课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	MAT 8040 数论 Number Theory
2.	**课程性质** **Compulsory/Elective**	必修课 Compulsory
3.	**课程学分/学时** **Course Credit/Hours**	3 学分/48 学时
4.	**授课语言** **Teaching Language**	英文 English
5.	**授课教师** **Instructor(s)**	胡勇 HU Yong，邱雁南 QIU Yannan
6.	**是否面向本科生开放** **Open to undergraduates or not**	是 Yes
7.	**先修要求** **Pre-requisites**	（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.） 初等数论或初等数论(H)、抽象代数或抽象代数(H)； Elementary number theory or Elementary number theory (H), Abstract Algebra or Abstract Algebra (H).

8. 教学目标
Course Objectives

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

课程主要目标是令学生熟悉现代数论中的基础知识和一些基本研究工具，特别是代数数论的经典内容。通过本课程的学习，学生能初步具备继续深入数论方向研究课题的能力。

The course's main objectives will be to familiarize the students with basics of modern number theory and the most essential tools in research in number theory, especially the classic results of algebraic number theory. After taking this course, students are expected to have the ability to dive further into research topics in number theory.

9. 教学方法
Teaching Methods

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

理论课程，课堂讲授为主。
This is a theoretical course, taught by classroom lectures.

10. 教学内容
Course Contents
（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

	Chapter 1	Arithmetic over finite fields

	1.1	Quadratic reciprocity and quadratic Gauss sums
	1.2	Characters, Gauss and Jacobi sums
	1.3	Equations over finite fields
	Chapter 2	Algebraic integers and number fields
	2.1	Integral extensions
	2.2	Quadratic fields, cubic and quartic reciprocity
	2.3	Dedekind domains and ideal theory
	2.4	Extension of Dedekind domains and ramification of primes
	2.5	Cyclotomic fields
	2.6	Finiteness theorems using geometry of numbers
	Chapter 3	Discrete valuations and local fields
	3.1	Absolute values and valuations
	3.2	Hensel's lemma and Newton polygon
	3.3	Extensions and ramification of discrete valuations

11. 课程考核
Course Assessment

（①考核形式 Form of examination；②.分数构成 grading policy；③如面向本科生开放，请注明区分内容。If the course is open to undergraduates, please indicate the difference.）

(1) 考试，十三级等级记分制；Written exam, letter grading
(2) 分数构成： 平时作业 20%；期中考试：30%，期末考试：50%
Grading policy: homework 20%; midterm 30%, final exam: 50%

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

教材 Textbook: 教师自编讲义 Lecture notes by the instructor

其他参考资料 Supplementary readings:

K. Ireland and M. Rosen, A classical introduction to modern number theory, 2nd edition,

J.-P. Serre, Local fields,

冯克勤, 《代数数论》，哈尔滨工业大学出版社.