

课程大纲 COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	MAT7080 组合数学专题 Topics in Combinatorics
2.	课程性质 Compulsory/Elective	选修 Elective
3.	课程学分/学时 Course Credit/Hours	3
4.	授课语言 Teaching Language	英文 English
5.	授课教师 Instructor(s)	向青教授, 李才恒教授, 刘博辰副教授 Qing Xiang, Professor; Caiheng Li, Professor; Bochen Liu, Associate Professor
6.	是否面向本科生开放 Open to undergraduates or not	是 Yes
7.	先修要求 Pre-requisites	MA103b 线性代数 I & II, MA214 抽象代数 MA103b Linear Algebra, MA214 Abstract Algebra
8.	教学目标 Course Objectives	
	<p>本课程介绍组合数学的几个分支的前沿研究, 主要内容包括关联几何 (特别是有限几何), 极值组合, 代数编码, 代数/极值图论。</p> <p>This course will introduce cutting edge research in several areas of combinatorics. The main topics will involve incidence geometry (in particular, finite geometry), extremal combinatorics, algebraic coding theory and algebraic/extremal graph theory.</p>	
9.	教学方法 Teaching Methods	
	<p>将采用传统方式教授此课(版书, 课堂讨论, 作业, 课外答疑, 闭卷考试)</p> <p>The course will be taught in the standard way ("chalk and board", in-class discussion, homework, office hours, closed-book exams).</p>	
10.	教学内容 Course Contents	
	Section 1	Introduction
	Section 2	Vector Spaces
	Section 3	Forms
	Section 4	Geometries

	Section 5	Combinatorial Applications (e.g. The finite field Kakeya problem)
	Section 6	Turan numbers of bipartite graphs
	Section 7	Erdos-Ko-Rado type theorems
	Section 8	MDS codes
	Section 9	Spread and ovoids in polar spaces
	Section 10	Generalized quadrangles/polygons
	Section 11	Incidence graphs of generalized polygons
	Section 12	LDPC codes from geometries
	Section 13	
	Section 14	
11.	课程考核 Course Assessment	
	作业 (40%) + 期末考试 (60%) Assignment (40%) + Final Exam (60%)	
12.	教材及其它参考资料 Textbook and Supplementary Readings	
	1. Finite geometry and combinatorial applications, by Simeon Ball 2. Polynomial Methods in Combinatorics, by Larry Guth 3. Incidence Geometry, Eric Moorhouse	