Hopf Algebras

Course: MATH 6329

Semester: Fall 2024

Instructor: Yorck Sommerhäuser

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Class meetings: Tuesday, Thursday 2:00 pm-3:15 pm

Office hours: Monday 3:15 pm–5:15 pm, Thursday 3:45 pm–5:45 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: Every Tuesday, a weekly exercise sheet will be handed out. This has to be submitted in class on the following Tuesday. There will be no exercise sheets during the last two weeks of the semester.

Examinations: There will be no examinations. The final mark will be based entirely on the score of the exercise sheets.

Policies: Eating, drinking, and smoking is not permitted in the classroom. While attendance is not required, it will be recorded. The use of electronic devices, especially cellphones, calculators, and laptop computers, is not permitted without explicit permission of the instructor. Electronic devices have to be turned off completely. While the use of artificial intelligence is permitted, it is not allowed to copy its answers verbatim.

Memorial University accommodates students with disabilities and demands academic integrity. The corresponding university policies can be found at http://www.mun.ca/policy/site/policy.php?id=239 and in the Academic Calendar in Paragraph 6.12, respectively.

In case of natural or man-made disasters, the course may transition to remote delivery. In case of emergency, this transition might be communicated only via e-mail.