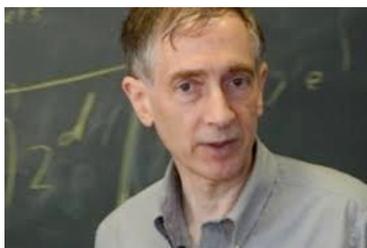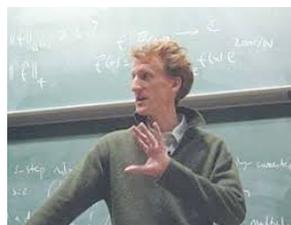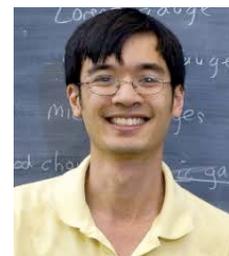| M. Chudnovsky | R. Stanley | K. Wickelgren | B. Green | T. Tao |

COMBINATORIAL MATHEMATICS – Mathematics 3152A

Instructor	Ján Mináč (also known as Professor Maniac ☺)
Email	minac@uwo.ca / and / jminac1811@gmail.com
Office Hours: *after each class in the same classroom and also by appointment and also by accidental meeting*	My indoor office is in Middlesex College. The number of my office is a 32nd 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 Times	Monday / Wednesday / Friday 10:30 a.m. – 11:30 a.m.
Class Location	Middlesex College room 107
Textbook	*Introductory Combinatorics (Classic Version), 5th Edition*, by Richard A. Brualdi, Pearson, 2017. There are some copies available in the Book Store. I will also request that the Taylor Library place a copy of this book on 2-hour reserve loan to be available for students. (This book is optional – recommended but not required, as the main source of information will be your lecture notes.)
Prerequistes	0.5 course from: Mathematics 2120A/B, 2155A/B, 2211A/B, Applied Mathematics 2811B or permission of the Department. Some basic knowledge of linear algebra and an introduction to mathematical structures may be useful. Also an interest in the magic of mathematics is very welcome. The courage to try and write neat proofs will be encouraged. If you are unsure about the background requirements, please speak with me or email me.
Final Examination Date	To be announced when the Office of the Registrar final exam schedule is in place. The final examination period this semester falls between December 8th - 19th.
Evaluation	Homework 60% and Final Examination 40%
Fun	During the entire semester. ☺
Combinatorial Claim	Combinatorial Mathematics is delightful magic, filled with surprises and interesting, challenging problems. (This claim will be proved in class.)
The Art of Studying and Research	We shall discuss and practice, and enjoy the art of studying and research.
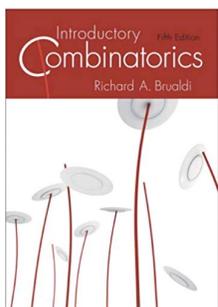
J. Chayes

Combinatorial Math Course Outline: Permutations, inversions in permutations, the binomial theorem, Pascal's triangle, the Inclusion-Exclusion Principle, Polya's counting formula for permutations and symmetry groups, Möbius inversion, recurrence relations, generating functions, Catalan numbers, difference sequences and Stirling numbers, partition numbers, introduction to graphs, trees, chromatic numbers, and magic squares. We shall also add some *ad hoc* interesting and I hope fascinating material, enhancing this basic subject and connecting it with current research in the field.

After the presentation of the basic course material, we shall select some delicious topics from an appetizing tray of tasty mathematical treats such as finite groups, networks, probability, distribution of prime numbers, finite fields, finite projective planes, codes, counting in groups, and some open problems.

L. Euler   J. Labute   R. Murty   J. Birman

The basic course material is the core of the course which we shall try to develop with many details and we shall aim at a full understanding of the basics.

In the other part of this course, we shall bravely make an attempt to understand the "big picture" and the latest developments. This will often be done with bold strokes of our brushes, aiming our imagination and letting it loose; as well as freeing us from worries about the details. Perhaps some of you will decide to climb this hill or that hill, or to examine certain deep topics with a microscope and the obsession that such an examination may require.

Remark. ***Combinatorics has a great tradition and a rich history***. However during the last century combinatorics often played the role of Cinderella although there was also some very interesting research going on in combinatorics at that time as well. Combinatorics was often not considered a part of "mainstream" mathematics but this view has changed dramatically, also due to some spectacular applications and developments in computer science and in science in general, including artificial intelligence and networks.

In the past, only a few of the most outstanding mathematicians devoted their energy to this fascinating subject. Today combinatorics is becoming quite popular and remarkable success has been obtained in recent years. I will try and systematically develop parts of this area, and I will try and preserve some of the charm, beauty, and romantic dreams contained within it.

When I was a teenager I often daydreamed and lived in my own world full of fantasy and magic. Sometimes combinatorial considerations snuck into this world. These were puzzling and fascinating. And then I learned that there were others dreamers called mathematicians who explore this combinatorial world as well as other mathematical worlds in a detailed way. And what a wonderful world all of this belongs to! I long to share this world with you.

Maryam Mirzakhani (Fields Medal 2014)   Karen Uhlenbeck (Abel Prize 2019)

Further Information:

Final Examination: There will be one written final examination.

Common Course Policies for 2019/20 Mathematics Undergraduate courses

The following is a list of course policies which are common to all undergraduate courses run by the Mathematics department at Western for the academic year 2019/20.

Senate Policy on Prerequisites:

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Course Websites:

Students should check OWL (http://owl.uwo.ca) or the course website (if not hosted on OWL) on a regular basis for news and updates for all of the courses in which they are enrolled. This is the primary method by which information will be disseminated to all students in each class. Students are responsible for checking OWL on a regular basis.

Accommodation and Accessibility:

If you are unable to meet a course requirement due to illness or other serious circumstances, you must seek approval for the absence as soon as possible. Approval can be granted either through a self-reporting of absence or via the Dean's Office/Academic Counselling unit of your Home Faculty. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at scibmsac@uwo.ca.

For further information, please consult the university's policy on academic consideration for student absences: https://www.uwo.ca/univsec/pdf/academic_policies/ appeals/Academic_Consideration_for_absences.pdf.

If you miss the Final Exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_ schedule.html).

Academic Policies:

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

In accordance with policy, http://www.uwo.ca/its/identity/activatenonstudent.html, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.
Electronic devices (including cell phones and calculators) are NOT allowed on exams and may be confiscated.

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.

Support Services:

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 Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations.

The policy on Accommodation for Students with Disabilities can be found here: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf.

The policy on Accommodation for Religious Holidays can be found here: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf.

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.

Acknowledgment of the Science Student Donation Fund:

Mathematics undergrad courses are supported by the Science Student Donation Fund. If you are a BSc or BMSc student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Counselling site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the Chair of the Department or email the Science Students' Council at ssc@uwo.ca.