生物技术（中澳）专业主干课程简介（部分）

序号	课程名称（中文）	课程名称（英文）
1	植物学	Botany
2	动物学	Zoology
3	生物技术专业导论	Introduction to the major of biotechnology
4	生物技术概念	Concepts of biotechnology
5	微生物学	Microbiology
6	生物化学	Biochemistry
7	细胞生物学	Cell biology
8	遗传学	Genetics
9	分子生物学	Molecular biology
10	生理学	Physiology
11	科学研究技巧	Research skills in Science
12	环境微生物学	Environmental microbiology
13	环境生物学	Environmental Biology
14	环境生物技术	Environmental biotechnology
15	基因和蛋白质生物化学	Biochemistry of genes and proteins

1. Botany （植物学）

Botany is a basic course of the students majoring in Biotechnology. Lectures and discussions about structure and developmental processes of various plants enables that students have a preliminary understanding of the structural characteristics of the plant at the levels from cell to tissue, organ and individuals, and of the basic knowledge of plant classification. Through the experiment, students may be trained to improve their abilities to analyze，design and try to resolve problems.

本课程是生物技术专业学生的基础课，使学生从植物细胞、组织、器官、个体等水平理解各种植物体的结构特征，掌握其发育过程；使学生能够对植物进行初步鉴定和分类；通过实验培养学生分析问题、设计并解决问题的能力。

2. Zoology （动物学）

Botany is a basic course of the students majoring in Biotechnology. Lectures and discussions about typical structure and morphology of various animals enables that students have a preliminary understanding of the structural characteristics of the animals, and of the basic knowledge of animal classification. Through the experiment, students may know the process of animal development from simple to complex, from aquatic to terrestrial, and may enhance the consciousness of protect animals and protect our natural environment.

本课程是生物技术专业学生的基础课，主要介绍动物各类群的典型形态、结构及各类群的分类依据。使学生能够正确认识动物的形态结构和分类方法。通过实验，使学生了解动物从简单到复杂、从水生到陆生的变化过程，增强保护动物、保护自然环境的意识。

3. Introduction to the major of biotechnology（生物技术专业导论）

This is a basic course for the freshman majoring in Biotechnology. Several professors will introduce the basic information to the freshman about this major, including the biotechnology major undergraduate student training scheme, preliminary knowledge of main courses of this major so that the students may adapt to university studies as soon as possible and may know somewhat the required courses and trainings that they must complete.

本课程是面向生物技术专业大一新生的一门基础课。本课程由多位教授为新生介绍关于本专业的人才培养方案以及主要专业课程的基本知识，以便让学生尽快适应大学的学习生活，基本了解本专业必须要完成的课程以及实践训练等。

4.Concepts of biotechnology（生物技术概念）

Overview of main types of energy transformations within the cell, role of enzymes and their action, fates of metabolites. Application of enzymes to biotechnology processes. Growth and handling. Structure, function, modes of replication or transmission of selected bacteria, viruses. Roles of microorganisms in disease, role in environmental cycles, industrial applications of microorganisms, use of microorganisms in biotechnology. Principles of major molecular biology and genetic engineering techniques, including restriction enzymes and their uses, major types of cloning vectors, construction of libraries, Southern and Northern blotting, hybridisation, PCR, DNA typing. Applications of above techniques in human health, medicine, agriculture and the environment. Introduction to the human genome project, gene therapy, molecular diagnostics, forensics, creation and uses of transgenic plants and animals, animal cloning, use of micro-organisms in industrial biotechnology.

细胞内能量转换主要类型;酶的作用及其反应活动;酶在生物技术过程中的应用;特定细菌和病毒的生长与处理、结构与功能、复制和传播模式；微生物在致病、环境循环、工业、生物技术方面的作用，微生物工业应用，生物技术中微生物应用；主要分子生物学和遗传工程技术的法则，包括限制酶及其作用、克隆载体主要类型、基因文库构建、Southern 杂交、Northern 杂交、PCR 等技术在人类健康、医药、农业、环境的应用；人类基因组计划、基因疗法、分子诊断学、取证、转基因动植物的的建立和使用、动物克隆、微生物在工业生物技术中的应用等。

5.Microbiology（微生物学）

This course is a degree professional course of students majoring in Biotechnology. The course introduces a survey of micro-organisms, structure and function of bacterial cells, microbial metabolism including photosynthesis, nutrition and growth of bacteria, counting techniques, microbial genetics, and how to control of microbial growth, sterilisation and disinfection.

微生物学是生物技术专业学生的一门专业学位课程，其内容主要包括：微生物的调查；细菌的结构和功能；微生物的新陈代谢，包括光合作用，营养和生长；微生物的计数方法;微生物遗传学;如何控制微生物生长、如何进行灭菌和消毒等。

6.Biochemistry（生物化学）

This course introduces the structure, chemical properties and function of the main classes of biomolecules including monosaccharides, polysaccharides, amino acids, peptides and proteins, fatty acids, triacylglycerols and related lipids, nucleotides and nucleic acids. Protein architecture and its relationship to protein function. Enzyme

kinetics, reaction mechanisms, methods for enzyme assay and analysis, inhibition of enzyme activity. Reactions of glycogenolysis, glycolysis, Krebs cycle and oxidative phosphorylation. Overview of nitrogen catabolism and lipid catabolism and their integration with carbohydrate catabolic pathways. Practical program to support the above theory including spectrophotometry, quantitative and qualitative analysis of carbohydrates and proteins, handling of enzymes and determination of their kinetic properties. Of course also safety in the laboratory.

本课程主要介绍重要生物分子如：糖类、氨基酸、蛋白质、脂肪酸、磷脂、核酸等的结构、化学特性和功能；蛋白质的结构与功能的关系；酶动力学、反应机理、酶活检验及抑制酶活性的方法；糖原分解、糖酵解、三羧酸循环和氧化磷酸化的反应；氮的分解代谢和脂代谢的概述及其与碳水化合物的代谢途径的整合等。

7.Cell Biology（细胞生物学）

This course is a degree professional course of students majoring in Biotechnology. The course introduces the structures and functions of the cell (membrane structure and organelles, nucleus and chromosomes, cytoskeleton), life process of the cell (signal transduction, cell division and differentiation, cell aging and death), and the origin and evolution of the cell, on a microscopic, submicroscopic and molecular level.

细胞生物学是生物技术专业的一门专业学位课程，该课程从显微、亚显微及分子水平介绍细胞的结构和功能（膜和细胞器、细胞核和染色体、细胞骨架）；细胞的生命过程（信号传导、细胞分裂和分化、细胞衰老和死亡）以及细胞的起源和进化。

8.Genetics（遗传学）

This course mainly introduces the genetic rules; sex linked inheritance; genetic analysis of fungi, viruses, bacteria; quantitative traits; extranuclear inheritance; the types and mechanism of genetic recombination; epigenetics; population genetics.

本课程主要介绍连锁遗传规律；伴性遗传；真菌、病毒、细菌的遗传分析；数量性状遗传；遗传重组的类型及机制；表观遗传学；群体遗传学等。

9.Molecular biology（分子生物学）

This course mainly introduces the structure and function of biological macromolecules; the principles of gene expression and regulation in prokaryotes and eukaryotes, including regulation of transcription, RNA processing, genetic code and tRNA, protein synthesis; the research methods of molecular biology.

本课程主要介绍生物大分子的结构和功能；原核生物和真核生物的基因表达与调控，包括转录调控，RNA 加工，遗传密码子和 tRNA，蛋白质合成；分子生物学的研究方法。

10. Physiology（生理学）

Through lectures and practical exercises, theoretical and practical material forming the introductory concepts for the course are presented. These concepts are basic and will provide the student with various skills in scientific method and laboratory techniques, analysis and safety. The course include: cellular physiology, homeostasis, neural physiology, sensory physiology, blood physiology, digestive physiology, respiratory physiology, energy metabolism, endocrine and reproductive physiology.

通过讲课和实践操作，使学生掌握理论与实践知识以及相关的科学方法和实验技能，主要内容包括：细胞生理学、稳态、神经生理学、感觉生理学、血液生理、消化生理、呼吸生理、能量代谢、内分泌及生殖生理。

11. Research skills in Science（科学研究技巧）

Literature review: abstracting and paraphrasing, citations and bibliographies. Identification of proposed research topic, methodology and hypotheses. Research preparation: Problem formulation, research design, objectives and scope, ethics. Planning strategies, information sources, time management and team work. Research methodologies appropriate to the sciences. Research presentation and follow up: layout, style, press release and follow-up strategies.

文献评论：概要和段落，引用和参考文献；建立研究主题、方法和假说；研究准备：问题规划、研究设计、目标和范围、伦理；规划策略、信息来源、时间管理和团队合作；确立科学的研究方法；研究展示和推进：作品布局、风格，出版作品和推进策略。

12. Environmental microbiology（环境微生物学）

Role of micro-organisms in food spoilage. Food borne pathogens and toxins, control methods, food preservation methods. Viruses host-parasite relationships. The immune system of host responses to infection. Clinical and diagnostic microbiology. Fermentation microbiology: manufacture of food, bioreactors.

微生物在食品变质中的作用；食源性致病菌和毒素的控制方法及食品保鲜方法；病毒与宿主之间的关系；宿主免疫系统对感染的反应；临床及诊断微生物学；发酵微生物学（食品制造及食物反应器）。

13. Environmental biology（环境生物学）

The biological transport and transformation of environmental pollutants. The effects of environmental pollutants on life. The survey of the biological effects of pollutants. Survey and biological assessment of the environmental quality. Principles and methods of biological purification. The applications of gene engineering in bioremediation of environmental pollution. The applications of fermentation engineering in controlling environmental pollution. Bioremediation of the polluted environment.

环境污染物生物转运与转化的过程、环境污染物对生物的影响、污染物的生物效应检测、环境质量的生物监测与生物评价、生物净化的原理与方法、基因工程与环境污染生物治理、发酵工程在环境污染生物治理中的应用、污染环境的生物修复等。

14. Environmental Biotechnology（环境生物技术）

Content will vary according to modern trends in biotechnology and is expected to include: Environmental role of biotechnology in sustainable development including grey water treatment and microbiological safety of grey water. Bioremediation and biomass utilisation. Plant and agricultural biotechnology. Microbial fermentations – organisms, culture conditions, metabolic processes. Downstream processing in biotechnology. DNA and protein microarrays. Human cell growth and Tissue Engineering. Nanotechnology and molecular motors.

根据当代生物技术发展趋势，课程内容可能会有变动，主要将包括：生物技术在

可持续性发展中的环境方面的作用，包括污水处理和污水中微生物的安全性；生物治理和生物量的利用；植物和农业生物技术；微生物发酵 —— 生物、培养条件、代谢过程；生物技术的下游过程；DNA 和蛋白质微阵列技术；人类细胞生长和组织工程；纳米技术和分子马达。

15. Biochemistry of Genes and Proteins（基因和蛋白质生物化学）

Gene structure, mutations in genes and their effects, particularly in relation to human genetics diseases. Variable repetitive DNA sequences, VNTRs, microsatellites, applications of these in DNA typing, with particular reference to forensic science. Genetic recombinations in gene complexes encoding antibodies and their significance for the human immune system. Faulty recombination and its implications to gene structure, function, genetics. Chromosomal rearrangements and their effects. Introduction to the laboratory applications of the above information wherever appropriate, e.g., techniques based on DNA structure and replication (e.g., DNA sequencing, hybridisations, PCR) in forensic, genetic diagnoses, drug design.

基因突变与人类遗传疾病。可变重复 DNA 序列、可变串联重复位点（VNTRs）、微卫星及其在法医学中的应用。编码抗体的基因重组在人类免疫系统中的重要性；错误重组及其对基因结构、功能和遗传的影响。染色体重排及其影响；上述信息在实验室的应用，如基于 DNA 结构和复制的技术（DNA 测序、杂交、 PCR）在法医、遗传诊断、药物设计等领域的应用。