PMATH 464/764, Introduction to Algebraic Geometry

Spring 2025

Basic information.

- *Main lecture*
  - MWF 10:30am-11:20am. MC 4064
  - Instructor: Xuemiao Chen, *x67chen@uwaterloo.ca*
  - TA: TBD
- *Office hours*
  - Xuemiao Chen, 1:30-2:30pm WF or by appointments.
  - TA: TBD

Course outline. An introduction to algebraic geometry through the theory of algebraic curves. General algebraic geometry: affine and projective algebraic sets, Hilbert's Nullstellensatz, co-ordinate rings, polynomial maps, rational functions and local rings. Algebraic curves: affine and projective plane curves, tangency and multiplicity, intersection numbers, Bezout's theorem and divisor class groups.

Textbook. There will be no textbooks required. Lecture notes will be posted on Learn. The lectures will be very much example and problem-solving oriented. I also highly recommend Lectures on algebraic geometry by Borcherds.

Assignments. There will be weekly assignments (except for the test weeks) due on the following Wednesdays at 8:30am. NO late homework will be accepted under any circumstances. But the lowest one will be dropped. You are expected to work independently at the first place but if you do receive help from other source, you will need to *acknowledge* them. Copying solutions of others could lead to failure of this class.

Exams. There will be two in-class tests and a final exam

- Test 1, June 6
- Test 2, July 4
- Final: TBD

There will be NO make-up tests but for a missed test, a shift of weight to the final can be arranged only if you have a valid reason and appropriate supporting documentation.

Grading. The final grades will be based on

$$30\%\ Assignments + 30\%\ Tests + 40\%\ Final.$$

What I would do if I were a student.

Find/work on good examples and use them to help you think deeper in theory

University policy.

Course prerequisites: Prereq: PMATH 347. Coreq: PMATH 348.

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 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. 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 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, cheat-ing) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate asso-ciate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline. For typical penalties, check Guidelines for the Assessment of Penalties.

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 they have a ground for an appeal should refer to Policy 72, Student Appeals.

Note for students with disabilities: AccessAbility 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.