APM 4777/5777: Computer Algebra

Tony Shaska
Department of Mathematics and Statistics
Oakland University
Rochester, MI 48309

Time: TR: 7:30-9:17 PM
Room: MSC 388
Phone: 248-370-3436 (office)
Office hours: TR: 6:30-7:20
E-mail: shaska@oakland.edu

Description. The mathematics and algorithms for symbolic computation. Includes theory of algebraic extensions, modular and p-adic methods, Groebner bases, factorization and zeros of polynomials, solutions to systems of polynomial equations, applications to automatic geometric theorem proving and closed form solutions to differential equations.

Prerequisites: MTH 2775 with a grade of (C) or higher and knowledge of a scientific computer programming language, or permission of instructor.

Course objectives: A student who successfully completes this course will be able to:

(1) To understand the foundations of computational algebra
(2) Have a basic understanding of affine and projective space
(3) Have some working knowledge of Python
(4) Have some working knowledge of Sagemath
(5) Have a basic understanding of Quantum Computing
(6) Complete a semester project which involves writing computer algebra software using Python

Grading: Homework will be assigned and occasionally will be collected to be graded. The following chart will be used to determine your grade:

- Homework 1 10%
- Homework 2 10%
- Homework 3 10%
- Homework 4 10%
- Homework 5 10%
- Final Project 50%

Grades will be determined with the following scale:

	A	B	C	D	F
+	N/A	85-89	70-74	55-59	0-49
∘	95-100	80-84	65-69	50-54	0-49
-	90-94	75-79	60-64	N/A	0-49

Course policies. The course will be conducted in accordance to the Oakland University regulations and policies. Details can be found here
https://oakland.edu/provost/policies-and-procedures/

Good study habits.

- Take careful notes, make sure to go over them when you get home
- Solve all the problems at the end of each section. Even when you are not able to solve a problem you learn a lot from them if you attempt to do so.
- Create study groups and participate actively on them
- Come to my office hours and ask for help for things that you don't understand. Make sure you come prepared with well though questions.