

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	仪器分析实践 Practice of Instrumental Analysis
2.	授课院系 Originating Department	化学系 Department of Chemistry
3.	课程编号 Course Code	CH305-2
4.	课程学分 Credit Value	2
5.	课程类别 Course Type	专业核心课 Major Core Courses
6.	授课学期 Semester	春季 Spring
7.	授课语言 Teaching Language	中文 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)	<p>朱秀珍, 化学系, 工程师 ZHU Xiu-Zhen, Chemistry Department, Teaching Engineer 第一教学楼 535 室 Rm.535, No.1 Teaching Bldg. zhuxz@sustech.edu.cn</p> <p>何绮婷, 化学系, 工程师 HE Qi-Ting, Chemistry Department, Teaching Engineer 第一教学楼 537 室 Rm.537, No.1 Teaching Bldg. heqt@sustech.edu.cn 0755-8801-8741</p> <p>房芳, 化学系, 工程师 FANG Fang, Chemistry Department, Teaching Engineer 第一教学楼 532 室 Rm.532, No.1 Teaching Bldg. fangf@sustech.edu.cn 0755-8801-8731</p> <p>李晓华, 化学系, 工程师 LI Xiao-Hua, Chemistry Department, Teaching Engineer</p>

	<p>第一教学楼 537 室 Rm.537, No.1 Teaching Bldg. lixh3@sustech.edu.cn 0755-8801-8738</p> <p>王春燕, 化学系, 工程师 WANG Chun-Yan, Chemistry Department, Teaching Engineer 第一教学楼 536 室 Rm.536, No.1 Teaching Bldg. wangcy@sustech.edu.cn 0755-8801-8740</p> <p>颜璵珩, 化学系, 实验员 YAN Ai-Hui, Chemistry Department, Teaching Technician 第一教学楼 533 室 Rm.533, No.1 Teaching Bldg. yanah@sustech.edu.cn 0755-8801-8733</p> <p>刘华伟, 化学系, 工程师 LIU Hua-Wei, Chemistry Department, Teaching Engineer 第一教学楼 536 室 Rm.536, No.1 Teaching Bldg. liuhw@sustech.edu.cn</p> <p>于月娜, 化学系, 工程师 YU Yue-Na, Chemistry Department, Teaching Technician 第一教学楼 533 室 Rm.533, No.1 Teaching Bldg. yuyn@sustech.edu.cn</p>				
<p>9. 实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact</p>	<p>无 NA</p>				
<p>10. 选课人数限额(可不填) Maximum Enrolment (Optional)</p>	<p>80</p>				
<p>11. 授课方式 Delivery Method</p> <p>学时数 Credit Hours</p>	<p>讲授 Lectures</p>	<p>习题/辅导/讨论 Tutorials</p>	<p>实验/实习 Lab/Practical</p>	<p>其它(请具体注明) Other (Please specify)</p>	<p>总学时 Total</p>
<p>4</p>	<p>0</p>	<p>56</p>	<p>4 for final exam</p>	<p>64</p>	
<p>12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements</p>	<p>仪器分析原理 (CH305-1)</p>				
<p>13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite</p>	<p>高等质谱分析 (CH322)</p>				
<p>14. 其它要求修读本课程的学系 Cross-listing Dept.</p>					

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

本课程涉及的仪器反映了仪器分析领域的新进展。本课程实验介绍多种仪器的基本原理，帮助学生了解仪器的基本概念和机理。授课老师在本课程从理论和操作的角度介绍仪器使用的全过程，并让学生完成实验的测试过程。选择的仪器都是价格合理的，并能满足当今大学化学和其他多学科（如材料科学、环境科学）课程的需要。

The instruments covered in this course should reflect new advances in the field of Instrumental Analysis. Experiments in this course should address the basic principles of the instruments and help the students to understand the fundamental concepts and mechanisms of the instruments. This course should facilitate the instructor to cover lab processes from both theoretical and operational perspectives, and let the students complete the experimental processes. The chosen instruments should be affordable, and meet the needs of majority of today's undergraduate chemistry and other multi-disciplinary (e.g. material science, environmental science) programs.

16. 预达学习成果 Learning Outcomes

仪器分析实践以实验操作为主，内容涉及光化学分析、波谱技术、结构分析、色谱和分离技术等。其目的主要是使学生了解现代物理测试方法、现代化学研究方法，各类现代分析测试仪器的构造与使用，规范地掌握仪器分析的基本操作和技能，进一步加深理解并掌握物理化学、仪器分析、数据处理等课程的基本知识和原理，提高学生分析问题和解决问题的能力，培养学生的创新意识和创新能力。

Based on experimental operation, the course of "Practice of Instrumental Analysis" covers the following fields: photochemical analysis, spectroscopy, structural analysis, chromatography and separation technology. Its purpose is to enable students 1) to understand the modern physical test methods, modern chemical research methods, the construction and use of all kinds of modern analysis and testing equipment; 2) to standardize the basic operation and skills of instrumental analysis; 3) to further deepen the understanding of physical chemistry, instrumental analysis and data analysis, and master the basic knowledge and principles; 4) to improve their abilities to analyse problems and solve problems; 5) to cultivate their innovative consciousness and innovation abilities.

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】仪器分析实践绪论课：4 学时，朱秀珍主讲

【2】实验课程部分：4 学时×14 个实验，共 56 学时，化学系工程师授课

- (1) 气相色谱-质谱联用仪的定性与定量分析
- (2) 倒置荧光显微镜表征荧光微球
- (3) 差分脉冲伏安法测定维生素 C 片中抗坏血酸含量
- (4) 液相色谱分析阿司匹林药片
- (5) 差示扫描量热与热重分析研究五水硫酸铜的脱水过程
- (6) 原子吸收光谱法测定水样中铜、镉、铬
- (7) 葱的相关光谱及荧光寿命的测定
- (8) 液相色谱-质谱联用仪的定性与定量分析
- (9) 离子色谱法对自来水中氟、氯、溴、硝酸根阴离子的测定
- (10) 毛细管电泳仪分离测定雪碧、芬达中苯甲酸钠
- (11) 核磁共振一维谱图（氢谱）/同荷化学位移相关二维谱（ ^1H - ^1H COSY）
- (12) 基质辅助激光解析(吸附)电离-飞行时间质谱检测多肽及蛋白样品
- (13) 粉末 X 射线衍射仪的介绍
- (14) 单晶结构衍射仪的介绍

【3】期末考试：4 学时，课堂报告

【1】Introduction to "Practice of Instrumental Analysis": 4 Credit Hours, Dr. ZHU Xiu-Zhen

【2】Experimental Courses: 4 Credit Hours×14=56 Credit Hours, Chemistry Department

- (1) Qualitative and Quantitative Analysis by Gas Chromatography-Mass Spectrometer
- (2) Characterization of Fluorescent Microspheres by Inverted Fluorescence Microscopy
- (3) Determination of Ascorbic Acid in Vitamin C Tablets by Differential Pulse Voltammetry
- (4) Analysis of Aspirin Tablets by Liquid Chromatography
- (5) Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA) of the Dehydration Process of Copper Sulfate Pentahydrate
- (6) Determination of Copper, Cadmium and Chromium in Water Samples by Atomic Absorption Spectrometry

(7)	Determination of Correlation Spectra and Fluorescence Lifetime of Anthracene
(8)	Qualitative and Quantitative Analysis by Liquid Chromatography-Mass Spectrometer
(9)	Determination of Fluorine, Chlorine, Bromine and Nitrate Anions in Tap Water by Ion Chromatography
(10)	Separation and Determination of Sodium Benzoate in Sprite and Fanta by Capillary Electrophoresis
(11)	One-Dimensional Proton Nuclear Magnetic Resonance Spectrum (1H-NMR)/ Two-Dimensional 1H Homonuclear Shift Correlated Spectra (1H-1H COSY)
(12)	Matrix-assisted Laser Desorption (Adsorption) Ionization-Time of Flight Mass Spectrometry for Detection of Peptides and Protein Samples
(13)	Introduction of Powder X-ray Diffractometer
(14)	Introduction of Single Crystal Structure Diffractometer
【3】 Final Exam: 4 Credit Hours	

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

(1)	刘密新 等. 仪器分析 (第 2 版). 北京: 清华大学出版社, 2008.
(2)	陈培榕, 李景虹, 邓勃. 现代仪器分析实验与技术. 北京: 清华大学出版社, 2006.

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%		病假须有医院的有效病假条, 事假须提供生活导师签字的请假条。 Sick-leave: provide an effective hospital certificate; Personal-leave: submit a written request for leave with your counsellor's signature.
课堂表现 Class Performance		35%		
小测验 Quiz		10%		实验前的小测试 Paper Based Test
课程项目 Projects				
平时作业 Assignments		40%		预习报告 10 分, 实验报告 30 分。 Pre-course report 10' Experimental report 30'
期中考试				

Mid-Term Test 期末考试 Final Exam			
期末报告 Final Presentation	10%		分组演讲报告 Group 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

化学系教学指导委员会
Teaching committee of the chemistry department

