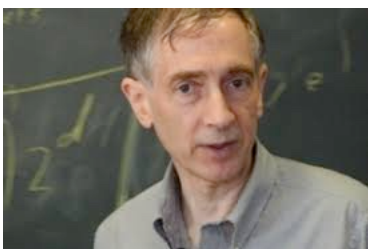




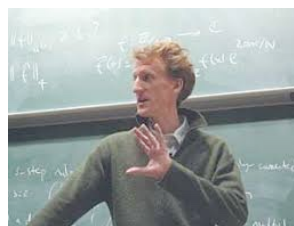
M. Chudnovsky



R. Stanley



K. Wickelgren



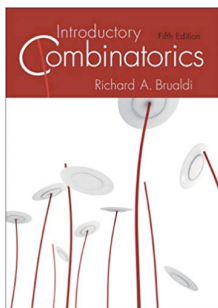
B. Green



T. Tao

**COMBINATORIAL MATHEMATICS – Mathematics 3152A**

<b>Instructor</b>	Ján Mináč (also known as Professor Maniac ☺)
<b>Email</b>	<a href="mailto:minac@uwo.ca">minac@uwo.ca</a> / and / <a href="mailto:jminac1811@gmail.com">jminac1811@gmail.com</a>
<b>Office Hours:</b> <i>after each class in the same classroom and also by appointment and also by accidental meeting</i>	My indoor office is in Middlesex College. The number of my office is a 32 <sup>nd</sup> 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. ☺
<b>Office Telephone</b>	(519) 661-2111, extension 86519
<b>Class Times</b>	Monday / Wednesday / Friday 10:30 a.m. – 11:30 a.m.
<b>Class Location</b>	Middlesex College room 107
<b>Textbook</b>	<i>Introductory Combinatorics (Classic Version), 5th Edition</i> , 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.)
<b>Prerequisites</b>	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.
<b>Final Examination Date</b>	To be announced when the Office of the Registrar final exam schedule is in place. The final examination period this semester falls between December 8 <sup>th</sup> - 19 <sup>th</sup> .
<b>Evaluation</b>	Homework 60% and Final Examination 40%
<b>Fun</b>	During the entire semester. ☺
<b>Combinatorial Claim</b>	Combinatorial Mathematics is delightful magic, filled with surprises and interesting, challenging problems. (This claim will be proved in class.)
<b>The Art of Studying and Research</b>	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.

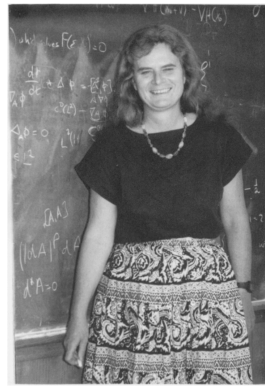
**Remark.** *Combinatorics has a great tradition and a rich history.* However during the last century combinatorics often played the role of Cinderella although there was also some very interesting research going on in combinatorics at that time as well. Combinatorics was often not considered a part 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.

### Final Examination Conflicts:

If you have a conflict with another final examination, you must contact the Registrar's Office as soon as possible to arrange a special time/place to write the final examination.

If you have three final examinations in 3 consecutive periods, you must contact the Dean of your faculty.

***In all cases please let your instructor know.***

If you miss the final examination due to illness, you must present a doctor's note to the appropriate Dean's Office, and you will be given a makeup final examination as soon as possible after the regular examination. If you are in this situation, you should contact your instructor as soon as you realize that you will miss the examination. Also see the University's policy on final examination conflicts:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/exam/conflicts.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/exam/conflicts.pdf)

**Academic dishonesty:** Scholastic offences are taken seriously and students are directed to read the official policy: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf). (See also the section "Scholastic discipline for undergraduate students" of the Academic Calendar.)

**Accessibility Statement:** Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111, extension 82147 for any specific question regarding an 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. Students who are in emotional / mental distress should refer to Mental Health@Western for a complete list of options about how to obtain help. Additional student-run support services are offered by the University Students' Council (<https://westernusc.ca/>). The website for Registrarial Services is: <http://www.registrar.uwo.ca>.

**Eligibility:** You are responsible for ensuring that you have successfully completed all course prerequisites and that you have not taken an antirequisite course. 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.