Pure Math 763, Winter 2017

COURSE OUTLINE

Lecturer Information

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Grade Distribution (UNOFFICIAL)

Homework assignments = 50 %
Final exam = 50 %

There will be about 5 homework assignments throughout the term.

Syllabus

The general linear group and its closed subgroups (∼6 weeks)

- basic properties
- exponential map, one-parameter subgroups
- the Lie algebra of a matrix Lie group
- properties of Lie algebras: nilpotence, solvability, semisimplicity
- integration on manifolds, Haar integrals

Representation theory of compact groups (∼2 weeks)

- unitary representations, unitarizability, irreducible representations
- matrix coefficient functuions, Schur orthogonality relations
- Peter-Weyl Theorem
- characters and central functions
- Fourier series

Representation theory of a specific example class: probably U(n) and SU(n) (∼3 weeks)

- highest weight theorem
- Weyl formulae, characters, dimension formula
- other topics (polynomial representations of complexifications, tensor products) as time permits

Texts

Primary: *Analysis on Lie Groups, An Introduction*, J. Faraut, Cambridge, 2008.
Secondary: *Lie Groups, An Introduction Through Linear Groups*, W. Rossmann, Oxford, 2002.
You will be responsible only for material covered in the lectures here, thus the book is not mandatory.

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: The Office for Persons with Disabilities (OPD), 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 OPD at the beginning of each academic term.