

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	医学有机化学 Medical Organic Chemistry
2.	授课院系 Originating Department	医学院 School of Medicine
3.	课程编号 Course Code	MED105
4.	课程学分 Credit Value	4
5.	课程类别 Course Type	专业基础课/Major Basic Courses
6.	授课学期 Semester	秋季/ Fall
7.	授课语言 Teaching Language	中英双语 English & Chinese
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)	胡海亮, 副教授, 医学院, huhl@sustech.edu.cn Hailiang Hu, Associate professor, School of Medicine, huhl@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	

11. 授课方式 Delivery Method	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
学时数 Credit Hours	64	0	0	0	64
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无/NA				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	无/NA				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无/NA				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

本课程旨在为学生提供基础理论知识以便于学生理解有机分子，尤其是生物有机大分子的特性，结构及反应活性，用实际例子去阐明有机化学在生物和医学学科的重要性。

This course aims to provide students with the basic principles to understand the characteristics, structure and reactivity of organic molecules, especially the bioorganic macromolecules, with examples illustrating the role of organic chemistry in biology and medicine.

16. 预达学习成果 Learning Outcomes

- 1 能够理解有机化学的基本概念，并能够有效的运用其中的专业名词；
- 2 能够形象地画出有机分子的结构表达式；
3. 理解有机分子结构和物理化学特性的基本原则；
- 4 能够理解常见官能团的性质（醇、醚、羟基化合物、醛、酮、酰卤化合物、羧酸酐、酯类、酰胺、氰类和胺）；
- 5 能够根据色谱数据判断出有机化合物的结构。

On successful completion of this course, students should be able to:

1. understand basic concepts and employ the vocabulary of organic chemistry;
2. draw correct structural representations of organic molecules;
3. understand the basic principles of structure and physical-chemical properties of organic molecules;
4. understand the properties of the common functional groups (alcohols, ethers, carbonyl compounds, aldehydes, ketones, carboxylic acids, acyl halides, anhydrides, esters, amides, nitriles, and amines);
5. determine structures of organic compounds based on spectroscopic data.

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.)

1. 医学有机化学 绪论

有机化合物和有机化学；共价键的形成和理论；分子的极性和分子间的作用力；有机化合物的分类；分子结构；分子式和实验式；有机酸碱概念

Introduction and Review

The origins of organic chemistry and organic compounds; Bonding in Organic compounds; molecular polarity and attractions between molecules; Classifications and reaction types of organic compounds; Structural formulas; Molecular formulas and empirical formulas; Acid-base theory

2. 立体化学

手性，手性分子和对映体；光学活性；费舍尔投影式；构型标记法；外消旋化合物；非对映异构体和内消旋化合物；对映异；手性分子的来源和生物作用

Stereochemistry

Chirality, asymmetric carbon atoms and enantiomers; Optical activity; Fischer projections; Diastereomers; Chiral compounds without asymmetric atoms; Stereochemistry of molecules with two or more asymmetric carbons; Meso compounds; Absolute and relative configuration; Physical properties of diastereomers; Resolution of enantiomers. Reform of chiral molecules and biological functions

3. 烷烃和烯烃的结构

烷烃的命名；烷烃的物理性质；烷烃的结构与构象；环烷烃；环己烷的构象；双取代环己烷的构象

烯烃的命名；烯烃的稳定性；烯烃的物理性质；炔烃的化学性质

Structure of Alkanes and Alkenes

Nomenclature of alkanes; Physical properties of alkanes; Structure and conformations of alkanes; Cycloalkanes; Cyclohexane conformations; Conformations of disubstituted cyclohexanes

Nomenclature of alkenes; Stability of alkenes; Physical properties of alkenes; chemical properties of Alkene

4. 卤代烃

卤代烃的命名和分类；卤代烃的日常用途；卤代烃的结构；卤代烃的物理性质；卤代烃的化学性质

Alkyl Halides

Nomenclature and classification of alkyl halides; Common uses of alkyl halides; Structure of alkyl halides; Physical properties of alkyl halides; chemical properties of alkyl halides

5. 醇的结构

醇的命名；醇的结构及分类；醇的物理性质；甲醇和乙醇的功能和毒性；硫醇的结构，命名；硫醇的物理性质和化学性质；酚的结构，分类和命名；酚的物理和化学性质

Structure of Alcohols

Nomenclature of alcohols; Structure and classification of alcohols; Physical properties of alcohols; functions and toxicity of methanol and ethanol; structure and nomenclature of Sulfur alcohol; physical and chemical properties of sulfur alcohol; structure, classification and nomenclature of phenols; physical and chemical properties of phenols

6. 醚、环氧化合物和硫化物

醚、环氧化合物和硫化物的命名；醚的物理性质；醚的自身氧化；环氧化合物的合成；硫化物

Ethers, Epoxides, and Sulfides

Nomenclature of ethers, epoxides and sulphides; Physical properties of ethers; Autoxidation of ethers; Synthesis of epoxides; Sulfides (Thioethers)

7. 酮和醛

酮和醛的分类和命名；酮和醛的物理性质；醛和酮的化学性质

ketones and aldehydes

Classification and Nomenclature of ketones and aldehydes; Physical properties of ketones and aldehydes; chemical properties of ketones and aldehydes

8. 羧酸

羧酸的命名；羧酸的结构和物理性质；羧酸的酸性；羧酸盐；取代羧酸；羟基酸；酮酸

Carboxylic Acids

Nomenclature of carboxylic acids; Structure and physical properties of carboxylic acids; Acidity of carboxylic acids; Salts of carboxylic acids; substituted acids; hydroxy acids; keto-acids

9. 羧酸衍生物

酸衍生物的结构与命名；羧酸衍生物的物理性质；羧酸衍生物的化学性质；尿素和丙二酰脲

Carboxylic Acids Derivatives

Structure and nomenclature of acid derivatives; Physical properties of carboxylic acid derivatives; chemical properties of carboxylic acid derivatives; urea and barbiturates

10. 胺

胺的命名；胺的结构；胺的物理性质；胺的化学性质；芳香重氮盐；生物碱

Amine

Nomenclature of amines; Structure of amines; Physical properties of amines; chemical properties of amines; Aromatic diazonium salts; Alkaloids

11. 芳基化合物

苯的发现;苯的结构与性质; 苯的物理性质; 苯的化学性质; 稠环芳基化合物; 芳香性-Hückel's 规则

Aromatic Compounds

The discovery of benzene; Nomenclature of aromatic compounds; The structure and properties of benzene; The chemical properties of benzene; Fused-ring aromatic compounds; aromaticity-Hückel's Rule

12. 脂

油脂; 甘油三酸酯; 磷脂; 甾类化合物; 萜类化合物

Lipids

Fats and oils; Triglycerides; Phospholipids; Steroids; Terpenes

13. 碳水化合物-糖类

碳水化合物的分类; 单糖; 双糖; 多糖

Carbohydrates

Classification of carbohydrates; Monosaccharides; Disaccharides; Polysaccharides

14. 氨基酸、多肽和蛋白质

α -氨基酸的结构和立体化学; 氨基酸的酸碱性质; 氨基酸的合成; 氨基酸的拆分; 氨基酸的反应; 多肽和蛋白质的命名以及结构; 多肽结构的鉴定; 蛋白质的分类; 蛋白质结构的分级; 蛋白质的变性

Amino Acids, Peptides, and Proteins

Structure and stereochemistry of the α -amino acids; Acid-base properties of amino acids; Synthesis of amino acids; Resolution of amino acids; Reactions of amino acids; Structure and Nomenclature of Peptides and Proteins; Peptide structure determination; Classification of proteins; Levels of protein structure; Protein denaturation

15. 核酸

核酸; 简介; 核糖核苷和核苷酸; 核糖核酸的结构; 脱氧核糖和脱氧核糖核酸的结构; 核苷酸的加成作用

Nucleic acids

Nucleic acids: introduction; Ribonucleosides and Ribonucleotides; The structure of Ribonucleic acid; Deoxyribose and the structure of deoxyribonucleic acid; Additional functions of nucleotides

16. 核磁共振光谱和质谱

吸收光谱， UV 光谱， 远红外光谱， 核磁的介绍；核磁共振谱图；质谱的介绍；通过质谱确定分子式

Nuclear Magnetic Resonance Spectroscopy and Mass Spectroscopy

General principle of absorption spectra; Ultraviolet-visible spectra; infrared spectra; Introduction of nuclear magnetic; Carbon-13 NMR spectroscopy; Interpreting carbon NMR spectra; Introduction to Mass spectrometry; Determination of the molecular formula by mass spectrometry.

Section	Topic	Hours
1	医学有机化学 绪论 Introduction and Review	2
2	立体化学 Stereochemistry	4
3	烷烃和烯烃的结构 Structure of Alkanes and Alkenes	6
4	卤代烃 Alkyl Halides	4
5	醇的结构 Structure of Alcohols	4
6	醚、环氧化合物和硫化物 Ethers, Epoxides, and Sulfides	4
7	酮和醛 ketones and aldehydes	4
8	羧酸 Carboxylic Acids	4
9	羧酸衍生物 Carboxylic Acids Derivatives	4
10	胺 Amine	4
11	芳基化合物 Aromatic Compounds	4
12	脂 lipids	4
13	碳水化合物-糖类 Carbohydrates	4
14	氨基酸、多肽和蛋白质 Amino Acids, Peptides, and Proteins	4
15	核酸 Nucleic acids	4
16	核磁共振光谱和质谱 Nuclear Magnetic Resonance Spectroscopy and Mass Spectroscopy	4

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

- 1、陆阳，罗美明，李柱来，李发胜 《有机化学》，第9版，人们卫生出版社，2018
- 2、唐玉海：《医用有机化学》高等教育出版社，第3版，2014
- 3、Xia Shuzhen, Luo Yiming, Feng Wenfang : 《Organic Chemistry for students of Medicine and Biology》, Huazhong University of Science and Technology Press, 2011 年
4. 张普庆主编 《医学有机化学》，科学出版社，第二版，2008

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				
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments		10		
期中考试 Mid-Term Test		30		
期末考试 Final Exam		60		
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 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

本课程已经过医学院教学副院长张文勇教授审核通过。