

CO 739 Combinatorial Hopf algebras and renormalization
Winter 2020
Tuesdays and Thursdays 11:30-12:50, MC 5417

Instructor: Karen Yeats Office hours: Tuesdays after class (or drop by or email)
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Outline

We will be looking at combinatorial Hopf algebras. We will study a number of classical and interesting Hopf algebras that appear in combinatorics. There will be some emphasis on how Hopf algebras appear in renormalization in quantum field theory, and those examples which lead there.

You do not need to know any physics to take this course. You should know something about at least one of enumerative combinatorics, abstract algebra, or renormalization in quantum field theory.

Grading

Homework will be roughly biweekly and typically due on Thursdays in class.

Final project 40% Homework 60%

You are welcome to discuss the homework assignments with your classmates, but you must **write them up independently** and **explicitly acknowledge** any discussions. Late assignments may be considered on a case-by-case basis, but **only** if you have contacted me **before** the deadline.

Project

I am leaving open what form your final project should take (I hope some of you will take me up on unusual project formats and maybe we'll have a play or a dance or ? Other possibilities are lesson plans for elementary or secondary classes or for a math circle, academic posters, presentations, or written projects).

As a rough guideline, if you do a written project alone it should be between 6 to 10 pages, if you do a presentation alone it should be 20 to 30 minutes,

if you do a combination written/presentation, it should be 4 or 5 pages with a 10 to 15 minute presentation. If you do something else it should in some sense be roughly equivalent in scope. If you are not sure come talk to me.

Formalities

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility.

[Check www.uwaterloo.ca/academicintegrity/ for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, <http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing academic offenses and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the undergraduate associate dean. For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline, <http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>. For typical penalties check Guidelines for the Assessment of Penalties, <http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm>.

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals, <http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm>.

Note for students with disabilities: Access Ability Services, located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without

compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the Access Ability Services at the beginning of each academic term.