



中南民族大学  
SOUTH-CENTRAL MINZU UNIVERSITY

适用于生物医学工程学院2025级本科生

生物医学工程学院  
本科专业人才培养方案  
(智能医学工程专业)

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# 生物医学工程学院简介

生物医学工程学院成立于 2009 年，前身可追溯至上世纪八十年代初期成立的生物磁学研究所。经过三十多年的建设，生物医学工程学科建成为国家民委重点学科，培养了大量的本科生、研究生，其中 65%以上来自少数民族地区，为民族地区社会经济发展做出了重要贡献。

通过长期的建设，学院形成了符合生物医学工程学科特点——“交叉性和综合性”的师资队伍。现有来自于 7 个不同一级学科的专任教师 39 名，其中教授 10 人，副教授 13 人，硕士生导师 30 人，专任教师中 95%具有博士学位。入选“湖北省名师工作室”1 个、中科院“百人计划”1 人、湖北省“百人计划”1 人、楚天英才计划 1 人、国家民委中青年英才计划 2 人、湖北省优秀青年骨干计划 1 人、“3551”光谷创业人才计划 1 人。设有生物医学基础部、医疗电子系和医学信息系 3 个系部，1 个实践教学与创新活动中心。

学院有生物医学工程、医学信息工程和智能医学工程 3 个本科专业，1 个生物医学工程一级学科硕士点（含工学、理学），在校本科生近 1200 人，硕士研究生 200 余人。生物医学工程专业为国家级一流专业建设点、省级品牌专业，并入选省级“战略性新兴产业”培养计划和“荆楚卓越工程师”培养计划，医学信息工程为省级一流专业建设点。学院现有湖北省生物医学工程虚拟仿真实验中心、湖北省服务外包人才培养（训）基地，以及医学传感器、生物医学信号检测、医疗仪器、虚拟仪器、课程设计、学生创新设计等专业实验室；建有东湖高新区高科医疗器械园、湖北省肿瘤医院、解放军中部战区总医院等实践教学基地。学院与东湖高新区高科医疗器械园合作培养卓越工程人才，与美国佛罗里达理工大学合作，按“2+2”模式培养国际创新人才。近 5 年来，学院学生在“全国大学生生物医学电子创新设计竞赛”、“全国大学生电子竞赛”、“全国大学生数学建模竞赛”、“蓝桥杯全国计算机软件大赛”等学科竞赛中获国家级、省（部）级奖励 200 余项；获得国家级和省级大学生创新科研项目立项 10 余项。

学院现有医学信息处理与肿瘤诊疗湖北省重点实验室和认知科学国家民委重点实验室 2 个省部级重点实验室；形成了膜离子通道结构、功能及生理建模、生物医学信号检测与处理、视觉认知计算与医学图像处理、生物医学传感与仪器

等 4 个具有学科特色的研究方向。实验室购置了 128 导脑功能成像系统、激光共聚焦显微镜、双通道膜片钳系统等先进设备。

学院以神经工程为核心，从微观到宏观，从分子、细胞和整体水平，探索神经系统活动的基本规律。在离子通道功能和神经递质释放、脑电和肌电信息检测与解析、医学成像和医学图像处理、医学人工智能、生物医学传感与医学仪器等方面的研究上形成了自己的特色。先后承担国家自然科学基金重大研究计划项目、面上项目、青年项目，以及省部级项目 60 余项，在国内外重要学术期刊上发表 SCI、EI 收录学术论文 160 余篇，获专利授权和软件著作权 80 余项，获省部级奖励 3 项。

学院秉承“医工融合、志惠民生”的办学理念，致力于学生创新能力和自我素质的提高，以学风院风建设为重点，通过完善课程体系，革新教学内容，强化工程实践，充分调动学生学习的积极性、主动性和创造性，提高了人才培养质量。多年来，学院就业率和就业质量稳居学校前列，连续 3 年被评为学校就业标兵单位，本科生升学率连续 3 年超过 35%。

## **Introduction to the College of Biomedical Engineering**

The College of Biomedical Engineering was established in 2009, with its origins tracing back to the Institute of Biomagnetics founded in the early 1980s. After over three decades of development, the discipline of Biomedical Engineering has grown into a key discipline under the State Ethnic Affairs Commission. The college has cultivated a large number of undergraduate and graduate students, over 65% of whom come from ethnic minority regions, making significant contributions to the socioeconomic development of these areas.

Through long-term development, the college has built a faculty team that reflects the interdisciplinary and comprehensive nature of Biomedical Engineering. Currently, there are 39 full-time faculty members from seven different primary disciplines, including 10 professors, 13 associate professors, and 30 master's supervisors. Among them, 95% hold doctoral degrees. The faculty includes one "Hubei Provincial Famous Teacher Studio," one member of the Chinese Academy of Sciences' "Hundred Talents Program," one member of Hubei Province's "Hundred Talents Program," one member of the "Chutian Scholar Program," two members of the State

Ethnic Affairs Commission's "Young and Middle-Aged Talents Program," one member of Hubei Province's "Outstanding Young Backbone Program," and one member of the "3551 Optics Valley Entrepreneurship Talent Program." The college consists of three departments: the Department of Biomedical Fundamentals, the Department of Medical Electronics, and the Department of Medical Information Engineering, as well as a Practical Teaching and Innovation Center.

The college offers three undergraduate programs—Biomedical Engineering, Intelligent Medical Engineering, and Medical Information Engineering—and one master's program in Biomedical Engineering (covering both engineering and science disciplines). It currently enrolls nearly 1,200 undergraduate students and over 200 graduate students. The Biomedical Engineering program is a national first-class undergraduate program and a provincial brand program, selected for the provincial "Strategic Emerging Industries" training plan and the "Jingchu Outstanding Engineer" training plan. The Medical Information Engineering program is a provincial first-class undergraduate program. The college houses the Hubei Provincial Virtual Simulation Experimental Center for Biomedical Engineering and the Hubei Provincial Service Outsourcing Talent Training Base, along with specialized laboratories for medical sensors, biomedical signal detection, medical instruments, virtual instruments, course design, and student innovation projects. It has established practical training bases in the East Lake High-Tech Development Zone Medical Device Park, Hubei Cancer Hospital, and the Central Theater General Hospital of the PLA. The college collaborates with the East Lake High-Tech Medical Device Park to cultivate outstanding engineering talents and partners with the Florida Institute of Technology in the U.S. to train international innovative talents under a "2+2" dual-degree program. Over the past five years, students have won over 200 national and provincial awards in competitions such as the National Biomedical Electronic Innovation Design Competition, the National Electronic Design Contest, the National Mathematical Modeling Contest, and the "Blue Bridge Cup" National Software and Information Technology Competition. Additionally, they have secured more than 10 national and provincial-level innovation research projects.

The college has two provincial and ministerial-level key laboratories: the Hubei Provincial Key Laboratory of Medical Information Processing and Tumor Diagnosis & Treatment, and the State Ethnic Affairs Commission Key Laboratory of Cognitive Science. It has developed four distinctive research directions: structure, function, and physiological modeling of membrane ion channels; biomedical signal detection and processing; visual cognitive computing and medical image processing; and biomedical sensors and instruments. The laboratories are equipped with advanced instruments such as a 128-channel brain imaging system, a laser confocal microscope, and a dual-channel patch-clamp system.

With a focus on neural engineering, the college explores the fundamental mechanisms of neural system activity from microscopic to macroscopic levels, encompassing molecular, cellular, and holistic perspectives. It has established research strengths in ion channel function and neurotransmitter release, EEG and EMG signal detection and analysis, medical imaging and image processing, medical artificial intelligence, and biomedical sensors and instruments. The college has undertaken over 60 national and provincial research projects, including major research initiatives, general projects, and youth projects under the National Natural Science Foundation of China. Faculty members have published more than 160 SCI/EI-indexed papers in prestigious academic journals, obtained over 80 patents and software copyrights, and received three provincial and ministerial-level awards.

Adhering to the educational philosophy of "Integrating Medicine and Engineering, Serving the People's Well-being," the college is committed to enhancing students' innovation capabilities and self-development. Emphasizing academic excellence and a positive learning environment, it continuously refines its curriculum, updates teaching content, and strengthens engineering practice to fully mobilize students' enthusiasm, initiative, and creativity, thereby improving the quality of talent cultivation. Over the years, the college has maintained a leading position in employment rates and job quality within the university, being recognized as an "Employment Model Unit" for three consecutive years. The undergraduate enrollment rate for further studies has exceeded 35% for three years running.

# 专业简介

## 智能医学工程专业

智能医学工程以现代医学与生物学理论为基础，融合先进的人工智能及相关领域的工程技术手段，探索人机协同的智能化诊疗方法及其临床应用。主要学习基础医学、生物学、电子计算机技术、人工智能技术、生物医学信息检测与信号处理、以及医疗仪器设计原理等专业基础理论和基本知识。将大数据分析、云计算、深度学习等人工智能手段应用于医学领域，解决医学临床的工程问题，培养能在智能医学以及其它人类健康工程相关行业从事研发和管理的复合型卓越人才。本科，学制四年，招理科生，毕业生授予工学学士学位。

## Program Introduction

### Intelligent Medical Engineering

Intelligent Medical Engineering integrates modern medicine and biology with advanced artificial intelligence (AI) and engineering technologies to explore intelligent human-machine collaborative diagnostic and therapeutic methods for clinical applications. The curriculum includes foundational courses in basic medicine, biology, computer technology, AI, biomedical signal detection and processing, and medical device design principles. Students learn to apply big data analytics, cloud computing, deep learning, and other AI techniques to solve clinical engineering challenges. The program aims to cultivate versatile, outstanding professionals capable of conducting research, development, and management in intelligent medicine and other human health-related engineering fields.

Degree: Bachelor of Engineering

Duration: 4 years

Admission: Science students

# 智能医学工程专业本科人才培养方案

## Undergraduate Program for Intelligent Medical Engineering

### 一、培养规格

#### I Cultivation Standards

##### I) 学制

Length of Schooling

修业年限：4 年

Duration: 4 years

##### II) 学位

Degree

授予学位：工学学士学位

Degrees conferred: Bachelor of Engineering

### 二、培养目标

智能医学工程专业培养目标：面向“健康中国”国家战略需求和大健康产业的人才需求，铸牢中华民族共同体意识，培养掌握人工智能和医工深度融合知识，具有家国情怀、中华民族共同体意识及人文关怀意识、创新精神和实践能力、德智体美劳全面发展的医工复合型卓越人才。学生毕业后可在大型综合性医院、医学相关科研院所、高校、以及人类大健康相关行业的企事业单位中从事智能医学研究、管理、服务和教育等工作，并逐步成长为具有扎实工程基础的智能医学卓越工程师；或进入医学、生物学、工程学相关学科攻读硕士或博士学位，成长为具有深厚理工功底的医学科学家。

毕业生应掌握现代医学、生命科学、工程科学等基础理论和人工智能技术、医学大数据分析技术、智能医学仪器开发技术等专业知识，并综合应用于健康管理与疾病预防、智能诊断、智能治疗、智能康复等相关产品研发和临床实践，具备批判性思维、探索精神和创新意识以及自主学习与终身学习能力，具备较强的沟通交流能力以及团队合作精神，能够在多学科、多文化背景的团队中发挥重要作用。

期待学生毕业后 5 年左右达到以下目标：

**1（人文素养）：**铸牢中华民族共同体意识，具有高度社会责任感和职业操守，良好



的人文科学素养、工程和医学伦理道德，在工程实践中充分考虑社会、健康、安全、法律及文化的影响，履行工程师责任，能为国家、区域和民族地区的健康事业服务；

**2（专业知识）：**在解决智能医学工程及相关领域复杂工程问题时，能够基于数学、自然科学原理，应用生物医学工程专业知识、电子技术、计算机技术、人工智能技术和现代工具，针对跨学科交叉融合的工程问题进行分析和研究，并设计出可行的解决方案；

**3（工程能力）：**具备医疗与健康智能产品设计、智能医学信息处理和医疗大数据分析等医工交叉领域的技术研究、开发和管理的的能力；

**4（沟通协作）：**具备良好的沟通、表达能力和团队协作能力，能在多民族、多学科、跨文化环境和团队中发挥作用；

**5（发展潜能）：**具有终身学习和快速自我提升的能力，能跟踪智能医学工程领域的最新理论、技术及前沿动态，适应科技和社会的快速发展。

## II Education Objectives

### **Education Objectives of the "Intelligent Medical Engineering Outstanding Engineer Experimental Class" in Biomedical Engineering:**

Aimed at addressing the national strategic needs of "Healthy China" and the talent demands of the healthcare industry, this program cultivates outstanding interdisciplinary professionals who integrate expertise in artificial intelligence and deep convergence of medicine and engineering. Graduates will embody a strong sense of patriotism, Chinese national community consciousness, humanistic care, innovative spirit, practical capabilities, and well-rounded development in moral, intellectual, physical, aesthetic, and labor education. Upon graduation, students will be equipped to engage in intelligent medical research, management, services, and education at large comprehensive hospitals, medical research institutes, universities, and enterprises/organizations related to human health. They will grow into outstanding intelligent medical engineers with solid engineering foundations or pursue master's or doctoral degrees in medicine, biology, or engineering-related disciplines, evolving into medical scientists with profound interdisciplinary expertise.

#### **Graduates Should Acquire:**

Foundational theories in modern medicine, life sciences, and engineering sciences, as well as

professional knowledge in artificial intelligence, medical big data analysis, and intelligent medical instrument development.

The ability to integrate and apply such knowledge to the research, development, and clinical practice of health management, disease prevention, intelligent diagnosis, treatment, and rehabilitation.

Critical thinking, exploratory spirit, innovative awareness, self-directed and lifelong learning capabilities, strong communication skills, and teamwork spirit to excel in multidisciplinary and multicultural environments.

#### **Expected Career Outcomes Within 5 Years After Graduation:**

**1 (Humanistic Literacy):** Strengthen the Chinese national community consciousness, uphold a high sense of social responsibility and professional ethics, demonstrate sound humanistic and scientific literacy, adhere to engineering and medical ethics, and consider societal, health, safety, legal, and cultural impacts in engineering practices. Fulfill engineers' responsibilities to serve national, regional, and ethnic healthcare initiatives.

**2 (Professional Expertise):** Address complex engineering challenges in intelligent medical engineering by applying mathematical and natural science principles, biomedical engineering expertise, electronic/computer technologies, AI tools, and modern methodologies. Analyze and design feasible solutions for interdisciplinary problems.

**3 (Engineering Competence):** Possess the capability to conduct technical research, development, and management in medical-health intelligent product design, intelligent medical information processing, and medical big data analysis.

**4 (Communication and Collaboration):** Demonstrate effective communication, presentation, and teamwork skills, contributing effectively in multiethnic, multidisciplinary, and cross-cultural environments.

**5 (Development Potential):** Cultivate lifelong learning and rapid self-improvement abilities to track cutting-edge theories, technologies, and trends in intelligent medical engineering, adapting to rapid advancements in science and society.

### **三、毕业要求**

学生应掌握生物学、医学、电子学、计算机科学等知识，在学习医学信号处理、人工智能基础理论基础上，能综合多种技能处理医学中的复杂输入，开发出有效的医学决策支持系统，帮助医生更准确诊断疾病、优化治疗方案或提升医疗服务的效率和质量，增强人类在医学领域的能力。毕业生应掌握的知识、具备的能力和素质：

1 工程知识：能够将数学、自然科学、医学、工程基础和人工智能技术等专业知识用于解决智能医学工程领域的复杂工程问题。

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临床医学、智能医学信息处理、智能医学仪器设计与制造过程中出现的复杂工程问题，综合考虑可持续发展的要求，以获得有效结论。

3 设计/开发解决方案：能够设计针对智能医学领域复杂工程问题的解决方案，设计满足特定需求的诊断和治疗系统，体现创新性，并从健康、安全与环境、全生命周期成本与净零碳要求、法律与伦理、社会与文化等角度考虑可行性。

4 研究：能够基于科学原理并采用科学方法对智能医学领域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。

5 使用现代工具：能够针对智能医学领域复杂工程问题，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。

6 工程与可持续发展：在解决智能医学工程领域相关复杂工程问题时，能够基于智能医学工程领域相关背景知识，分析和评价工程实践对健康、安全、环境、法律以及经济和社会可持续发展的影响，并理解应承担的责任。

7 工程伦理和职业规范：有工程报国、为民造福的意识，具有人文社会科学素养和社会责任感，能够理解和践行工程伦理，在工程实践中遵守工程职业道德、规范和相关法律，履行责任。

8 个人和团队：能够在多样化、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 沟通：能够就智能医学领域的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；能够在跨文化背景下进行沟通和交流，理解、尊重语言和文化差异。

10 项目管理：理解并掌握与工程项目相关的管理原理与经济决策方法，并能在多学科环境中应用。

11 终身学习：具有自主学习、终身学习和批判性思维的意识 and 能力，能够理解广泛的技术变革对工程和社会的影响，适应新技术变革。

### III Basic requirements for Cultivation

Students should acquire knowledge in biology, medicine, electronics, and computer science. Building on expertise in medical signal processing and fundamental AI theories, they should synthesize multidisciplinary skills to address complex medical inputs, develop effective medical decision support systems, and assist physicians in accurate disease diagnosis, optimized treatment planning, or improving healthcare efficiency and quality, thereby advancing human capabilities in medicine.

Knowledge, Competencies, and Qualities Graduates Should Possess:

**1. Engineering Knowledge:** Ability to apply mathematics, natural sciences, medicine, engineering fundamentals, and AI technologies to solve complex engineering problems in intelligent medical engineering.

**2. Problem Analysis:** Ability to identify, articulate, and analyze complex engineering issues in clinical medicine, intelligent medical information processing, and the design/manufacturing of intelligent medical instruments using mathematical, natural science, and engineering principles. Integrate sustainable development considerations to derive valid conclusions.

**3. Design/Development of Solutions:** Ability to design innovative solutions for complex engineering challenges in intelligent medicine, including diagnostic and therapeutic systems tailored to specific needs. Evaluate feasibility by considering health, safety, environmental impacts, lifecycle costs, net-zero carbon requirements, legal and ethical standards, and sociocultural factors.

**4. Research:** Ability to conduct research on complex engineering problems in intelligent medicine using scientific principles and methodologies, including experimental design, data analysis and interpretation, and synthesizing information to reach valid conclusions.

**5. Use of Modern Tools:** Ability to develop, select, and apply appropriate technologies, resources, modern engineering tools, and IT tools (e.g., predictive modeling and simulation) for addressing complex engineering problems in intelligent medicine, while understanding their limitations.

**6. Engineering and Sustainable Development:** Ability to analyze and evaluate the impacts of engineering practices on health, safety, environment, law, and socioeconomic sustainability in

intelligent medical engineering, while recognizing professional responsibilities.

**7. Engineering Ethics and Professional Standards:** Demonstrate a commitment to serving the nation and society through engineering, uphold humanistic values and social responsibility, adhere to engineering ethics, comply with professional codes and legal standards, and fulfill obligations in practice.

**8. Individual and Teamwork:** Ability to assume roles as an individual contributor, team member, or leader in diverse, multidisciplinary teams.

**9. Communication:** Ability to communicate effectively with peers and the public on complex engineering issues in intelligent medicine through reports, technical documentation, presentations, and clear responses. Engage in cross-cultural communication with respect for linguistic and cultural differences.

**10. Project Management:** Understand and apply project management principles and economic decision-making methods in multidisciplinary environments.

**11. Lifelong Learning:** Cultivate self-directed learning, lifelong learning, and critical thinking to adapt to technological advancements and understand their societal and engineering implications.

#### 四、毕业要求与培养目标对应矩阵

#### IV Matrices of graduation requirements and cultivation objectives

培养目标及毕业要求 Cultivation Objectives & Graduation Requirements	1 (人文素养) Humanistic Qualities	2 (专业知识) Professional Knowledge	3 (工程能力) Engineering Competence	4 (沟通协作) Communicati on and Collaboration	5 (发展潜能) Development Potential
毕业要求 1 工程知识 Graduation Requirement I		√			√
毕业要求 2 问题分析 Graduation Requirement II		√			
毕业要求 3 设计/开发解决方案 Graduation Requirement III		√	√	√	
毕业要求 4 研究 Graduation Requirement IV		√	√		
毕业要求 5 使用现代工具 Graduation Requirement V			√		√
毕业要求 6 工程与可持续发展 Graduation Requirement VI	√		√		
毕业要求 7 工程伦理和职业规范 Graduation Requirement VII	√				
毕业要求 8 个人和团队 Graduation Requirement VIII				√	
毕业要求 9 沟通 Graduation Requirement IX				√	
毕业要求 10 项目管理 Graduation Requirement X			√	√	√
毕业要求 11 终身学习 Graduation Requirement XI					√

## 五、毕业要求实现矩阵

### V Graduation requirement realization matrix

课程及毕业要求 Course & Graduation Requirements	毕业要求 Graduation requirement										
	1 工程知识 Engineering Knowledge	2 问题分析 Problem Analysis	3 设计开发/解决方案 Design/Development Solutions	4 研究 Research	5 使用现代工具 Using Modern Tools	6 工程与可持续发展 Engineering and Sustainable Development	7 工程伦理与职业规范 Engineering ethics and Professional norms	8 个人和团队 Individual and team	9 沟通 Communication	10 项目管理 Project management	11 终身学习 Lifelong learning
思想道德与法治 Moral Education and Rule of Law							H				
中国近现代史纲要 Essentials of China Modern and Contemporary History							M				
毛泽东思想和中国特色社会主义理论体系概论 Introduction to MAO Zedong Thought and Socialist Theoretical System with Chinese Characteristics							M				
马克思主义基本原理 Basis Principles of Maxism							M				
习近平新时代中国特色社会主义思想概论 Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era											H
形势与政策 Situation and Policy											H
英语 English								H			
劳动教育 Labor Education								H			
大学英语扩展课程 University English Extension Program								H			

课程及毕业要求 Course & Graduation Requirements	毕业要求 Graduation requirement										
	1 工程知识 Engineering Knowledge	2 问题分析 Problem Analysis	3 设计开发/解 决方案 Design/Develop ment Solutions	4 研究 Research	5 使用现代 工具 Using Modern Tools	6 工程与可持续 发展 Engineering and Sustainable Development	7 工程伦理与职 业规范 Engineering ethics and Professional norms	8 个人和团队 Individual and team	9 沟通 Communication	10 项目管理 Project management	11 终身学习 Lifelong learning
中华民族共同体概论 Education of Chinese Minzu Community Consciousness						L			H		
就业指导 Employment Guidance						M	H				L
工程项目管理与经济决策 Engineering Project Management and Economic Decision Analysis						M		M		H	
军事技能训练 Military Skill Training							L	M			
高等数学 Advanced Mathematics	H										
线性代数 Linear Algebra	M										
概率论与数理统计 Probability Theory and Mathematic Statistics	M										
复变函数 Complex Function	L										
大学物理 College Physics	H										
大学物理实验 College Physics Experiments				M					L		
人工智能与 Python 程序设计 Artificial Intelligence and Python Programming	L				H						
电路分析 Fundamentals of Circuit Analysis	H	M									
生物医学电子学 I Biomedical Electronics I	M	H	M								
生物医学电子学实验 I Biomedical Electronics		M	L		M						



课程及毕业要求 Course & Graduation Requirements	毕业要求 Graduation requirement										
	1 工程知识 Engineering Knowledge	2 问题分析 Problem Analysis	3 设计开发/解 决方案 Design/Develop ment Solutions	4 研究 Research	5 使用现代 工具 Using Modern Tools	6 工程与可持续 发展 Engineering and Sustainable Development	7 工程伦理与职 业规范 Engineering ethics and Professional norms	8 个人和团队 Individual and team	9 沟通 Communication	10 项目管理 Project management	11 终身学习 Lifelong learning
Experiments I											
生物医学电子学 II Biomedical Electronics II	M	H									
生物医学电子学实验 II Biomedical Electronics Experiments II		M	L		M						
信号与系统 Signals and Systems	M	H		H							
智能医学工程导论 Introduction to Intelligent Medical Engineering				L		H	M				
解剖生理学 Anatomy and Physiology		M		M			H				
解剖生理学实验 Anatomy and Physiology Experiments		M					M	L			
生物医学数字信号处理 Biomedical Digital Signal Processing	M	H		H							
模式识别与深度学习 (A) Biomedical Digital Signal Processing	M	H		H							
工程制图 Engineering Drafting					L						
生物医学工程前沿 Frontiers in Biomedical Engineering	M			M		H	M				L
医用基础化学 Medical Foundation Chemistry		M									
临床医学概论 Introduction to Clinical Medicine				L			M				

课程及毕业要求 Course & Graduation Requirements	毕业要求 Graduation requirement										
	1 工程知识 Engineering Knowledge	2 问题分析 Problem Analysis	3 设计开发/解 决方案 Design/Develop ment Solutions	4 研究 Research	5 使用现代 工具 Using Modern Tools	6 工程与可持续 发展 Engineering and Sustainable Development	7 工程伦理与职 业规范 Engineering ethics and Professional norms	8 个人和团队 Individual and team	9 沟通 Communication	10 项目管理 Project management	11 终身学习 Lifelong learning
生物医学工程伦理 Ethics and Professional Norms of Biomedical Engineering							H				
生物化学 Biochemistry		M									
单片机 C 程序设计 C Programming for Micro-controller	M		M		M			M			
虚拟仪器 Virtual Instrument			M		M						
分子生物学 Molecular Biology		M									
医学细胞生物学 Medical Cell Biology		M									
人工智能数学基础 Mathematical Foundations of Artificial Intelligence	H										
嵌入式系统设计 Embedded Systems Design			M		M						
医学大数据分析 Medical Big Data Analysis	M			M	M						
医学图像处理与计算机视觉 Medical Image Processing and Computer Vision		M			M						
自然语言处理 Natural Language Processing	M				M						
生物医学传感与测量仪器 Biomedical Sensors and Measure Instruments		M		M							
病理生理学 Pathophysiology		M									
数据库技术与应用 Database Technology and Applications			M		M						
电子实训 Electrical Engineering Training		H						M	L		

课程及毕业要求 Course & Graduation Requirements	毕业要求 Graduation requirement										
	1 工程知识 Engineering Knowledge	2 问题分析 Problem Analysis	3 设计开发/解 决方案 Design/Develop ment Solutions	4 研究 Research	5 使用现代 工具 Using Modern Tools	6 工程与可持续 发展 Engineering and Sustainable Development	7 工程伦理与职 业规范 Engineering ethics and Professional norms	8 个人和团队 Individual and team	9 沟通 Communication	10 项目管理 Project management	11 终身学习 Lifelong learning
智能医学工程综合课设 I(可穿戴 医疗仪器) Intelligent Medical Engineering Comprehensive Course Design I (Wearable Medical Devices)		H	H	M	H			H	M	M	L
智能仪器课程设计 Intelligent Instrumentation Course Design		H	H	M	H			H	M	M	L
智能医学工程综合课设 II (医 学人工智能) Intelligent Medical Engineering Comprehensive Course Design II (Medical Artificial Intelligence)		H	H	M	H			H	M	M	L
工程训练 Engineering training			M			M		M			
专业实习 Teaching Exercitation					M				M		M
毕业论文 Undergraduate Thesis		H	H	H	M		M	L	M	L	H

注① 不同学期的同一门课程只需填写一次；

②所有的课程和教学活动都要列入表格，包括集中实践性环节；

③表格要清晰展示每门课程与“毕业要求”中每项具体要求达成的关联度情况，关联度强的用“H”表示，关联度中等的用“M”表示，关联度弱的用“L”表示。

## 六、核心课程

人工智能与 Python 程序设计、解剖生理学、智能医学工程导论、生物医学数字信号处理、模式识别与深度学习、生物医学电子学 I、单片机 C 程序设计、生物医学电子学 II、嵌入式系统设计、医学图像处理与计算机视觉、医学大数据分析

## VI Core Courses

Artificial Intelligence and Python Programming、Anatomy and Physiology、Introduction to Intelligent Medical Engineering、Biomedical Digital Signal Processing、Pattern Recognition and Deep Learning、Biomedical Electronics I、C Programming for Micro-controller、Biomedical Electronics II、Embedded Systems Design、Medical Image Processing and Computer Vision、Medical Big Data Analysis

## 七、主要实践性教学环节

大学物理实验 A（1）、大学物理实验 A（2）、电子实训、生物医学电子学实验 I、生物医学电子学实验 II、解剖生理学实验、智能医学工程综合课程设计 I（可穿戴医疗仪器）、智能仪器课程设计、智能医学工程综合课程设计 II（医学人工智能）、工程训练、鸿蒙硬件开发实训、机器学习应用实训

## VII Main Internship and Practical Training

College Physics Experiments A (I)、College Physics Experiments A (II)、Electrical Engineering Training、Biomedical Electronics Experiments I、Biomedical Electronics Experiments II、Anatomy and Physiology Experiments、Intelligent Medical Engineering Comprehensive Course Design I (Wearable Medical Devices)、Intelligent Instrumentation Course Design、Intelligent Medical Engineering Comprehensive Course Design II (Medical Artificial Intelligence)、Engineering Training、HarmonyOS Hardware Development Training、Machine Learning Application Training

## 八、学时与学分

### VIII Hours/Credits

学时学分构成表

Table of Hours and Credits

课程类别 Courses Classified		学时/周数 Period/Weeks	学分 Credits		学分比例 Proportion of Credits	
			理论 Theory	实验(实践) Practice		
通识课程平台 General Courses Platform	必修 Compulsory	512	26	3	19.3%	
	选修 Elective	112	7	/	4.67%	
学科基础课程平台 Basic Courses Platform	必修 Compulsory	692	35.5	4.5	26.67%	
专业课程平台 Major Courses Platform	必修 Compulsory	236	11	2.5	9%	
	选修 Elective	480	19.5	7	17.67%	
集中性实践教学平台 Practical Teaching Platform	必修 Compulsory	26W	/	26	17.3%	
	选修 Elective	0	/	0		
素质拓展平台 Quality Development Platform	双创学分 Innovation & Entrepreneurship Credits	必修 Compulsory	32	2	/	1.33%
	其他学分 Other Credits		80+1W	5	1	4%
小计 Amount	必修学分总数 Compulsory Credits	116.5	选修学分总数 Elective Credits	33.5	选修学分比例 Proportion of Elective Credits	22.3%
	理论学分总数 Theory Credits	105	实践学分总数 Practice Credits	43	实践教学环节比例 Proportion of Internship and Practical Training	28.7%
最低毕业学分 The Lowest Graduate Credits		150				

注：Φ学分比例：各教学平台或教学环节占最低毕业学分的比例。

②实践教学环节，包括集中性实践教学环节和实验教学（不含体育）。集中性实践教学环节，包括培养方案内集中实施的实践、实习、课程设计、毕业设计、毕业论文、社会调查等；实验教学，包括课内实验和独立开设实验。

③必修学分总数=通必学分+学科基础学分+专必学分+实践必修学分+素质拓展学分；

选修学分总数=通选学分+专选学分+实践（选修）学分；

理论学分总数=所有平台理论学分之和（不包括双创学分）；

实践学分总数=所有平台实践学分之和（不包括双创学分）；

最低毕业学分=必修学分+选修学分=理论学分+实践学分+双创学分。

## 九、教学进程计划表

### IX Teaching Schedule Form

表一：通识课程平台 / Form I: General Course Platform

表一（A）：通识必修课程/Form I (A):General Compulsory Courses (General Required)

课程编号 Course Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
20W100000613	英语 1 English 1	2	32	32				1
218110000313	体育 1 Physical Education 1	0/1	26			26		1
217100014918	思想道德与法治 Moral Education and Rule of Law	2.5/0.5	52	40		12		2
217100015218	形势与政策 Situation and Policy	2	32	32				1-8
225100000118	中华民族共同体概论 The Introduction to Community for the Chinese Nation	1.5/ 0.5	36	24		12		2
20W100000713	英语 2 English 2	2	32	32				2
218110000213	体育 2 Physical Education 2	0/1	32			32		2
2171000122	中国近现代史纲要 Essentials of China Modern and Contemporary History	2.5/ 0.5	52	40		12		1
20W100002623	跨文化交际 Intercultural Communication	2	32	32				3/4
20W100002523	中外文化比较 Comparison of Chinese and Western Cultures	2	32	32				3/4
20W100001618	中华文化导论（英文） Introduction to Chinese Culture	2	32	32				3/4
20W100001518	英语国家社会与文化 Society and Culture of English Speaking Countries	2	32	32				3/4
20W100001318	高级媒体英语视听说 Advanced Media English: Watching, Listening and Speaking	2	32	32				3/4
20W100001018	学术英语阅读与写作 Academic Reading and Writing	2	32	32				3/4
218110015018	体育 3 Physical Education 3	0/0.5	16			16		3
217100012318	马克思主义基本原理 Basis Principles of Maxism	2.5/0.5	52	40		12		4

217100015818	毛泽东思想和中国特色社会主义理论体系概论 Introduction to MAO Zedong Thought and Socialist Theoretical System with Chinese Characteristics	2.5/0.5	52	40		12		3
217100015918	习近平新时代中国特色社会主义思想概论 Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	2.5/0.5	52	40		12		5
218110014718	体育 4 Physical Education 4	0/0.5	16			16		4
218110014018	体育 5 Physical Education 5	0/0.5	16			16		5
218110015318	体育 6 Physical Education 6	0/0.5	16			16		6
<b>学分要求：必修学分 29</b> <b>Demand of Credits: Required 29</b>								

注：大学英语扩展课程包括学术英语阅读与写作、高级媒体英语视听说、英语国家社会与文化、中华文化导论（英文）、跨文化交际（英文）、中外文化比较，要求在第 3,4 学期完成 2 学分即可。

注：大学英语扩展课程包括学术英语阅读与写作、高级媒体英语视听说、英语国家社会与文化、中华文化导论（英文）、跨文化交际（英文）、中外文化比较，要求在第 3,4 学期完成 4 学分即可。

**表一（B）：通识选修课程（通选课）/Form I (B): General Elective Courses**

模块 Module	学分 Crts.
心理健康与安全 Psychological Health and Safety	7  注： 1. 必修心理健康教育、大学生生命与财物防护实务和 美育相关课程； 2. 必修文科类课程 1 门。
人文素养与写作 Humanistic Accomplishment and Writing	
科学技术与工程 Science and Technology & Engineering	
艺术体验与审美 Art Appreciation and Aesthetics	
国际视野与世界 Contemporary China and the World	
中华文化与文明 Chinese Culture and Civilization	
创业素养与实践	
<b>学分要求：选修学分 7</b> <b>Demand of Credits: Elective 7</b>	

表二：学科基础课程平台

Form II. Basic Course Platform

课程类别 Course Classified	课程编号 Courses Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
学科基础必修 Basic Courses Required	2101000113	高等数学 A(1) Advanced Mathematics A(1)	4	80	64			16	1	
	2101000118	线性代数 Linear Algebra	2	48	32			16	1	
	212100023923	电路分析 Circuit Analysis	2/0.5	52	32	12		8	2	
	210100025623	高等数学 A(2) Advanced Mathematics A(2)	4.5	96	72			24	2	
	209100064918	人工智能与 Python 程序设计 Artificial Intelligence and Python Programming	1.5/1	56	24	32			2	AI 类
	211100010918	大学物理 A(1) College Physics A(1)	3	56	48			8	2	
	211112003313	大学物理 A(1)实验 College Physics Experiments A(1)	0/0.5	16	0	16			2	
	212100029423	生物医学电子学 I Biomedical Electronics I	3.5	56	56				3	铸牢类
	212110023823	生物医学电子学实验 I Biomedical Electronics Experiments I	0/1	24	0	24			3	
	211100011018	大学物理 A(2) College Physics A(2)	3	56	48			8	3	
	211112003413	大学物理 A(2)实验 College Physics Experiments A(2)	0/0.5	16	0	16			3	
	2101000112	概率论与数理统计 Probability and mathematical statistics	2.5	56	40			16	3	
	210100025423	复变函数 (B) Functions of Complex Variable (B)	2	48	32			16	3	
	212100029823	生物医学电子学 II Biomedical Electronics II	3	48	48				4	铸牢类
	212110023723	生物医学电子学实验 II Biomedical Electronics Experiments II	0/1	24	0	24			4	
	212103003613	信号与系统 Signal and System	3.5	64	56			8	4	
	212100029123	工程项目管理与经济决策 Engineering Project Management and Economic Decision-Making	1	16	16				5	



课程类别 Course Classified	课程编号 Courses Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
学分要求：必修学分 40 Demand of Credits: Required 40										

表三：专业课程平台

Form III: Major Courses Platform

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Name	学分 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
专业必修 Required Courses	212100023523	智能医学工程导论 Introduction to Intelligent Medical Engineering	1	16	16				3	AI 类
	212103006213	解剖生理学 Anatomy and Physiology	3.5	64	56			8	5	铸牢类
	212110023423	解剖生理学实验 Anatomy and Physiology Experiment	0/1.5	36	0	36			5	
	212100023623	生物医学数字信号处理 Biomedical Digital Signal Processing	3/0.5	60	48	12			5	
	212100025223	模式识别与深度学习 Pattern Recognition and Deep Learning	3.5/0.5	68	56	12			5	AI 类
专业选修 Elective courses	212100022623	工程制图 Engineering Drafting	2/0.5	44	32	12			1	需注明选修学分要求和学生在某一学期最少选修学分  第 1 学期不少于选 3.5 学分  第 2 学期最少选 2 学分  第 3 学期最少选 9 学分
	212100022823	生物医学工程前沿 Frontiers in Biomedical Engineering	1	16	16				1	
	212100023123	医用基础化学 Medical Foundation Chemistry	2/0.5	44	32	12			1	
	212103001113	临床医学概论 Introduction to Clinical Medicine	2	32	32				1	
	212100023023	生物医学工程伦理 Ethics and Professional Norms of Biomedical Engineering	2	32	32				2	
	212100024623	生物化学 Biochemistry	2/0.5	44	32	12			2	
	212100024123	单片机 C 程序设计 C Programming for Microcontrollers	2/1	56	32	24			3	
	212100011218	虚拟仪器 Virtual Instrument	1/0.5	28	16	12			3	
	212100008913	分子生物学 Molecular Biology	2	32	32				3	
	212100009113	医学细胞生物学 Medical Cell Biology	2	32	32				3	
	212100024223	程序设计 (C/C++) Programming C/C++	3/1	72	48	24			3	
	212100025523	面向对象程序设计 (JAVA) Object Oriented Programming (JAVA)	2/0.5	44	32	12			3	
	212100024723	数据结构 Data Structure	2	32	32				4	

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Name	学分 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
	212100011718	嵌入式系统设计 Embedded System Design	2/1	56	32	24			4	第4学期最少选5学分
	212110025423	医学细胞与分子检测实验 Medical Cell and Molecular Detection Experiment	0/1	24	0	24			4	
	210100027023	人工智能数学基础 Mathematical Foundations of Artificial Intelligence	2	32	32				4	AI类
	212103006513	生物统计学 Biostatistics	2	32	32				4	第5学期最少选8学分
	212100028523	移动医疗 APP 开发与应用 Mobile Medical APP Development and Application	2/0.5	44	32	12			5	
	212100027923	医学大数据分析 Big Data Analytics for Healthcare	2	32	32				4	
	212100024823	可编程数字系统 Programmable Digital System	1.5/0.5	36	24	12			5	
	212103004313	医学成像技术与设备 Medical Imaging Technology and Equipment	2.5	40	40				5	
	212100030223	数据库技术与应用 Database Technology and Applications	2/0.5	44	32	12			5	
	212100030423	自然语言处理 Natural Language Processing	2/0.5	44	32	12			5	
	212100024423	生物医学传感与测量仪器 Biomedical Sensors and Measurement Instruments	3.5/0.5	68	56	12			5	第6学期最少5学分
	212100030123	医学检验与体外诊断仪器 Medical laboratory and analytical instruments	2/0.5	44	32	12			6	
	212100028623	病理生理学 Pathophysiology	2	32	32				6	
	212100025123	医学图像处理与计算机视觉 Medical image Processing and Computer Vision Technology	3.5/0.5	68	56	12			6	AI类
	212100019218	生物芯片 Biochip	2	32	32				6	第6学期最少5学分
	212100025723	生物医学信息检索（双语） Biomedical Information Retrieval (Bilingual)	1	16	16				6	
	212100029023	药理学 Pharmacology	2	32	32				6	
	212103001713	生物医学光子学导论 Introduction to Biomedical Photonics	2	32	32				7	
	212100025923	生物材料（A） Biomaterials（A）	2	32	32				7	

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Name	学分 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
	212103002713	生物物理学 Biophysics	2	32	32				7	
	212100024323	医疗器械管理与法规 Medical Device Management and Regulations	2	32	32				7	
<b>学分要求: 40 (其中必修学分 13.5, 选修学分 26.5)</b> <b>Demand of Credits: 40 ( Required 13.5, Elective 26.5)</b>										

表四：集中性实践课程平台

Form IV: Practical Teaching Platform

课程类别 CourseClassified	课程编号 CourseCode	实践教学名称 Course Name	学分 Crs.	周数/学时数 Total Period/Hrs.	学时类型 PeriodClassified		开课学期 Semester	
					实践 Exp.	实习 Pra.		
实践 Teaching Practice	必修 Compul sory Courses	112110010718 劳动教育 Labor Education	1	32	√		1-7	
		109110000318 军事技能训练 Military Skill Training	/2	36	√		1	
		212110026123 电子实训 Electrical Engineering Training	0/1	1W		√	2	
	选修 Elective Courses	212110026023 医学临床工程实践 Medical Clinical Engineering Practice	2	12W	√		7	
		212110027023 医疗器械工程实践 Medical Device Engineering Practice	2	12W	√		7	
	课程设计 Project Design	必修 Compul sory Course	212110029523 智能医学工程综合课设 I (可穿戴医疗仪器) Intelligent Medical Engineering Comprehensive Course Design I (Wearable Medical Devices)	2	2W	√		4
			212110027723 智能仪器课程设计 Intelligent Instrumentation Course Design	2	2W	√		5 AI 类
			212110026623 智能医学工程综合课设 II (医学人工智能) Intelligent Medical Engineering Comprehensive Course Design II (Medical Artificial Intelligence)	2	2W	√		6 AI 类
		选修 Elective Courses	212110027823 人机协同课程设计 Human-Machine Collaborati on Course Design	2	2W	√		6 AI 类
	212110026823 智能视觉课程设计 Intelligent Vision Course Design		2	2W	√		6 AI 类	
	小计 Amount		必修学分 10, 选修学分 0					
	实习 Teaching Exercitati on	专业实习 Teaching Exercitati on	必修 Compul sory Course	212110019018 专业认知实习 Professional recognizing practice	1	1W		√
701110000118 工程训练 A Engineering training A				1	24		√	5
212110028423 鸿蒙硬件开发实训 HarmonyOS Hardware Development Training				2	2W		√	3
212110026723 机器学习应用实训 Machine Learning Application Training				2	2W		√	5 AI 类
毕业实习		选修						

课程类别 CourseClassified		课程编号 CourseCode	实践教学名称 Course Name	学分 Crs.	周数/学时数 Total Period/Hrs.	学时类型 PeriodClassified		开课学期 Semester
						实践 Exp.	实习 Pra.	
Graduation Practice	Elective Courses							
毕业论文(设计) Graduation Thesis (Project)	必修 Compulsory Course	01845010	毕业论文 Undergraduate Thesis	10	12W			8
小计 Amount		必修学分 16, 选修学分 0						
<b>学分要求: 26 (必修学分 26, 选修学分 0)</b> <b>Demand of Credits: 26 (Required 26, Elective 0)</b>								

表五：素质拓展平台

Form V: Quality Development Platform

课程编号 Course Code	课程/模块名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
109100000418	军事理论 Military Theory	2	36	36				1
109100000818	国家安全教育 National Security Education	1	16	16				2
	美育实践	1	/			/		1-7
/	创新教育 Innovation Education	2	/					
115100000213	大学生职业生涯与发展规划 Career and Development Planning of University Students	1	16	16				1
115100000113	就业指导 Employment Guidance	1	16	16				6
<b>学分要求：必修学分 8</b> <b>Demand of Credits: Required 8</b>								

执笔人：

学院盖章：

审核人：

完成日期：