

Hopf Algebras

Course: MATH 6329

Semester: Winter 2022

Instructor: Yorck Sommerhäuser

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Class meetings: Tuesday, Thursday 11:00 am–12:15 pm

Office hours: Monday, Friday 4:00 pm–6:00 pm and by appointment.

Textbook: Y. Sommerhäuser: MATH 6329 Course Manual, 2nd ed., Memorial University, St. John's, 2022

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.

Homework: Beginning Tuesday of the second week, a weekly exercise sheet will be distributed via e-mail. This has to be submitted on the following Tuesday via e-mail. There will be no exercise sheets during the last two weeks of the semester.

Examinations: There will be no examinations.

Final mark: The final mark will be based entirely on the score of the exercise sheets.