南方科技大学 SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

课程详述
COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	**课程名称 Course Title**	**生物医学概论 Introduction to Biomedical Science**
2.	**授课院系 Originating Department**	南方科技大学伦敦国王学院医学院 SUSTech-KCL School of Medicine
3.	**课程编号 Course Code**	JEIS104
4.	**课程学分 Credit Value**	3
5.	**课程类别 Course Type**	专业基础课 Major Foundational Course
6.	**授课学期 Semester**	秋季 Fall
7.	**授课语言 Teaching Language**	英文 English
8.	**授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师） Instructor(s), Affiliation & Contact（For team teaching, please list all instructors）**	Gangjian QIN, School of Medicine, Email: qingj@sustech.edu.cn
9.	**实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact**	待公布 To be announced
10.	**选课人数限额 (可不填) Maximum Enrolment（Optional）**	

11.		讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other（Please specify）	总学时 Total
	授课方式 Delivery Method					
	学时数 Credit Hours	48	N/A	N/A	N/A	48

12.	先修课程、其它学习要求 **Pre-requisites or Other Academic Requirements**	无 None
13.	后续课程、其它学习规划 **Courses for which this course is a pre-requisite**	无 None
14.	其它要求修读本课程的学系 **Cross-listing Dept.**	无 None

教学大纲及教学日历 | Syllabus and Academic Calendar

15. 教学目标 Course Objectives

"Fundamentals of Biomedical Science" is a major foundational course for undergraduate students who major in medicine and life science-related subjects. The aim is to introduce basic concepts and knowledge in biology and medicine that will aid students' subsequent studies of medical and professional courses. The course will help students gain basic understanding of functional integration and homeostasis of human organ systems, transmission of biological information, and adaptation to environment. Through discussion of hot topics and medical problems and analysis of real clinical cases, the students will learn trends of biomedical advancements and gain perspectives on the global challenges of health care.

生物医学概论是一门主要专业基础课程，教学目的是为医学和生命科学相关专业的本科生提供医学的重要基础-生命科学的基础知识。为学生进一步学习其它基础医学以及临床医学等学科奠定基础，灌输生物医学的全局观和独特视角。通过对现今医学问题和实例的讨论与分析，初步了解专业领域的发展趋势与专业运作机制与价值。

16. 预达学习成果 Learning Outcomes

Learning outcomes: Upon completion of this section, the students should be able to

1. Understand basic concepts and knowledge in biology and medicine;
2. Understanding functional integration and homeostasis of human organ systems, transmission of biological information, and adaptation to environment;
3. Develop an understanding of the biological study of medicine or the application of biological principles to medical research and practice;
4. Develop an understanding and awareness of follow-up medicine and professional courses
5. Cultivate the ability to think independently and have a rigorous and realistic scientific style.

本课程完成后，学生将能够：

1. 掌握生命科学的基本知识；
2. 了解人体器官系统及其功能整合和稳态、生物信息的传递和对环境的适应；
3. 培养从生物学角度研究医学，或将生物学原理应用到医学研究和实践中去的认识；
4. 培养对后续医学和专业课程初步了解和认识；
5. 培养独立思考的能力和严谨求实的科学作风。

17. 课程内容及教学日历 （如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）
Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

第 1 章 探索生命与科学
1.1 生命的特征
1.2 人类与其他动物的关系
1.3 科学作为一个过程
1.4 科学与社会面临的挑战

Chapter 1: Exploring Life and Science
1.1 The Characteristics of Life
1.2 Humans Are Related to Other Animals
1.3 Science as a Process
1.4 Science and the Challenges Facing Society

第一单元 人体的组成
UNIT 1 HUMAN ORGANIZATION

第 2 章 生命的化学
2.1 从原子到分子
2.2 水与生命
2.3 生命分子
2.4 碳水化合物
2.5 脂质
2.6 蛋白质
2.7 核酸

Chapter 2: Chemistry of Life
2.1 From Atoms to Molecules
2.2 Water and Life
2.3 Molecules of Life
2.4 Carbohydrates
2.5 Lipids
2.6 Proteins
2.7 Nucleic Acids

专题讨论 1：微生物学技术：分离致病微生物以鉴别和挑选敏感性抗生素治疗；病原微生物检测以快速诊断传染性（风疹、单纯疱疹、肝炎和艾滋病等）疾病
TBL symposium 1: Microbiology Techniques: 1) Isolation of pathogens and testing their sensitivity to antibiotics; 2) Rapid detection of virus (Rubella, herpes simplex, hepatitis and AIDS) to aid clinical diagnosis of infectious diseases

第 3 章 细胞的结构与功能
3.1 什么是一个细胞？
3.2 细胞是如何组成的？
3.3 细胞膜及其物质如何穿过它
3.4 细胞核和内膜系统
3.5 细胞骨架、细胞运动和细胞连接
3.6 细胞新陈代谢和能量反应

Chapter 3: Cell Structure and Function
3.1 What Is a Cell?
3.2 How Cells Are Organized?
3.3 The Plasma Membrane and How Substances Cross It
3.4 The Nucleus and Endomembrane System
3.5 The Cytoskeleton, Cell Movement, and Cell Junctions
3.6 Metabolism and the Energy Reactions

专题讨论 2：细胞中的信号转导
TBL symposium 2: Signal Transduction in the Cell

第 4 章 组织、器官系统与稳态
4.1 组织类型
4.2 结缔组织连接和支撑
4.3 肌肉组织移动身体

4.4 神经组织联络
4.5 上皮组织保护
4.6 器官系统、体腔和体膜
4.7 外皮系统
4.8 稳态

Chapter 4: Tissues, Organ Systems, and Homeostasis
4.1 Types of Tissues
4.2 Connective Tissue Connects and Supports
4.3 Muscular Tissue Moves the Body
4.4 Nervous Tissue Communicates
4.5 Epithelial Tissue Protects
4.6 Organ Systems, Body Cavities, and Body Membranes
4.7 Integumentary System
4.8 Homeostasis

第二单元 人体的维持
UNIT 2 MAINTENANCE OF THE HUMAN BODY

第 5 章 心血管系统：心脏和血管
5.1 心血管系统概述
5.2 血管的类型
5.3 心脏是双泵
5.4 血压
5.5 两种心血管途径
5.6 毛细管交换
5.7 心血管疾病

Chapter 5: Cardiovascular System: Heart and Blood Vessels
5.1 Overview of the Cardiovascular System
5.2 The Types of Blood Vessels
5.3 The Heart Is a Double Pump
5.4 Blood Pressure
5.5 Two Cardiovascular Pathways
5.6 Exchange at the Capillaries
5.7 Cardiovascular Disorders

第 6 章 心血管系统：血液
6.1 血液：概述
6.2 红细胞和气体的运输
6.3 白细胞与疾病防御
6.4 血小板与凝血
6.5 人类血型
6.6 血液稳态

Chapter 6: Cardiovascular System: Blood
6.1 Blood: An Overview
6.2 Red Blood Cells and the Transport of Gases
6.3 White Blood Cells and Defense Against Disease
6.4 Platelets and Blood Clotting
6.5 Human Blood Types
6.6 Homeostasis

第 7 章：淋巴系统和免疫系统
7.1 淋巴系统
7.2 先天免疫防御
7.3 适应性免疫防御
7.4 获得性免疫
7.5 免疫系统紊乱

Chapter 7: The Lymphatic and Immune Systems
7.1 The Lymphatic System
7.2 Innate Immune Defenses
7.3 Adaptive Immune Defenses

7.4 Acquired Immunity
7.5 Disorders of the Immune System

专题讨论 3：疫苗与健康
TBL symposium 3: Vaccine and health

第 8 章 传染病生物学
8.1 细菌和病毒
8.2 传染病与人类健康
8.3 新发疾病和 COVID-19
8.4 抗生素耐药性

Chapter 8: Biology of Infectious Diseases
8.1 Bacteria and Viruses
8.2 Infectious Diseases and Human Health
8.3 Emerging Diseases and COVID-19
8.4 Antibiotic Resistance

第 9 章 消化系统与营养
9.1 消化概述
9.2 口腔、咽部和食道
9.3 胃和小肠
9.4 附属器官和分泌物的调节
9.5 大肠和排便
9.6 营养与体重控制
9.7 肝脏与物质代谢

Chapter 9: Digestive System and Nutrition
9.1 Overview of Digestion
9.2 The Mouth, Pharynx, and Esophagus
9.3 The Stomach and Small Intestine
9.4 The Accessory Organs and Regulation of Secretions
9.5 The Large Intestine and Defecation
9.6 Nutrition and Weight Control
9.7 Liver and Metabolism

第 10 章：呼吸系统
10.1 呼吸系统
10.2 上呼吸道
10.3 下呼吸道
10.4 呼吸机制
10.5 通风控制
10.6 体内气体交换
10.7 呼吸系统疾病

Chapter 10: Respiratory System
10.1 The Respiratory System
10.2 The Upper Respiratory Tract
10.3 The Lower Respiratory Tract
10.4 Mechanism of Breathing
10.5 Control of Ventilation
10.6 Gas Exchange in the Body
10.7 Disorders of the Respiratory System

第 11 章：泌尿系统
11.1 泌尿系统
11.2 肾脏结构
11.3 尿液形成
11.4 肾脏和体内平衡
11.5 泌尿系统疾病

Chapter 11: Urinary System
11.1 The Urinary System
11.2 Kidney Structure

11.3 Urine Formation
11.4 Kidneys and Homeostasis
11.5 Urinary System Disorders

第三单元 人体的运动与支撑
UNIT 3 MOVEMENT AND SUPPORT IN HUMANS

第 12 章：骨骼系统
12.1 骨骼系统概述
12.2 轴向骨架的骨骼
12.3 附肢骨架的骨骼
12.4 衔接
12.5 骨骼生长与稳态

Chapter 12: Skeletal System
12.1 Overview of the Skeletal System
12.2 Bones of the Axial Skeleton
12.3 Bones of the Appendicular Skeleton
12.4 Articulations
12.5 Bone Growth and Homeostasis

第 13 章：肌肉系统
13.1 肌肉系统概述
13.2 骨骼肌纤维收缩
13.3 全肌收缩
13.4 肌肉疾病
13.5 肌肉稳态

Chapter 13: Muscular System
13.1 Overview of the Muscular System
13.2 Skeletal Muscle Fiber Contraction
13.3 Whole Muscle Contraction
13.4 Muscular Disorders
13.5 Homeostasis

第四单元 人体的整合与协调
UNIT 4 INTEGRATION AND COORDINATION IN HUMANS

第 14 章：神经系统
14.1 神经系统概述
14.2 中枢神经系统
14.3 边缘系统和高级心理功能
14.4 周围神经系统
14.5 药物治疗和毒品使用所致疾病

Chapter 14: Nervous System
14.1 Overview of the Nervous System
14.2 The Central Nervous System
14.3 The Limbic System and Higher Mental Functions
14.4 The Peripheral Nervous System
14.5 Drug Therapy and Substance Use Disorders

第 15 章：感官
15.1 感觉受体和感觉概述
15.2 躯体感官
15.3 味觉和嗅觉
15.4 视觉
15.5 听觉
15.6 平衡感

Chapter 15: Senses
15.1 Overview of Sensory Receptors and Sensations
15.2 Somatic Senses
15.3 Senses of Taste and Smell

15.4 Sense of Vision
15.5 Sense of Hearing
15.6 Sense of Equilibrium

第 16 章：内分泌系统
16.1 内分泌腺
16.2 下丘脑和垂体
16.3 甲状腺和甲状旁腺
16.4 肾上腺
16.5 胰腺
16.6 其他内分泌腺体
16.7 激素与稳态

Chapter 16: Endocrine System
16.1 Endocrine Glands
16.2 Hypothalamus and Pituitary Gland
16.3 Thyroid and Parathyroid Glands
16.4 Adrenal Glands
16.5 Pancreas
16.6 Other Endocrine Glands
16.7 Hormones and Homeostasis

第五单元 生殖
UNIT 5 REPRODUCTION IN HUMANS

第 17 章：生殖系统
17.1 人类生命周期
17.2 男性生殖系统
17.3 女性生殖系统
17.4 卵巢周期
17.5 生殖控制
17.6 性传播疾病

Chapter 17: Reproductive System
17.1 Human Life Cycle
17.2 Male Reproductive System
17.3 Female Reproductive System
17.4 The Ovarian Cycle
17.5 Control of Reproduction
17.6 Sexually Transmitted Diseases

第 18 章 发育与衰老
18.1 受精
18.2 胚胎发育
18.3 胎儿发育
18.4 怀孕和分娩
18.5 衰老

Chapter 18: Development and Aging
18.1 Fertilization
18.2 Embryonic Development
18.3 Fetal Development
18.4 Pregnancy and Birth
18.5 Aging

专题讨论 4：干细胞技术与组织再生
TBL symposium 4: Stem Cell Technology and Tissue Regeneration

第六单元：人体遗传学
UNIT 6 HUMAN GENETICS

第 19 章：细胞分裂
19.1 染色体
19.2 细胞周期

19.3 有丝分裂
19.4 减数分裂
19.5 减数分裂和有丝分裂的比较
19.6 染色体遗传

Chapter 19: Cell Division
19.1 Chromosomes
19.2 The Cell Cycle
19.3 Mitosis
19.4 Meiosis
19.5 Comparison of Meiosis and Mitosis
19.6 Chromosome Inheritance

第 20 章：癌症
20.1 癌症概述
20.2 癌症的病因和预防
20.3 癌症诊断
20.4 癌症的治疗

Chapter 20: Cancer
20.1 Overview of Cancer
20.2 Causes and Prevention of Cancer
20.3 Diagnosis of Cancer
20.4 Treatment of Cancer

第 21 章：遗传
21.1 基因型和表型
21.2 单性状和双性状遗传
21.3 遗传疾病
21.4 超越简单的遗传模式
21.5 性别连锁遗传

Chapter 21: Genetic Inheritance
21.1 Genotype and Phenotype
21.2 One- and Two-Trait Inheritance
21.3 Inheritance of Genetic Disorders
21.4 Beyond Simple Inheritance Patterns
21.5 Sex-Linked Inheritance

专题讨论 5：细胞学和组织病理学检测技术：肿瘤细胞和组织活检检测
TBL symposium 5: Detection and Classification of Cancer from Microscopic Biopsies

专题讨论 6：遗传病的诊断；组学技术和大数据分析在生物医学中的应用
TBL symposium 6: Diagnosis of Genetic Diseases; Omics and Big data in Biomedical Sciences

第 22 章 DNA 生物学与技术
22.1 DNA 和 RNA 的结构与功能
22.2 基因表达
22.3 DNA 技术
22.4 基因组学与基因治疗

Chapter 22: DNA Biology and Technology
22.1 DNA and RNA Structure and Function
22.2 Gene Expression
22.3 DNA Technology
22.4 Genomics and Gene Therapy

专题讨论 7：基因编辑与合成生物学在生物医药中的应用；生物安全与伦理
TBL symposium 7: Gene Editing and Synthetic Biology in Biomedicine and Pharmaceutics; Bio-safety and Bio-ethics

第七单元 人类进化与生态学
UNIT 7 HUMAN EVOLUTION AND ECOLOGY

第 23 章：人类进化

23.1 生命的起源
23.2 生物进化
23.3 人类的分类
23.4 古人类的进化
23.5 人类的进化

Chapter 23：Human Evolution
23.1 Origin of Life
23.2 Biological Evolution
23.3 Classification of Humans
23.4 Evolution of Hominins
23.5 Evolution of Humans

第 24 章 生态学与生态系统的性质
24.1 生态系统的性质
24.2 生态系统中的能量流
24.3 全球生物地球化学循环

Chapter 24：Ecology and the Nature of Ecosystems
24.1 The Nature of Ecosystems
24.2 Energy Flow in Ecosystems
24.3 Global Biogeochemical Cycles

第 25 章 人类与生物圈的互动
25.1 人口增长
25.2 人类对资源的利用和污染
25.3 生物多样性
25.4 努力实现可持续发展的社会

Chapter 25：Human Interactions with the Biosphere
25.1 Human Population Growth
25.2 Human Use of Resources and Pollution
25.3 Biodiversity
25.4 Working Toward a Sustainable Society

专题讨论 8：地球变暖和大气污染对人类健康的影响；生活环境和食品对健康的影响
TBL symposium 8: The Effect of Global Warming and Air Pollution on Health; Living Environment- and Food-borne Diseases

Team-based learning (TBL) is a structured form of small-group learning that emphasizes student preparation out of class and application of knowledge in class. Students are organized strategically into diverse teams of 5-7 students that work together throughout the class. Each TBL symposium includes processes such as pre-test and peer review, etc.

教学日历 | Academic Calendar

Section	Topic	Hours
Lecture 1	探索生命与科学; 生命的化学 Exploring Life and Science; Chemistry of Life	2
TBL symposium 1	微生物学技术：分离致病微生物以鉴别和挑选敏感性抗生素治疗；病原微生物检测以快速诊断传染性（风疹、单纯疱疹、肝炎和艾滋病等）疾病 Microbiology Techniques: 1) Isolation of pathogens and testing their sensitivity to antibiotics; 2) Rapid detection of virus (Rubella, herpes simplex, hepatitis and AIDS) to aid clinical diagnosis of infectious diseases	2
Lecture 2	细胞的结构与功能 Cell Structure and Function	2
TBL symposium 2	细胞中的信号转导 Signal Transduction in the Cell	2

Lecture 3	组织、器官系统与稳态 Tissues, Organ Systems, and Homeostasis	2
Lecture 4	心血管系统：心脏和血管 Cardiovascular System: Heart and Blood Vessels	2
Lecture 5	心血管系统: 血液; 淋巴系统和免疫系统 Cardiovascular System: Blood; The Lymphatic and Immune Systems	2
TBL symposium 3	疫苗与健康 Vaccine and health	2
Lecture 6	传染病生物学; 消化系统与营养代谢 Biology of Infectious Diseases; Digestive System and Nutrition	2
Lecture 7	呼吸系统; 泌尿系统 Respiratory System; Urinary System	2
Lecture 8	骨骼系统; 肌肉系统 Skeletal System; Muscular System	2
Lecture 9	神经系统; 感官 Nervous System; Senses	2
Lecture 10	内分泌系统 Endocrine System	2
Lecture 11	生殖系统; 发育与衰老 Reproductive System; Development and Aging	2
TBL symposium 4	干细胞技术与组织再生 Stem Cell Technology and Tissue Regeneration	2
Lecture 12	细胞分裂 Cell Division	2
Lecture 13	癌症; 遗传 Cancer; Genetic Inheritance	2
TBL symposium 5	细胞学和组织病理学检测技术：肿瘤细胞和组织活检检测 Detection and Classification of Cancer from Microscopic Biopsies	2
TBL symposium 6	遗传病的诊断、组学技术和大数据分析在生物医学中的应用 Diagnosis of Genetic Diseases; Omics and Big data in Biomedical Sciences	2
Lecture 14	DNA 生物学与技术 DNA Biology and Technology	2
TBL symposium 7	基因编辑与合成生物学在生物医药中的应用；生物安全与伦理 Gene Editing and Synthetic Biology in Biomedicine and Pharmaceutics; Bio-safety and Bio-ethics	2
Lecture 15	人类进化 Human Evolution	2
Lecture 16	生态学与生态系统的性质; 人类与生物圈的互动 Ecology and the Nature of Ecosystems; Human Interactions with the Biosphere	2

TBL symposium 8	地球变暖和大气污染对人类健康的影响；生活环境和食品对健康的影响 The Effect of Global Warming and Air Pollution on Health; Living Environment- and Food-borne Diseases	2
	Final review and discussion	

以上课程信息可能根据实际授课需要或在课程优化之后产生变动。如对课程有任何疑问，请联系授课教师。
The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

18. 教材及其它参考资料 Textbook and Supplementary Readings

- *Human Biology 17th ed. Sylvia S. Mader, Michael Windelspecht, McGraw-Hill Higher Education 2023. Print ISBN 9781260710823, 1260710823; eText ISBN 9781264407620, 1264407629*
- *Campbell biology 12th ed. Lisa A. Urry et al. New York, NY : Pearson 2021. Identifiers: LCCN 2019039139 | ISBN 9780135188743 (hardcover),ISBN 9780135988046 (ebook)*
- *Molecular Biology of the Cell 7th ed. Bruce Alberts et al, New York : W. W. Norton & Company. 2022 Identifiers: LCCN 2021049376 | ISBN 9780393884821 (hardcover) | ISBN 9780393884630 (epub)*

Supplementary Reading Material

- *《生物医学导论》曹新主编 第 2 版 2016, 人民卫生出版社*

课程评估 ASSESSMENT

19.

评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance		5		
课堂表现 Class Performance				
小测验 Quiz		15		
课程项目 Projects				
平时作业 Assignments		20		
期中考试 Mid-Term Test				
期末考试 Final Exam		30		
期末报告 Final Presentation				
其它（可根据需要改写以上评估方式） Others (The above may be		30		TBL symposia

modified as necessary)				

20. **记分方式 GRADING SYSTEM**

√ A. **十三级等级制 Letter Grading**
☐ B. **二级记分制（通过/不通过） Pass/Fail Grading**

课程审批 REVIEW AND APPROVAL

21. **本课程设置已经过以下责任人/委员会审议通过**
This Course has been approved by the following person or committee of authority

The course has been reviewed and approved by the JEI New Course Review Panel Meeting (新课程审核小组会议纪要)

It is a fundamental physics course/module required by the BMS curriculum. The instructor is competent and has experience teaching the course/module, and the course content and Syllabus are appropriate for the BMS curriculum. The required teaching facility is available.

The teaching materials were reviewed. Their political, ideological, scientific and applicability meet the requirements of the JEI, and no issues are observed in their political standpoint and value orientation.

Signature of the Executive Dean: Date: