

**Math 5213 (Abstract Algebra II) Course Outline**  
Winter 2024

**Instructor:** A. J. Dean email: [andrew.j.dean@lakeheadu.ca](mailto:andrew.j.dean@lakeheadu.ca)

**Office Hours:** Wednesdays 10:00am-12:00 noon, or by appointment or happenstance.  
(RB 2009)

**Text:** *Abstract Algebra*, David S. Dummit and Richard M. Foote, Prentice Hall, New Jersey. (Note: This book is available from the Lakehead Library.)

**Text:** *Advanced Modern Algebra*, Joseph J. Rotman, American Math. Society. (Note: This book is available from the Lakehead Library.)

**Learner Outcomes:** After successfully completing this course, the student will understand and be proficient in writing proofs and doing computations in some advanced areas of linear algebra, including modules over PIDs, canonical forms, bilinear forms, graded algebras, and Lie algebras. They will be familiar with representation theory, including modules over group rings, Wedderburn's theorem and its consequences, character theory, induced characters, and the theorems of Burnside, Hall, and Frobenius. They will be familiar with, and able to perform basic computations with simplicial homology, homology functors, derived functors, and inductive limits. They will be able to compute Grothendieck groups, and  $K_0$  groups of various AF  $C^*$ -algebras. Time permitting, group cohomology will also be introduced. The student will also become proficient in presenting mathematical proofs in abstract algebra at a blackboard in a clear and effective manor.

**Grading Scheme:** There will be weekly assignments, which will account for 75% and a final exam, which will account for the remaining 25%.

**Accommodations:** Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. if you think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please visit: <http://studentaccessibility.lakeheadu.ca>