

PMATH 863 Lie Groups and Lie Algebras, Winter 2019

Lectures: MW 11:30-12:50 in MC 5479.

Instructor: Stephen New, office MC 5419, extension 35554, office hours MWF 2:30-3:20.

Prerequisites: It would be useful for students to have some knowledge of topology, differential geometry and functional analysis. Students with limited background in these areas will need to be willing to accept some results without proof. Most of the proofs can be found in the following texts:

Topology, by Munkres,

An Introduction to Differential Manifolds and Differential Geometry, by Boothby,

Foundations of Differential Manifolds and Lie Groups, by Warner,

Real Analysis, by Bruckner, Bruckner and Thomson.

Text: There is no required textbook. Some recommended texts include:

Compact Lie Groups, by Sepanski,

Representations of Compact Lie Groups, by Bröcker and tom Dieck,

Introduction to Lie Algebras and Representation Theory, by Humphreys,

Éléments de Mathématique, Groupes et Algèbres de Lie, by Bourbaki.

Course Outline: We shall study Lie Groups and Lie Algebras, and representations of compact Lie groups. with some emphasis placed on the classical matrix groups.

Course Mark: Students will be asked to submit several written assignments (you may work together on the assignments, but you must write up all your solutions in your own words). Each student will choose either to give a verbal presentation or to submit a written project, on a topic agreed on in advance with the instructor. There will also be a final exam in which you will be asked to reproduce some of the proofs and calculations done in class. The final course grade G will be given by the maximum of the two marking schemes

$$G = 60\%A + 30\%P + 10\%E$$

$$G = 40\%A + 20\%P + 40\%E$$

where A is at the average of the assignment marks, P is the mark on the presentation or project, and E is the mark on the exam.