

Hopf Algebras

Course: MATH 6329

Semester: Winter 2016

Instructor: Yorck Sommerhäuser

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Class meetings: Tuesday 12:00 m–12:50 pm, Thursday 12:00 m–12:50 pm, Friday 1:00 pm–1:50 pm, SN 2041

Office hours: Tuesday, 4:00 pm–5:00 pm, Thursday 4:00 pm–5:00 pm and by appointment.

Textbook: S. Montgomery: Hopf algebras and their actions on rings, 2nd revised printing, Reg. Conf. Ser. Math., Vol. 82, Am. Math. Soc., Providence, 1997, ISBN-10: 0821807382.

Course description: We discuss the fundamental properties of Hopf algebras with a view toward the Kaplansky conjectures.

Objectives: The objective of the course is both to discuss the basic properties of Hopf algebras and to introduce the student to basic open questions that are the subject of current research.

Coverage: We discuss Hopf algebras and Hopf modules, integrals, Frobenius algebras, Maschke's theorem for Hopf algebras, modular functions and elements, Radford's formula for the fourth power of the antipode, trace formulas for integrals, the Larson-Radford theorem on the involutivity of semisimple Hopf algebras over fields of characteristic zero, the Nichols-Zoeller freeness theorem, the class equation for Hopf algebras, the Drinfel'd double, the exponent of a Hopf algebra, and Cauchy's theorem for Hopf algebras.

Exams: There will be a midterm exam and a comprehensive final exam. The midterm exam takes place on Tuesday, February 16. The final exam takes place during the examination period from April 11 to April 20 at a time determined by the registrar's office.

Homework: On Tuesday, a weekly exercise sheet will be handed out, containing three or four problems. This has to be completed until the next Tuesday. While it is allowed to collaborate on the problems, every student is required to write up his solution in his own words.

Marking weights:

Homework:	25 %
Midterm exam:	25 %
Final exam:	50 %