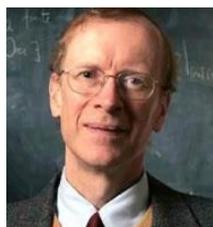




H. Poincaré



A. Wiles



R. Taylor



L. Euler

MATHEMATICS 2124B-001 COURSE OUTLINE – WINTER 2016

Introduction to Mathematical Problem Solving

Instructor:	Ján Mináč (also known as Professor Maniac ☺)
Contact information:	minac@uwo.ca / and / jminac1811@gmail.com
Office hours and office location:	Will be discussed in class, but this will not be the main topic of the class. (My indoor office is in Middlesex College. The number of my office is a 32 nd prime number. Exercise 0: Find the number of my office. (You can find the solution in the rotunda in Middlesex College.) I also use the university campus as a large, outdoor office. ☺)
Office telephone:	519 661-2111, extension 86519
Class time and location:	MWF, 2:30 p.m. – 3:30 p.m. (Mondays and Fridays: Thames Hall 3101 Wednesdays: Social Science Centre 2020)
Prerequisites:	Some very basic knowledge of linear algebra and calculus is useful. If you are unsure about the background, please speak with me or email me.
Evaluation:	Will be discussed in class, but also see below for more details.
Some questions whose answers we master:	What is a formula for the sum $1^5 + 2^5 + \dots + (n-1)^5$? What is the sum $1 + 2 + 3 + \dots$? What is a formula for $\sin \alpha + \sin 2\alpha + \dots + \sin n\alpha$?
Fun:	During the entire semester. ☺
Problem solving claim:	Problem solving is delightful magic, filled with surprises and interesting, challenging problems. (This claim will be proven in class.)
The art of studying and research:	We shall discuss and practice.

Recommended textbook:

The Art and Craft of Problem Solving, by Paul Zeitz, Second Edition, John Wiley & Sons, Inc., ISBN: 0-471-78901-1.

Syllabus: Here is a brief outline of some of the topics covered in Math 2124B. We will use selected sections of Chapters 1, 2, 3, 4, 5, 6, 7 and 9; concentrating on:

- Psychological strategies of problem solving = fascinating!
- The “Pigeon Hole Principle” (despite the name, our class is not a zoology class!)
- Generating functions
- Polynomials
- Number theory
- The principle of Inclusion – Exclusion (everybody will be included!) ☺

Syllabus (continued):

- Binomial theorem
- Taylor Series
- Eulerian mathematics

We shall illustrate these topics also on examples of finite fields and Bernoulli numbers.

Course Outline:

Mathematics is unique among all sciences because of the existence of proofs. The fact that one can write a proof of an interesting statement, and people can verify it and enjoy it, is amazing!

The purpose of this course is learning techniques, tactics and strategies of solving problems and writing these solutions elegantly. I want you to enjoy the sheer process of trying to solve problems, the incredible feeling of victory and elation at moments of breakthroughs and discoveries. I want you to experience fun and happiness and appreciation of cool and deep mathematics.

The topics we shall consider, will be from number theory, combinatorics, counting, calculus, group theory, and geometry.

Your homework assignments will be a very important part of this course. Learning by doing!

I wish you all great fun and success in this joint adventure of conquering the world of solving problems and writing proofs!



Evaluation: Biweekly homework assignments and final examination. (Weight will be best results of 40% and 60%, or 60% and 40% for homework assignments and final examination respectively.)

Final examination date: The date of the final examination has yet to be determined.

Missed final examination: Students must contact their faculty's academic counselling office as soon as possible, to apply for permission to write a special exam. (See: <https://studentservices.uwo.ca/secure/index.cfm>)

Use of electronic devices: Calculators are permitted during the final examination for this course.

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

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, extension 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>.

Code of student conduct: To foster a supportive and enriching academic environment that is conducive to learning and free inquiry, Western has a Code of Student Conduct (<http://www.uwo.ca/univsec/pdf/board/code.pdf>). You can expect your instructor to promote this environment and also respect each student's unique views and opinions. Because Western is also a part of *your* environment, we expect the same from you. Activities that disturb another student's right to this environment will not be tolerated; these include talking in class about matters irrelevant to the course and using electronic devices inappropriately. You can also expect your instructor to come prepared and eager to help you learn. In turn, we expect that you will come prepared and ready to learn.