

# Pmath 863, Introduction to Lie Groups and Lie Algebras Winter 2023

## Basic information.

- Time and Place: 8:30am-9:20am MWF, DWE 3519
- Instructor: Xuemiao Chen, [x67chen@uwaterloo.ca](mailto:x67chen@uwaterloo.ca)
- Office hour: 9:30am-11:30am F, MC 5324 or by appointment
- Grader: TBD

**Textbook.** The lectures will be based on *Lie Groups, Lie Algebras and Representations* 2nd edition by Brian C. Hall. You should be able to get the PDF versions from the website of the university library. Our goal is to cover most of the book.

**Course Descriptions.** An introduction to matrix Lie groups and their associated Lie algebras: geometry of matrix Lie groups; relations between a matrix Lie group and its Lie algebra; representation theory of matrix Lie groups. At the end, we will also cover some theory of general Lie groups.

**Assignments.** There will be weekly assignments due on Mondays. NO late assignments will be accepted. The lowest two will be dropped. You are encouraged to discuss with your classmates, but you will need to write your own solutions.

**Grading:** The final grades will be based on the assignments and attendance of the classes.

## University policy.

*Course prerequisites:* You are assumed to be familiar with linear algebra, real analysis and group theory.

*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 the Office of Academic Integrity for more information.]

*Grievance:* A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4. 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 an academic offence, and to take responsibility for their actions. [Check the Office of Academic Integrity for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheat-ing) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline. For typical penalties, check Guidelines for the Assessment of Penalties.

*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 they have a ground for an appeal should refer to Policy 72, Student Appeals.

*Note for students with disabilities:* AccessAbility Services, located in Needles Hall, Room 1401, 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 AccessAbility Services at the beginning of each academic term.

*Turnitin.com:* Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course. It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.