Applied Mathematics 1999F
Introduction to Experimental Mathematics
Fall 2014 Course Outline

Corequisites: Calculus 1000A/B or 1500A/B or Applied Mathematics 1413.

Lectures: Tuesday & Thursday 12:30—1:20, UCC-66 (WALS Classroom)

Tutorials: Wednesday & Friday 11:30—12:20, HSB 16

Instructor: Prof. Robert Corless   **Office:** MC272 x88785
    Email: rcorless@uwo.ca   **Website:** www.apmaths.uwo.ca/~rcorless

Administrative Assistant: Steven Thornton   **Office:** MC275J
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Course Website: Students should check OWL (owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. The missing of critical information due to your failure to check OWL cannot be used as a basis for appeal.

Textbook: There is **no** textbook for this course.

Software: It is recommended that you have Maple (maplesoft.com/products/maple/) installed on your computer. Instructions will be given in lecture on how to obtain a discounted copy. Maple is also available in all computer labs on campus.

Evaluation: 15% — Project plan + 5% peer assessment
    25% — Project status report + 5% peer assessment
    15% — Final presentation + 5% peer assessment
    25% — Final report + 5% peer assessment

    Late marks will accumulate at 50% for the first day, 75% for the second day or later.

    Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at this website: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Course Content:
- Complex numbers & arithmetic
- Polynomial algebra & rootfinding
- Dynamical systems
- Continued fractions
- Generating functions
- Complex functions including special functions

Course Description:

What:

- Experimental mathematics is how you find out what's true (or might be true).
- **"*Compute First! Ask questions later.*"**
- This first-year course aims to get you to **do** mathematics, not just read about it.
- Because of computer algebra programming content, and that it's project-based (no exams) you get an essay credit.
- You will lean a CAS (Computer Algebra System). We will use Maple but if you choose you may use and other CAS (e.g. Sage which is free). You will learn to program (the course is a good excuse to do so).

Why:

- Most mathematics (certainly applied mathematics but also pure math) uses computers nowadays. This course shows you how, right away. Your CAS skills will be useful for all future projects
- The topics we're going to use as vehicles are themselves useful and interesting (especially dynamical systems, which is used everywhere in science).
- The practice you get writing – both of computer programs and reports – is itself useful for internalizing mathematics knowledge (yes, really).
- You will learn about the discipline of knowing that your experiments are reproducible (this is a Big Thing in scientific computing these days)
- Outlet for creativity! I want to see publication-quality graphics to illustrate your mathematical results!
- The course will be challenging and stimulating.

Who:

Prof. Rob Corless has been teaching university-level mathematics with (and to) computers for more than thirty years. [It's just possible he taught one or more of your parents.] He has over a hundred research publications, in various areas. He has published two books with Springer (New York), one on computer algebra (Essential Maple) and one on numerical methods (A Graduate Introduction to Numerical Methods, with Nic Fillion). More, he has over a dozen papers on "research in teaching", specifically on the use of technology in teaching. He has won two teaching awards and has been the plenary speaker at teaching conferences (e.g. "Computer-Mediated Thinking"). Finally, he is the author of several papers on Experimental Mathematics.

Where:

Classes will take place in the new WALS (Western Active Learning Space) classroom. This classroom is designed to encourage active learning among students and instructors. There will be some lecturing and direction, but **you** will have some control of the syllabus, and you will be encouraged to learn in an active and interactive manner. **Some** of your final grade will be from peer assessment. More information about the WALS classroom can be found at www.uwo.ca/wals/.

Addendum to all Applied Mathematics Course Outlines

Accessibility
Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 ext. 82147 if you have questions regarding accommodation.

Support Services
Learning-skills counsellors at the Student Development Centre (http://www.sdc.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, http://westernusc.ca/services.

The website for Registrarial Services is http://www.registrar.uwo.ca.

Academic Accommodation:
If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible.

If you are a science student, the Academic Counselling Office of the Faculty of Science is located in WSC 191, and can be contacted at 519-661-3040 or scibmsac@uwo.ca. Their website is http://www.uwo.ca/sci/undergrad/academic_counselling/index.html.

A student requiring academic accommodation due to illness must use the Student Medical Certificate (https://studentservices.uwo.ca/secure/medical_document.pdf) when visiting an off-campus medical facility.

For further information, please consult the university's medical illness policy at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.