Department of Mathematics & Statistics
Concordia University

MAST 232
Mathematics with Computer Algebra
Winter 2016

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Office Hours: Friday, 16:00–17:30 and By Appointment

Text: *Learning with Mathematica,* online lecture notes, by Fred E Szabo.

Calculators: All calculations in this course are carried out with *Mathematica*.
No calculators are required or allowed.

Tests: Tests, assignments and examinations will be interactive and use *Mathematica*.
Missed tests cannot be made up.

Evaluations: Evaluations are based on regular interactive participation throughout the term and, in addition, require the completion of a **project** and preparation of an associated *Mathematica* **slideshow**. Details, *Mathematica* templates, and a sample project and slideshow will be posted on Moodle and discussed in detail in the second half of the course.

Final Grade: The final grade will be based on quizzes worth 20%, assignments worth 20%, a midterm examination worth 30%, reflections worth 5%, a *Mathematica* project worth 20%, and a slideshow based on the project worth 5%. *Students who miss the midterm examination may be permitted to rewrite the examination if they provide an appropriate medical certificate justifying their absence for medical reasons.*

Note: **Please note that there is no "100% final examination" in this course and no supplemental examination.**

Requirements: All activities throughout the course require a **laptop**, either your own or one of the University-owned laptops with *Mathematica* installed. These laptops can be borrowed from the Webster Library for the duration of the lectures, quizzes, and examinations, if needed. All work in this course requires a suitably fast Internet connection.

Preamble: Mast 232 is a foundation course designed to provide you with new tools for learning and excelling in your studies of mathematics and related subjects. As the course proceeds, you will have many opportunities to look at the mathematics you know from a new perspective and expand your knowledge in manageable steps, with the help of technology. I call it "*A New Kind of Learning*."

The New Kind of Learning is built on the evolving pedagogical opportunities built into *Mathematica*, with particular emphasis on working with symbolic and numeric computations, discovering mathematical truths using *Mathematica* "manipulations," minimizing the requirements for writing programming code by using free-form input, writing in the *Wolfram Alpha* language, employing and the *Mathematica* predictive interface and suggestions bar, gaining conceptual insight through graphing and visualization, exploring computations and mathematical concepts using Boolean algebra, and exploiting other technological tools.

The course begins in earnest in Week 1 and you need to come prepared to learn, participate, and commit yourself to taking your knowledge to the next level. Your teaching assistants and I will do everything we can to make your learning experience relevant, enjoyable, and accessible. **So please come prepared: bring a laptop with *Mathematica* installed and activated.**

Curriculum:

WEEKS	TOPICS
Week 1	INTRODUCTION WITH MATHEMATICA
Week 2	Free-form input and Wolfram Alpha queries
Week 3	Functions, recursion, and piecewise definition
Week 4	Lists, tables, modules, and procedures
Week 5	Curves, graphs, and "manipulations"
Week 6	Curve-fitting and data visualization
Week 7	MIDTERM EXAMINATION
Week 8	Linear systems, matrices, and polynomials
Week 9	Matrices, least squares, and determinant equations
Week 10	Difference quotients, secants, slopes, and tangents
Week 11	Limits, derivatives, and optimization
Week 12	Limits, integrals, arc length, area, and volume
Week 13	SUMMARY AND REVIEW