

课程大纲

COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	生物大分子结构与功能 Structure and Function of Biomacromolecules
2.	课程性质 Compulsory/Elective	选修 Elective
3.	开课单位 Offering Dept.	医学院 School of Medicine
4.	课程学分/学时 Course Credit/Hours	3 学分/48 学时
5.	授课语言 Teaching Language	英文 English
6.	授课教师 Instructor(s)	李婉秋 (liwq3@sustech.edu.cn)
7.	开课学期 Semester	秋季 Autumn
8.	是否面向本科生开放 Open to undergraduates or not	否
9.	先修要求 Pre-requisites	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 生物化学
10.	教学目标 Course Objectives	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 生命是复杂且动态的。所有的生物都是由同一组化学元素组成的, 主要是碳、氮、氧、氢、硫和磷。生物大分子包含核酸、蛋白质和多糖, 它们分别由核苷酸、氨基酸和单糖形成。生物大分子通过与其他生物大分子或者小分子相互作用而发挥其生物学功能, 也是正常生命活动的基础。研究和学习生物大分子的结构, 有利于了解其作用机制, 也是理解正常生命活动、探讨疾病发生和发展分子机制的重要手段。本课程的目标是通过讲授生物大分子的结构与功能之间的相关性, 帮助学生掌握生物大分子的基本组成, 理解生物大分子发挥作用的的基础, 了解生物大分子研究相关的常用技术手段, 同时, 学生通过学习本课程, 为后续的深造学习和实际的科学研究奠定重要基础。
11.	教学方法 Teaching Methods	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 1. 采用多媒体教学方式授课, 促进学生更好地掌握和理解生物大分子的结构特性以及与功能的相关性。 2. 采用引入式教学, 鼓励学生多提问、勤思考, 让学生融入课堂, 加强课堂讨论环节, 激发学生的学习兴趣。 3. 理论联系实际, 促进学生将本课程所学内容灵活应用到实际的科学研究与工作中。
12.	教学内容 Course Contents	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)
	Section 1	1. Introduction to Biomacromolecules: Nucleic acid, Protein, Glycans, from structure to function.

Section 2	2. Biomacromolecular structure: NUCLEIC ACIDS 2.1 Nucleotides: Constituents of Nucleic Acids. 2.2 Structural Organization. 2.3 Sequence Analysis of Nucleic Acids.
Section 3	2. Biomacromolecular structure: NUCLEIC ACIDS 2.4 Nucleotides: Constituents of Nucleic Acids. 2.5 Structural Organization. 2.6 Sequence Analysis of Nucleic Acids. 2.7 Secondary Structure and Structure Polymorphism of DNA. 2.8 Supercoiling and Tertiary Structure of DNA. 2.9 Classification and Structures of RNA. 2.10 RNA Folds and Structure Motifs.
Section 4	2. Biomacromolecular structure: NUCLEIC ACIDS 2.11 Energetics of Nucleic Acid Structure. 2.12 Nucleic Acid Application. 2.13 Nucleic Acid Purification and Characterization.
Section 5	3. Biomacromolecular structure: PROTEINS 3.1 Amino Acids: Constituents of Proteins. 3.2 Architecture of Protein Molecules. 3.3 Primary Structure of Proteins: Chemical and Enzymatic Sequence Analysis. 3.4 Primary Structure of Proteins: Sequence Analysis by Tandem Mass Spectrometry.
Section 6	3. Biomacromolecular structure: PROTEINS 3.1 Secondary Structures and Motifs of Proteins. 3.2 Domains and Tertiary Structures of Proteins.
Section 7	3. Biomacromolecular structure: PROTEINS 3.8 Quaternary (Subunit) Structures of Proteins.
Section 8	3. Biomacromolecular structure: PROTEINS 3.9 In Vitro protein expression systems. 3.10 Purification and Characterization: Chromatography, Electrophoresis.
Section 9	4. Biomacromolecular structure: CATALYSIS (ENZYMES) 4.1 Biocatalyst: Definition and Classification. 4.2 Characteristics of Enzymes.
Section 10	4. Biomacromolecular structure: CATALYSIS (ENZYMES) 4.3 Enzyme Kinetics. 4.4 Enzyme Mechanisms. 4.5 Enzyme Regulation.
Section 11	4. Biomacromolecular structure: CATALYSIS (ENZYMES) 4.1 Abzyme. 4.2 Ribozyme.
Section 12	5. Biomacromolecular structure: POLYSACCHARIDES 5.1 Monosaccharides: Constituents of Glycans. 5.2 Sequence Analysis of Polysaccharides: Primary Structure. 5.3 Conformation: Secondary and Tertiary Structures of Polysaccharide Chains. 5.4 Conformation: Description of Some Polysaccharide Structures.

Section 13	5. Biomacromolecular structure: POLYSACCHARIDES 5.5 Glycobiology: Study of Glycoprotein- Associated Glycans.
Section 14	6. Biomacromolecular interactions 6.1 Protein-Protein interactions. 6.2 Protein-Nucleic Acid interactions.
Section 15	7. Studies of Biomacromolecular structures 7.1 Genome, Proteome and Glycomic Informatics: Databases and Web Servers. 7.2 Structure Determination Methods: NMR, X-Ray, Cryo-EM etc.
Section 16	8. Discussion, Presentation and Review
13. 课程考核 Course Assessment	
<p>(① 考核形式 Form of examination; ②. 分数构成 grading policy; ③ 如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)</p> <p>① 考核形式 闭卷考试;</p> <p>② 分数构成 本课程的考核分为期末考试和平时成绩 (小测验 + Presentation) 两部分: 总评成绩: 理论考试 (50%) + 平时成绩 (30% + 20%)</p>	
14. 教材及其它参考资料 Textbook and Supplementary Readings	
Biomacromolecules: Introduction to Structure, Function and Informatics C. Stan Tsai ISBN: 978-0-470-08011-5 2007	