

ALGEBRAIC NUMBER THEORY SPRING 2022

PMATH 441 / PMATH 641

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CLASS SCHEDULE

Section	Location	Time	Instructor(s)
PMATH 441 001 [LEC]	PHY 313	Mondays, Wednesdays & Fridays 9:30 a.m. - 10:20 a.m.	Blake Madill bmadill@uwaterloo.ca
PMATH 641 001 [LEC]		Mondays, Wednesdays & Fridays 9:30 a.m. - 10:20 a.m.	
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INSTRUCTOR / TA INFORMATION

Instructor: Blake Madill

E-mail: bmadill@uwaterloo.ca

Office Hours: TBA

TA: TBA (tba@uwaterloo.ca). The TA will be in charge of the grading *and regrading* of your assignments. .

COURSE DESCRIPTION

Calendar Description for PMATH 441

An introduction to algebraic number theory; unique factorization, Dedekind domains, class numbers, Dirichlet's unit theorem, solutions of Diophantine equations.

Prereq: PMATH 348

Calendar Description for PMATH 641

An introduction to algebraic number theory; unique factorization, Dedekind domains, class numbers, Dirichlet's unit theorem, solutions of Diophantine equations.

Antireq: PMATH 441

This course is an introduction to algebraic number theory, with a particular emphasis on number fields, algebraic integers, prime factorization, Dedekind domains, and ideal class groups.

LEARNING OUTCOMES

No explicit learning outcomes defined for this course.

TENTATIVE COURSE SCHEDULE

Week #	Week of	Topic	Due:
1	May 2	Algebraic Integers	
2	May 9	Trace, Norm, Additive Structure	A1
3	May 16	Geometry of Numbers	A2
4	May 23*	The Discriminant	A3
5	May 30	Prime Factorization I	A4
6	June 6	Prime Factorization II	A5
7	June 13	Ideal Norm, Ramified Primes	Midterms
8	June 20	Ideal Class Group I	A6
9	June 27*	Ideal Class Group II	A7
10	July 4	Unit Theorem	A8
11	July 11	TBA	A9
12	July 18	Presentations/TBA	A10
13	July 25	Review	

TEXTS / MATERIALS

Title / Name	Notes / Comments	Required
Number Fields by Marcus		No

STUDENT ASSESSMENT

Component	Value
Assignments (x 10)	25%
a) Assignments will be due on Wednesdays at 9 AM. b) At least 8/10 assignments must have a grade of at least 50% in order to pass the course. If this is not achieved, a	

maximum grade of 47% will be possible

Component	Value
Midterm Exam (Written)	15%
Midterm Exam (Oral)	10%
Written Exam: Monday, June 13, in-class (50 min). Oral Exam: Scheduled individually, Tuesday, June 14.	

Component	Value
Final Exam	50%
Schedule by the Registrar.	

You may work in groups on assignments, but you must write up your solutions independently. No resources external to the course (Eg. looking up a solution online) may be used.

PMATH 641 students will have a final exam weighting of 40% and a final presentation worth 10%.

ASSIGNMENT SCREENING

No assignment screening will be used in this course.

ADMINISTRATIVE POLICY

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 [the Office of Academic Integrity](https://uwaterloo.ca/academic-integrity/) (<https://uwaterloo.ca/academic-integrity/>) for more information.]

Grievance: A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. Read [Policy 70, Student Petitions and Grievances, Section 4](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>) . 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 an academic offence, and to take responsibility for their actions. [Check [the Office of Academic Integrity](https://uwaterloo.ca/academic-integrity/) (<https://uwaterloo.ca/academic-integrity/>) for more information.] 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](#) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>) . For typical penalties, check [Guidelines for the Assessment of Penalties](#) (<https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties>) .

Appeals: A decision made or penalty imposed under [Policy 70, Student Petitions and Grievances](#) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>) (other than a petition) or [Policy 71, Student Discipline](#) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>) may be appealed if there is a ground. A student who believes they have a ground for an appeal should refer to [Policy 72, Student Appeals](#) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72>) .

Note for students with disabilities: [AccessAbility Services](#) (<https://uwaterloo.ca/disability-services/>) , located in Needles Hall, Room 1401, 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.

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.