

PMATH 445/745 – Fall 2019
Representation Theory of Finite Groups

Instructor: Blake Madill	Office hours:	Tues. 10-11, Wed. 10-11, or by appointment
Email: bmadill@uwaterloo.ca	Class Website:	https://learn.uwaterloo.ca
Office: MC 5423	Location:	QNC 1507
Class Time: MWF, 1:30 - 2:20		

List of Topics: Basic definitions and examples: subrepresentations and irreducible representations, tensor products of representations. Character theory. Representations as modules over the group ring, Artin-Wedderburn structure theorem for semisimple rings. Induced representations, Frobenius reciprocity, Mackey's irreducibility criterion.

The final grade will be calculated by the following grading scheme:

Assignments (Best 4 of 5)	20%	
Tests (x2)	40%	(See Schedule)
Final Exam	40%	(to be scheduled by the Registrar's Office)

Textbook: You may find the following (optional) book useful for reference:

- (1) *Linear Representations of Finite Groups*. Serre
- (2) *Representations and Characters of Groups*. James and Liebeck

Assignments and Tests: There will be 5 assignments and 2 in-class tests.

Assignments will be submitted electronically through Crowdmark and will be due on the below dates at 9:00 AM.

Assignment 1	Thursday, Sept. 19
Assignment 2	Thursday, Oct. 3
Test 1	Friday, Oct. 11
Reading Week	Oct. 14 - 18
Assignment 3	Thursday, Oct. 24
Assignment 4	Thursday, Nov. 7
Test 2	Friday, Nov. 15
Assignment 5	Thursday, Nov. 28

These dates are subject to change. However, I find this unlikely. Late assignments will receive a grade of 0.

Website: The course web site is at learn.uwaterloo.ca (Waterloo LEARN), where assignments, solutions, grades, a copy of this syllabus, and occasional other information will be posted. Assignments will be submitted through crowdmark.com.

Reading Week: Oct. 14 - 18.

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 or her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, 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 [check www.uwaterloo.ca/academicintegrity/] to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) 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,

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) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Note:: AccessAbility Services, 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 AccessAbility Services at the beginning of each academic term.

Course Schedule

Week #	Week of	Topics and sections covered	Info
1	Sept. 2	Representations	
2	Sept. 9	Subrepresentations and Irreducible Representations	
3	Sept. 16	Character Theory I	A1 due
4	Sept. 23	Character Theory II	
5	Sept. 30	Induced Representations	A2 due
6	Oct. 7	Module Theory I	Test 1
7	Oct. 14	<i>Reading Week</i>	
8	Oct. 21	Module Theory II	A3 due
9	Oct. 28	Group Algebras and Representations	
10	Nov. 4	Frobenius Reciprocity	A4 due
11	Nov. 11	Mackey's Criterion	Test 2
12	Nov. 18	Applications to Group Theory	
13	Nov. 25	Extra Topics (TBA)	A5 due
14	Dec. 2	Review	

Note: This schedule is subject to change at any time.