

MATHEMATICS 5P10 (Winter 2018)

Modern Algebra

- Professor: Dr. Yuanlin Li
Room MC J422
Email: yli@brocku.ca
Home Page: <http://spartan.ac.brocku.ca/~yli/5P10/5p10f15.html>
- Lectures: TR: 9:30 -11:00 am (J409)
- Office Hours: TR: 11:00 - 11:50 am or by appointment
- Textbooks:
1. *An Introduction to the Theory of Groups*, 4th edition, by Joseph J. Rotman, Springer-Verlag, New York, Inc. 1995 (**corrected second printing 1999**)
 2. *Algebra*, first edition, by Thomas W. Hungerford, Springer-Verlag, New York, Inc. 1974
 3. *An Introduction to Group Rings*, first edition, by Cesar Polcino Milies and Sudarshan K. Sehgal, Kluwer Academic Publishers, Dordrecht, 2002
- Prerequisite: MATH 3P13
- Marking Scheme:
- Three Assignments: 40%
Midterm Exam: 30%
Course Project (regarded as the final exam): 30%
- Course Content: This course covers some basic topics (groups, rings, modules and group rings) in algebra. The details are as follows:
1. Topics in Groups: Groups and Homomorphisms, The Isomorphism Theorems, Symmetric Groups and G-sets, The Sylow Theorems, Sub-normal and Normal Series, Solvable and Nilpotent groups, *Free groups. (Chapters 1-6 in Rotman's book)
 2. Ring Theory: Rings and Homomorphisms, Ideals, Factorization in Commutative Rings, Rings of Quotients and Localization, Rings of Polynomials and Formal Power series. (Chapter 3 in Hungerford's book)
 3. Modules: Modules, Homs and Exact Sequences, Free Modules and Vector Spaces, Projective and Injective Modules, Tensor Products, Modules over PID. (Chapter 4 in Hungerford's book)
 4. Introduction to group rings. (Chapter 3 in Polcino Milies and Sehgal's book)

Course Project: This project will help you develop your research abilities. Students are expected to work on your own. Several topics will be given, and each student will choose a topic from the given list. No two individuals should choose the same topic. In order to complete the project, you will need to study reference books related to your chosen topic. Research papers and books can be found from the library, through an inter-library loan, through an internet search, or by using academic databases such as “mathscinet”. More detailed instructions will be given in class. An outline of your project is due on Feb. 2, a draft copy (optional) is due on Mar. 23, and the final copy is due on Mar. 30. Each student will also be expected to give a presentation of its project. Your marks for the project will be based on both your final copy and your presentation.

Exams and Assignments:

Exam	Date	Mark
Midterm	Thursday, March. 8	30%
AS #	Due Date	Mark
1	Friday, Jan. 26	12%
2	Friday, Feb. 16	14%
3	Friday, Mar. 16	14%
Project	Due Date	Mark
Outline	Feb. 2	2%
Draft Copy	Mar. 23	optional
Final Copy	Mar. 30	20%
Presentation	Last week	8%

Notes:

(1) The Midterm exam will be 60 minutes long and held during the regular lecture time. There is no final exam and your research project will be regarded as the final exam.

(2) **This course also emphasizes good mathematical writing. Students will be expected to write their solutions to assignments using a very readable and logical mathematical style.** The assignments are due at 4 pm on the due dates. **No late assignments will be accepted.** The solution to each homework will be posted after the due date. Please attach a cover page to your assignment. This should bear (at the top) **your name, student number, course number and assignment number.** A sample cover page can be found in the **Course Home Page.**

(3) **Reading Week:** Feb. 19-23 (no classes).