

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	组合数学 Combinatorics				
2.	授课院系 Originating Department	数学系 Department of Mathematics				
3.	课程编号 Course Code	MAT8010				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业选修课 Major Elective Courses				
6.	授课学期 Semester	春季 Spring				
7.	授课语言 Teaching Language	英文 English				
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)	李才恒 LI Caiheng 数学系 Department of Mathematics lich@sustech.edu.cn 朱一飞 ZHU Yifei 数学系 Department of Mathematics zhuyf@sustech.edu.cn				
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	待公布 To be announced				
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	45				45

12.	先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	抽象代数 (MA214) Abstract Algebra (MA214)
13.	后续课程、其它学习规划 Courses for which this course is a pre-requisite	代数图论 Algebraic Graph Theory (MAT7012)
14.	其它要求修读本课程的学系 Cross-listing Dept.	

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

组合数学是一门研究离散结构及其构造的学科，它由众多分支组成。本课程针对基础及应用数学方向本科生设置，教学内容将覆盖组合计数、组合极值理论、图论、设计理论、有限几何、编码和密码学。教学目标旨在让学生了解和掌握组合数学的基础理论、基本方法、重要例子以及主要结果，培养学生在组合数学领域初步的科研能力。

Combinatorics is the study of discrete structures and configurations. It consists of several sub-areas. This course is for students majoring in mathematics and applied mathematics. The course will cover enumerative combinatorics, extremal combinatorics, graph theory, design theory, coding theory, finite geometry, and some parts of cryptography. The goal is to make sure that the students understand fundamental theories, important examples and main results, and can use combinatorial methods in future study and research.

16. **预达学习成果 Learning Outcomes**

完成本课程后，学生应掌握组合数学的基本概念和方法，熟悉各种组合方法和技巧，并能解决现实生活提出的问题。特别地，在学习本课程后，学生应该能够达到以下几点。

- 掌握基本知识，深入理解和掌握定义、定理、原则和公式本质。学习后，学生应该能够不仅记住概念和基本组合方法，同时也能深刻理解组合数学的基本原理和理念。
- 培养思维能力，提高对事物的观察、研究组合结构的能力。
- 提高解决实际问题的能力。学习本课程后，学生应该能够使用学到的知识解决相关的数学问题。

After completing this course, students should master the basic concepts and methods in combinatorics. After learning the course, students should be familiar with a range of methods and techniques for solving real-life problems. In particular, the students should achieve the following.

- Master the basic knowledge and acquire an in-depth understanding of the definitions, theorems, combinatorial principles and formulas. After the study, students should be able not only to remember the concepts and the basic combinatorial laws, but also understand the basic principles and ideas of combinatorial theory.
- Enhance the ability of thinking and doing research in combinatorics.
- Improve the ability of solving practical problems. After learning this course, students should be able to use the learned knowledge to solve real-life problems.

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.)

- Recurrence relations and generating functions (2 lectures)
- The principle of inclusion and exclusion (2 lectures)
- Latin squares, systems of distinct representatives, Hall's marriage theorem (4 lectures)
- Extremal set theory, including Sperner's theorem and the Erdős–Ko–Rado theorem (4 lectures)
- Finite geometry, including Gaussian coefficients, projective planes, and the Bruck–Ryser–Chowla theorem (4 lectures)
- Ramsey's theorem, including the pigeonhole principle, Ramsey numbers (3 lectures)
- Basic graph theory, including trees, Eulerian graphs, Hamiltonian graphs (3 lectures)

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

- J.H. van Lint and R.M. Wilson, A course in combinatorics, Cambridge University Press
- R.P. Stanley, Enumerative combinatorics, Vol. I, Second Edition, Cambridge University Press

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		50		三次章节作业，设置助教批改 Three chapter assignments, with a grader
期中考试 Mid-Term Test				
期末考试 Final Exam		50		闭卷 Closed-book
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)

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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

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