

# 哈尔滨数论短课程系列

为了促进哈尔滨地区数论方向的建设与持续发展，并加强与国内外数论学者的交流与合作，我们在此推出数论短课程系列。我们将邀请国内外数论领域资深专家，就数论领域一系列基础理论进行讲学。欢迎感兴趣的师生积极参与！

—组织者：刘春晖、秦超、王珺、张毅超

## 第一期：岩泽理论 (Iwasawa Theory)

**主讲专家：**林明辉 教授（华中师范大学）

**助课教师：**秦超、王珺

**课程时间：**2022 年 8 月 8 日至 8 月 13 日

**答疑时间：**8 月 10 日至 8 月 13 日，上午 9: 30-11: 30

**课程地点：**哈工大理学楼 901 室

♡ **第一讲：**8 月 9 日，下午 2 点-5 点

**讲授内容：** We review preliminaries on the power series ring in one variable with coefficient in the  $p$ -adic ring of integers. Along the way, we establish the Weierstrass Preparation Lemma. We also describe the structure theory of finitely generated modules over such power series ring.

♡ **第二讲：**8 月 10 日，下午 2 点-5 点

**讲授内容：** We will prove the Iwasawa asymptotic class number formula building on the structure theory. If time permits, we shall say something on the Kummer theory over a cyclotomic  $\mathbb{Z}_p$ -extension.

♡ **第三讲：**8 月 11 日，下午 2 点-5 点

**讲授内容：** We review the notion of Dirichlet  $L$ -functions. This is followed a discussion of the construction of  $p$ -adic  $L$ -function attached to these Dirichlet  $L$ -functions.

♡ **第四讲：**8 月 12 日，下午 2 点-5 点

**讲授内容：** We formulate the Iwasawa Main Conjecture for totally real fields (which is now a theorem of Mazur-Wiles, Wiles). We then give a sketch on its applications to the study of relating special values of Dedekind zeta functions to higher  $K$ -groups.

## 参考文献

- P. Bayer and J. Neukirch, On values of zeta functions and  $\ell$ -adic Euler characteristics. *Invent. Math.* 50 (1978/79), no. 1, 35-64.
- K. Iwasawa, On  $\mathbb{Z}_\ell$ -extensions of algebraic number fields, *Ann. of Math. (2)* 98 (1973), 246–326.
- J. Neukirch A. Schmidt, K. Wingberg, *Cohomology of Number Fields*, 2nd edn., Grundlehren Math. Wiss. 323 (Springer-Verlag, Berlin, 2008).
- L. C. Washington, *Introduction to cyclotomic fields*. Grad. Texts in Math. 83. Springer-Verlag, New York, 1997.
- C. Weibel, *The K-book. An introduction to algebraic K-theory*. Grad. Stud. Math. 145. Amer. Math. Soc. Providence, RI, 2013.