 144002             | 大学英语 (二)<br>College English(2)   |             | 64                            |                                  |                 |                      | 4.0           | 2                | №10                      |
|                                | 152001             | 体育 (一)<br>Physical Education (1)   |             | 32                            |                                  |                 | 32                   | 1.0           | 1                | №12                      |
|                                | 152002             | 体育 (二)<br>Physical Education (2)   |             | 32                            |                                  |                 | 32                   | 1.0           | 2                | №12                      |
|                                | 152003             | 体育 (三)<br>Physical Education (3)   |             | 32                            |                                  |                 | 32                   | 1.0           | 3                | №12                      |
|                                | 152004             | 体育 (四)<br>Physical Education (4)   |             | 32                            |                                  |                 | 32                   | 1.0           | 4                | №12                      |
|                                | 106001             | 军事理论<br>Military Principle   |             | (16)                          |                                  |                 |                      | 1.0           | 2                | №9                       |
|                                | 140191             | 微积分 II (一)<br>Calculus (1)   |             | 80                            |                                  |                 |                      | 5.0           | 1                | №1.1                     |
|                                | 140192             | 微积分 II (二)<br>Calculus(2)  |             | 80                            |                                  |                 |                      | 5.0           | 2                | №1.1                     |
|                                | 130009             | 工程制图<br>Engineering Drawing  |             | 48                            |                                  |                 |                      | 3.0           | 2                | №1.3                     |
|                                | 141001             | 大学物理 I (一)<br>General Physics (1)  |             | 48                            |                                  |                 |                      | 3.0           | 2                | №1.2                     |
|                                | 141002             | 大学物理 I (二)<br>General Physics (2)  |             | 48                            |                                  |                 |                      | 3.0           | 3                | №1.2                     |
|                                | 141007             | 大学物理实验 (一)<br>Physics Experiment(1)  |             | 32                            |                                  | 32              |                      | 1.0           | 2                | №1.2                     |

|  |                     |   |       |      |  |    |     |      |   |          |
|--|---------------------|---|-------|------|--|----|-----|------|---|----------|
|  | 141008              | 大学物理实验(二)<br>Physics Experiment(2)                |       | 32   |  | 32 |     | 1.0  | 3 | №1.2     |
|  | 147045              | 大学化学 I<br>General Chemistry                       |       | 32   |  |    |     | 2.0  | 1 | №1.2     |
|  | 140197              | 线性代数与解析几何<br>Linear Algebra & Analytic Geometry   |       | 48   |  |    |     | 3.0  | 1 | №1.1     |
|  | 140019              | 概率论与数理统计<br>Probability & Mathematical Statistics |       | 48   |  |    |     | 3.0  | 2 | №1.1     |
|  | 145268              | C++程序设计基础<br>C++ Programming Foundations          |       | 48   |  |    |     | 3.0  | 2 | №5.1,5.2 |
|  |                     | 人文科学领域<br>Humanities                              | 通识课 E | 96   |  |    |     | 6.0  |   | №8       |
|  |                     | 社会科学领域<br>Social Science                          |       | 64   |  |    |     | 4.0  |   | №6,7     |
|  | <b>合 计</b><br>Total |   |       | 1068 |  | 64 | 128 | 69.0 |   |          |

### 三、专业教学计划表(续)(Teaching Schedule)

| 类别<br>Course<br>Category            | 课程<br>代码<br>Course No. | 课程名称<br>Course Title                                   | 是否<br>必修<br>C/E | 学 时 数<br>Total Curriculum Hours |   |                    |                | 学分<br>数<br>Credits | 开课<br>学期<br>Semester | 毕业<br>要求<br>Student<br>Outcomes |
|-------------------------------------|------------------------|--|-----------------|---------------------------------|---|--------------------|----------------|--------------------|----------------------|---------------------------------|
|                                     |                        |  |                 | 总学时<br>Class<br>Hours           | 上机<br>Computer-ai<br>ded Class<br>Hours | 实验<br>Lab<br>Hours | 实践<br>Practice |                    |                      |                                 |
| 学科基础课<br>Disciplinary Basic Courses | 136273                 | 生物医学工程导论<br>Introduction of Biomedical engineering     | 必               | 32                              |   |                    |                | 2.0                | 1                    | №1.4                            |
|                                     | 136301                 | 生物医学工程与人类健康<br>Biomedical Engineering and Human Health | 必               | 32                              |   |                    |                | 2.0                | 2                    | №1.4,2.3                        |
|                                     | 135020                 | 电路 II<br>Electric Circuits                             | 必               | 64                              |   |                    |                | 4.0                | 2                    | №1.2                            |
|                                     | 135005                 | 电路实验<br>Experiment of Electric Circuits                | 必               | 16                              |   | 16                 |                | 0.5                | 3                    | №1.2                            |
|                                     | 135034                 | 模拟电子技术 II<br>Analog Electronics                        | 必               | 64                              |   |                    |                | 4.0                | 3                    | №1.2                            |
|                                     | 135043                 | 模拟电子技术实验<br>Experiment of Analog Electronics           | 必               | 16                              |   | 16                 |                | 0.5                | 3                    | №1.2                            |
|                                     | 170026                 | 细胞生物学<br>Cell Biology                                  | 必               | 48                              |   |                    |                | 3.0                | 3                    | №1.2                            |
|                                     | 136296                 | 实验室安全规范<br>Lab Safety                                  | 必               | 8                               |   |                    |                | 0.5                | 3                    | №1.3                            |
|                                     | 136309                 | 解剖与生理学<br>Anatomy and Physiology                       | 必               | 48                              |   |                    |                | 3.0                | 3                    | №1.2                            |
|                                     | 155081                 | 数字电子技术 II<br>Digital Electronics                       | 必               | 64                              |   |                    |                | 4.0                | 4                    | №1.2                            |
|                                     | 135045                 | 数字电子技术实验<br>Experiment of Digital Electronics          | 必               | 16                              |   | 16                 |                | 0.5                | 4                    | №1.2                            |
|                                     | 135041                 | 信号与系统<br>Signal and System                             | 必               | 64                              |   |                    |                | 4.0                | 4                    | №1.3                            |
|                                     | 170058                 | 微机原理与应用<br>Principles & Applications of Microcomputer  | 必               | 48                              |   |                    |                | 3.0                | 4                    | №1.3                            |
|                                     | 135048                 | 数字信号处理<br>Digital Signal Processing                    | 必               | 48                              |   |                    |                | 3.0                | 5                    | №1.3                            |
|                                     | 136317                 | 生物医学工程专业英语<br>Specialized English                      | 必               | 32                              |   |                    |                | 2.0                | 5                    | №10                             |
|                                     | 170062                 | 医学概论<br>Introduction of Clinical Medicine              | 选               | 32                              |   |                    |                | 2.0                | 4                    | №1.2                            |
| 136316                              | 生物力学<br>Biomechanics   | 选  | 48              |                                 |   |                    | 3.0            | 4                  | №1.4                 |                                 |

| 类别<br>Course<br>Category           | 课程<br>代码<br>Course No. | 课程名称<br>Course Title  | 是否<br>必修<br>C/E | 学时数<br>Total Curriculum Hours                                   |   |                    |                | 学分<br>数<br>Credits | 开课<br>学期<br>Semester | 毕业<br>要求<br>Student<br>Outcomes |
|------------------------------------|------------------------|---|-----------------|---|---|--------------------|----------------|--------------------|----------------------|---------------------------------|
|                                    |                        |   |                 | 总学时<br>Class<br>Hours   | 上机<br>Computer-ai<br>ded Class<br>Hours | 实验<br>Lab<br>Hours | 实践<br>Practice |                    |                      |                                 |
|                                    |                        |   |                 |   |   |                    |                |                    |                      |                                 |
|                                    | 170195                 | 生物化学与分子生物学<br>Biochemistry and Molecular Biology                                  | 选               | 48  |   |                    |                | 3.0                | 6                    | №1,2                            |
|                                    | <b>合计<br/>Total</b>    |   | 必<br>C          | 600   |   | 48                 |                | 36.0               |                      |                                 |
|                                    |                        |   | 选<br>E          | 选修课修读最低要求 2.0 学分<br>minimum elective course credits required: 2 |   |                    |                |                    |                      |                                 |
| 专业领域课<br>Specialty-related Courses | 170066                 | 医学图像处理<br>Medical Image Processing  | 必               | 32  |   |                    |                | 2.0                | 5                    | №2,3,,5                         |
|                                    | 170064                 | 医学仪器设计<br>Medical Instrument Design   | 必               | 48  |   |                    |                | 3.0                | 5                    | №2,3,,5                         |
|                                    | 170063                 | 医学传感器原理及应用<br>Principle and Application of Medical Sensor                         | 必               | 32  |   |                    |                | 2.0                | 6                    | №2,3,5                          |
|                                    | 136288                 | 计算神经科学基础<br>Computational Neuroscience  | 必               | 32  |   |                    |                | 2.0                | 6                    | №2,3,5                          |
|                                    | 170065                 | 医学成像技术<br>Medical Imaging Technology  | 选               | 32  |   |                    |                | 2.0                | 4                    | №2,3                            |
|                                    | 170068                 | 生物系统建模与仿真<br>Emulation and Modeling of Biological System                          | 选               | 32  |   |                    |                | 2.0                | 4                    | №2,3,5                          |
|                                    | 145022                 | 计算方法<br>Computing method  | 选               | 48  | 8                                       |                    |                | 3.0                | 4                    | №2.1                            |
|                                    | 170077                 | 医学超声学<br>Biomedical ultrasonic  | 选               | 32  |   |                    |                | 2.0                | 5                    | №2,3                            |
|                                    | 136390                 | 嵌入式仪器仪表<br>Embedded Instrument  | 选               | 32  |   |                    |                | 2.0                | 5                    | №2,3,5                          |
|                                    | 145172                 | 人工智能<br>Artificial Intelligence   | 选               | 40  |   |                    |                | 2.5                | 5                    | №2,3,5                          |
|                                    | 136287                 | 脑科学前沿导论<br>Instruction of Brain Science Frontier                                  | 选               | 32  |   |                    |                | 2.0                | 5                    | №2,3,5                          |
|                                    | 136274                 | 组织工程概论<br>Introduction of Tissue Engineering                                      | 选               | 32  |   |                    |                | 2.0                | 5                    | №2,3,5                          |
|                                    |                        | 医学心理学<br>Medical psychology   | 选               | 32  |   |                    |                | 2.0                | 6                    | №1,2                            |
|                                    | 170069                 | 生物医学测量<br>Biomedical Measurement  | 选               | 32  |   |                    |                | 2.0                | 5                    | №2,3,5                          |
|                                    | 170074                 | 生物医学信号处理 I<br>Biomedical Signal Processing  | 选               | 32  |   |                    |                | 2.0                | 6                    | №2,3,5                          |
|                                    | 145279                 | 移动应用开发(Android)<br>Mobile Application Development                                 | 选               | 40  | 16                                      |                    |                | 2.0                | 6                    | №2,3,5                          |
|                                    | 136388                 | Matlab 分析与建模<br>Matlab Analysis and Modeling                                      | 选               | 24  |   |                    |                | 1.5                | 6                    | №2,3, 5                         |
|                                    |                        | 医学伦理<br>Medical Ethics  | 选               | 18  |   |                    |                | 1.0                | 6                    | №7,8                            |
|                                    | 136290                 | 生物医学工程创新与创业<br>Innovation & Entrepreneurship in Biomedical Engineering            | 选               | 32  |   |                    |                | 2.0                | 6                    | №3-7                            |
|                                    | 145276                 | 物联网技术<br>Internet of Things technologies  | 选               | 32  |   |                    |                | 2.0                | 7                    | №2,3,5                          |
|                                    |                        | 神经病学<br>Neurology   | 选               | 56  |   | 20                 |                | 2.5                | 6                    | №1,2                            |
|                                    | 136304                 | 生物微加工在生物医用材料中的应用<br>Bio-Micro Fabrication and Applications in Biomedical Material | 选               | 32  |   |                    |                | 3.0                | 7                    | №2,3                            |
|                                    | 120003                 | 创新研究训练<br>Innovation Research Training  | 选               | 32  |   |                    |                | 2.0                | 3-7                  | №3-12                           |

| 类别<br>Course<br>Category | 课程<br>代码<br>Course No. | 课程名称<br>Course Title                        | 是否<br>必修<br>C/E | 学时数<br>Total Curriculum Hours                                    |   |                    |                | 学分<br>数<br>Credits | 开课<br>学期<br>Semester | 毕业<br>要求<br>Student<br>Outcomes |
|--------------------------|------------------------|---|-----------------|--|---|--------------------|----------------|--------------------|----------------------|---------------------------------|
|                          |                        |   |                 | 总学时<br>Class<br>Hours  | 上机<br>Computer-ai<br>ded Class<br>Hours | 实验<br>Lab<br>Hours | 实践<br>Practice |                    |                      |                                 |
|                          | 120004                 | 创新研究实践 I<br>Innovation Research Practice 1  | 选               | 32   |   |                    |                | 2.0                | 3-7                  | №3-12                           |
|                          | 120005                 | 创新研究实践 II<br>Innovation Research Practice 2 | 选               | 32   |   |                    |                | 2.0                | 3-7                  | №3-12                           |
|                          | 120006                 | 创业实践<br>Entrepreneurial practice            | 选               | 32   |   |                    |                | 2.0                | 3-7                  | №3-12                           |
|                          | <b>合计<br/>Total</b>    |   | 必<br>C          | 144  |   |                    |                | 9.0                |                      |                                 |
|                          |                        |   | 选<br>E          | 选修课修读最低要求 27.0 学分<br>minimum elective course credits required:27 |   |                    |                |                    |                      |                                 |

备注：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。

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

| 课程<br>代码<br>Course<br>No | 课程名称<br>Course Title   | 是否<br>必修<br>C/E | 学时数<br>Total Curriculum<br>Hours |                        | 学分数<br>Credits | 开课<br>学期<br>Semester | 毕业要求<br>Student<br>Outcomes |
|--------------------------|--|-----------------|----------------------------------|------------------------|----------------|----------------------|-----------------------------|
|                          |  |                 | 实践<br>Practice<br>weeks          | 授课<br>Lecture<br>Hours |                |                      |                             |
| 106002                   | 军训<br>Military Training  | 必<br>C          | 3 周                              |                        | 3.0            | 1                    | №9                          |
| 143197                   | 马克思主义理论与实践<br>Marxism Theory and Practice  | 必<br>C          | 2 周                              |                        | 2.0            | 假期                   | №8                          |
| 130356                   | 工程训练 I<br>Engineering Training I   | 必               | 2 周                              |                        | 2.0            | 4                    | №3.3                        |
| 170203                   | 细胞生物学实验<br>Experiment of Cell Biology  | 必               | 1 周                              |                        | 1.0            | 3                    | №3-4                        |
| 136391                   | 微机原理与应用课程设计<br>Course Project of Principles & Applications of<br>Microcomputer     | 必               | 1 周                              |                        | 1.0            | 4                    | №3-6                        |
| 136311                   | 解剖与生理学实验<br>Experiment of Human Anatomy and Physiology                             | 必               | 1 周                              |                        | 1.0            | 3                    | №3                          |
| 136315                   | 医学图像处理课程设计<br>Course Project of Medical Image Processing                           | 必               | 1 周                              |                        | 1.0            | 5                    | №3-6,9-10                   |
| 170083                   | 医学仪器课程设计<br>Course Project of Medical Instrument                                   | 必               | 1 周                              |                        | 1.0            | 5                    | №3-6,9-10                   |
| 136142                   | 认识实习<br>Cognition Internship   | 必               | 1 周                              |                        | 1.0            | 4                    | №3-6,7,10                   |
| 136392                   | 医学传感器原理及应用课程设计<br>Course Project of Principle and Application of<br>Medical Sensor | 必               | 2 周                              |                        | 2.0            | 6                    | №3-6,9-10                   |
| 136393                   | 计算神经科学基础课程设计<br>Course Project of Computational Neuroscience                       | 必               | 2 周                              |                        | 2.0            | 6                    | №3-6,9-10                   |
| 136163                   | 毕业实习<br>Practice on Diploma Project  | 必               | 3 周                              |                        | 3.0            | 8                    | №3-6,7,10                   |

|                            |                                      |        |      |  |      |     |       |
|----------------------------|--------------------------------------|--------|------|--|------|-----|-------|
| 136162                     | 毕业设计（论文）<br>Diploma Project (Thesis) | 必      | 15 周 |  | 15.0 | 7-8 | №2-12 |
| <b>合 计</b><br><b>Total</b> |                                      | 必<br>C | 35 周 |  | 35   |     |       |

## 五、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 2 个学分。

### 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，还必须参加国家创新创业训练计划或广东省创新创业训练计划或 SRP（学生研究计划）或百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于 4 个学分。

## 5.“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 two credits.

### 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.