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	代数图论 Algebraic Graph Theory
2.	授课院系 Originating Department	数学系 Department of Mathematics
3.	课程编号 Course Code	MAT7012
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	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）	李才恒，教授，数学系 慧园 3 栋 528 邮箱: lich@sustech.edu.cn 电话: 0755-88018755 Caiheng Li, Professor, Department of Mathematics Room 528, Block 3, Wisdom Garden. email: lich@sustech.edu.cn phone: 0755-88018755
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**	MA214 抽象代数 MA214 Abstract Algebra	
13. 后续课程、其它学习规划 **Courses for which this course is a pre-requisite**		
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**

代数图论是一门关于应用代数方法研究图论问题的数学分支。本课程针对基础及应用数学方向学生设置，教学内容包括群论和图论的相关知识及其联系，例如置换群，本原群及拟本原群，图的对称性，图的谱理论等。教学目标旨在让学生了解和掌握代数图论的基础理论，基本方法，重要例子以及主要结果；在将来的学习和研究中能够使用代数和组合方法去解决问题。

Algebraic graph theory is a branch of mathematics in which algebraic methods are applied to problems about graphs. This course is for students major in mathematics and applied mathematics. The course includes permutation groups, primitive and quasi-primitive groups, graph symmetry properties, spectral theory of graphs and so on. The goal is to make students to understand fundamental theory, important examples and main results, so they can use algebraic and combinatorial methods in the future study.

16. **预达学习成果 Learning Outcomes**

After completing this course, students should master the basic concepts and methods in algebraic graph theory. After learning this course, the students should be familiar with a range of methods and techniques for solving real life problems. In particular, after learning this course, the students should be able

1．to master the basic knowledge, deeply to understand and master the nature of the definitions, theorems, algebraic graph theory principles and formulae. After the study, the students should be able not only to remember the above concepts and the basic algebraic graph theory theorem, but also deeply to understand the basic principles and ideas of algebraic graph theory;

2．to train the ability of thinking and to enhance the ability to do research graphs;

3．to improve the ability of solving practical problems. After learning this course, students should be able to use the learned knowledge to solve the life related mathematical problems.

完成本课程后,学生应掌握代数图论的基本概念和方法,熟悉各种代数图论方法和技巧,并能解决现实生活提出的问题。特别是,在学习本课程后,学生应该能够

1.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代数图论定理, 同时也能深刻理解代数图论的基本原理和理念。

2.培养思维能力，提高对事物的观察，研究组合结构的能力。

3.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。

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.)

Section 1, Group actions, permutation groups；群作用和置换群。（2H）

Section 2, Transitive actions, bi-transitive actions；传递作用，二部传递作用。（7H）

Section 3, Imprimitive groups, and quotient actions; 非本原群，和商作用。（6H）

Section 4, Quasiprimitive groups, and normal quotient actions；拟本原群，及正规商作用。（6H）

Section 5, Primitive groups and quasiprimitive groups, O'Nan-Scott theorem; 本原群，拟本原群，及 O'Nan-Scott 定理。（6H）

Section 6, Orbital graphs, arc-transitive graphs and digraphs; 轨道图，弧传递图和有向图。（6H）

Section 7, Graph embeddings and regular maps; 图的嵌入和正则地图。（6H）

Section 8, Spectrum theory of graphs; 图的谱理论。（6H）

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

Required :

Norman Biggs, Algebraic Graph Theory, 2014;

Chris Gosil, Gordon Royle, Algebraic Graph Theory, 2000.

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		30%		
期中考试 Mid-Term Test		30%		
期末考试 Final Exam		40%		
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)**		4	

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