

## 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 <b>Course Title</b>	化学与探索 <b>Chemistry and Discovery</b>
2.	授课院系 <b>Originating Department</b>	化学系 / Department of Chemistry
3.	课程编号 <b>Course Code</b>	CH104
4.	课程学分 <b>Credit Value</b>	1
5.	课程类别 <b>Course Type</b>	专业选修课 Major Elective Courses
6.	授课学期 <b>Semester</b>	春季 Spring
7.	授课语言 <b>Teaching Language</b>	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） <b>Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	<p>房芳，化学系，工程师 FANG Fang, Department of Chemistry, Teaching Engineer fangf@sustech.edu.cn 0755-88018731</p> <p>于月娜，化学系，实验师 YU Yue-Na, Department of Chemistry, Teaching Engineer yuyn@sustech.edu.cn 0755-88018378</p> <p>何绮婷，化学系，工程师 HE Qi-Ting, Department of Chemistry, Teaching Engineer heqt@sustech.edu.cn 0755-88018741</p> <p>李晓华，化学系，工程师 LI Xiao-Hua, Department of Chemistry, Teaching Engineer lixh3@sustech.edu.cn 0755-88018738</p> <p>朱秀珍，化学系，实验师</p>

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9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	无 NA				
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	每班最多容纳 20 人 Max. 20 per class				
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			32		32
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.	其它非化学专业学生均可选修本课程。 This course may also be suitable for non-specialists, i.e. for all those students who wish to take a laboratory course in chemistry.				

## 教学大纲及教学日历 SYLLABUS

### 15. 教学目标 Course Objectives

化学系推出的《化学与探索》课程，涉及到无机化学、分析化学、物理化学以及材料科学等相关领域。将材料、考古检测、化妆品护肤等日常生活中的现象和事物以化学角度进行科学分析。将化学科学知识、研究方法与技术以及其中的科学思想融入到课程之中。让学生走进化学世界，感受化学魅力。

**Chemistry and Discovery** course from Department of Chemistry relates to inorganic, analytical and physical chemistry, material science, etc. Phenomena and matter in everyday life, such as materials, astronomy, geography, archaeological testing, cosmetics and skin care, have been explored in a chemistry way. This course introduces chemical principles, methods, techniques and thinking, and opens an attractive chemistry world.

### 16. 预达学习成果 Learning Outcomes

培养学生的科学素养，观察能力、思维能力、创新能力，让学生体会科学探究的过程。让学生了解化学、认识化学、喜欢化学、学好化学。

After completing this course, students should master scientific literacy, observation ability, thinking ability, and innovation ability. Through scientific exploration, students should learn chemistry, like chemistry, and look forward to studying chemistry well.

### 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、食品与化学（4学时） Food & Chemistry (4 hours)

本实验的目的是从化学的角度科学认识食物，包括食品的色、香、味、功效、毒性等与所含成分的关系；食品加工过程中添加剂的作用和利弊关系；食品制作过程中的涉及的化学反应，常见加工食品的工艺流程与食品质量、安全等；最后，通过蛋白凝乳实验加深学生对课程内容的认识。

The aim is to study food from a chemical view point, including chemistry relating to major and minor components of food, their nutritional, physiological, sensory, flavour and microbiological aspects; chemistry of food additives, together with their metabolism, toxicology and food fate; chemical reactions induced by processing, distribution and domestic conditions and effects of processing on the composition, quality and safety of foods, other bio-based materials, by-products, and processing wastes; meanwhile, consolidation of the knowledge mentioned previously through a practical experiment: preparation of curd.

#### 2、咖啡中的化学（4学时） The Chemistry of Coffee (4 hours)

了解咖啡豆的多孔结构、烘焙工艺和风味之间的关系；咖啡豆烘焙中的美拉德反应；阿拉比卡咖啡和罗布斯塔咖啡的成分差异；水中的镁与咖啡中的风味物质结合关系；冲煮咖啡中的萃取原理等；制作手冲咖啡。

To learn about: the relationship between the porous structure of coffee beans, the roasting process and flavor; the Maillard reaction in coffee bean roasting; the compositional differences between Arabica and Robusta coffees; the relationship between magnesium in water and the binding of flavor substances in coffee; the principles of extraction in brewing coffee; making hand brewed coffee.

#### 3、蓝晒印象工艺（4学时） The Art of Cyanotype (4 hours)

蓝色颜料发展史和艺术史；蓝晒印象工艺的化学原理；感光剂的混合（柏林绿）与光照后产物（普鲁士蓝）、曝光过度产物（普鲁士白）的化学结构差异；普鲁士蓝的结构特性及合成原理（不同价态铁离子的配位环境）；通过不同材质和印刷方式来创作蓝晒作品。

The aim is to introduce the history of blue pigments and art history; the chemistry of cyanotype; the chemical structure differences between the mix of sensitizers (Berlin green) and the post-illumination product (Prussian blue) and overexposure product (Prussian white); the structural properties of Prussian blue and the principle of synthesis (coordination environments for different valence iron ions). Students are expected to create cyanotype prints through different materials and printing methods.

#### 4、智能感温感光变色材料（4学时） Smart Materials: Thermochromic and Photochromic Materials (4 hours)

介绍感温感光变色材料的变色原理、应用范围等，了解该种材料的合成方法。通过实验制作实用的变色产品，让同学们亲自观察感光变色以及感温变色现象。

To introduce the principle, application and synthesis of thermochromic and photochromic materials. Through experiments, practical thermochromic and photochromic materials are produced, and color change with temperature or UV light is observed.

#### 5、功效型护肤品（4学时） Functional Skincare Products (4 hours)

介绍功效类护肤品作用机制和原料种类；护肤品类型和适用；护肤品功效评价、质量检测等相关知识；通过实验配制护肤品并检验其功效。

To introduce the mechanism of functional skincare products, the types of raw materials and skincare products, the quality testing, etc. Several skin care products are produced in the lab and their efficiency is tested.

#### 6、功能洗护用品（4学时） Functional Washing and Care Products (4 hours)

介绍头发的结构、化学性质和生理特性；有关洗护产品的分类、组成和相关化学机理；头发的护理保养等相关知识。通过实验配制功能洗发水和护发素。

To introduce the structure, chemical properties and physiological characteristics of hair; the classification, composition and chemical mechanism of washing and care products; relevant knowledge of hair care and maintenance. Functional shampoo and conditioner will be formulated and prepared by experiment.

#### 7、贵金属快速检测（4学时） Rapid Detection of Precious Metals (4 hours)

介绍市场上贵金属首饰（金、银、铂）纯度及命名国家标准；贵金属检测仲裁方法及无损检测方法；金饰品快速检测流程及数据处理。通过X射线荧光法测定贵金属饰品中贵金属的含量及有害元素的含量。

To introduce the national standards for purity and naming of precious metal jewelry (gold, silver, platinum) on the market; precious metal detection such as arbitration and non-destructive testing methods; gold jewelry rapid detection and data processing. In the lab, the content of precious metals and harmful elements in precious metal jewelry is determined by X-ray fluorescence.

#### 8、量子点发光材料（4学时） Quantum Dot Light Emitting Materials (4 hours)

介绍发光原理、发光材料的分类和特性、发光材料的发展历史等相关知识。通过实验感受量子点的魅力，以此激发学生对化学的兴趣和热情。

To introduce the principles of luminescence, the classification, characteristics, development history of luminescent materials, etc. Through the experiment, students can enjoy the charm of quantum dots, so as to stimulate their interest in and enthusiasm for chemistry.

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

自编实验教材。  
Self-edited teaching materials.

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		10		
课堂表现 Class Performance		30		
小测验 Quiz				
课程项目 Projects		40		
平时作业 Assignments		20		
期中考试 Mid-Term Test				
期末考试 Final Exam				
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