

MA 59800 - Fall 2015- Syllabus
Hopf algebras in Topology, Geometry and Physics

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Class times: TR 9:00 – 10:15 am in Math 215

Homepage for the course: <http://www.math.purdue.edu/~rkaufman/MA598sp15/>

Office hours: Thursday 10:30-11:45.

If you have a conflict with these times, we can arrange for another time to meet.

Texts: The course will draw from many references including, but not limited to the books by Sweedler, Montgomery, Kassel, Manin and articles by Radford, Quillen, Connes-Kreimer, Connes-Moscovici, Deligne, Brown, etc.

Course description:

Hopf algebras are classical objects, which underlie many constructions in mathematics. By definition they are algebraic objects, but they appear naturally as functions on a group. More recently they have started to play an increasing role in physics and number theory. We will start with the basic algebraic definitions, examples and main theorems. After this we will move to the topological/geometric side and consider how these structures arise in these contexts.

The next topic of study will be their occurrence in analysis and mathematical physics through the work of Connes and Kreimer. Finally we aim to consider their role in number theory, through the work of Connes-Moscovici and their role in motivic theory as explained by Goncharov, Deligne and more recently Francis Brown.

Required Work: Besides the expected participation in class there may be homework assignments. There will be the choice of an oral presentation during the semester or a written project at the end of the semester.

Academic Adjustments for Students with Disabilities:

In this mathematics course accommodations are managed between the instructor, student and DRC Testing Center.

Students should see instructors outside class hours – before or after class or during office hours – to share your Accommodation Memorandum for the current semester and discuss your accommodations as soon as possible.