Instructor

Lecturer  Jonathan Noel

Research area  Extremal and probabilistic combinatorics, graph theory, algorithms.

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General Course Information

Number of units  1.5

Pre-requisites  MATH 222 or permission of the department.

Office Hours and Assistance

Lectures  Mondays, Wednesdays and Thursdays at 2:30pm to 3:20pm on Zoom. Posted to Brightspace after the lecture for asynchronous viewing.

Office hours  Wednesdays at 9:30am to 11:20am or by appointment (please send an email in advance to book one) on Zoom.

Topics

Extremal set theory  Chains and antichains, Littlewood–Offord Problem, shadows, Harris–Kleitman Inequality, intersecting families, sunflower lemma, VC-dimension.

Extremal graph theory  Turán-type problems, Erdős–Stone Theorem, extremal numbers for bipartite graphs, stability, supersaturation, Szemerédi Regularity Lemma, triangle removal lemma, independent sets, permanents and counting perfect matchings.

Course Material and Online Resources

Lecture notes  Written by the lecturer. Available for download on the course webpage.

Supplement to lecture notes  Additional resources compiled by the lecturer. Includes references, links to alternative lecture notes and links to alternative lecture videos from other universities. Available for download on the course webpage.

Course webpage  www.math.uvic.ca/~noelj/Math_492_529_2021.html
**Brightspace** Please check Brightspace regularly for updates: [bright.uvic.ca/](http://bright.uvic.ca/) The project will be submitted through Brightspace. There is a forum available to ask (and answer) questions about the course.

**Crowdmark** Assignments will be released, submitted and marked through Crowdmark: [app.crowdmark.com/sign-in/university-of-victoria](http://app.crowdmark.com/sign-in/university-of-victoria).

**Calculator** A calculator is permitted in this course, but you are unlikely to require one.

### Evaluation and Grading

Your final percentage grade will be computed according to the following scheme.

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Written Project</th>
<th>Oral Final Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>30%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Percentage scores will be converted to letter grades according to the university-wide standard table [web.uvic.ca/calendar/undergrad/info/regulations/grading.html#](http://web.uvic.ca/calendar/undergrad/info/regulations/grading.html#).

**Assignments** The assignments are designed to encourage students to actively engage with the ideas presented in the course. There will be 6 bi-weekly assignments, roughly corresponding to the 6 chapters of the lecture notes, usually due on Sundays. Only your best 5 assignments will count, each worth 10% of your final grade. There will be opportunities to complete bonus problems for extra marks.

**Written project** The project for this course involves reading a research paper, or small collection of papers, in extremal combinatorics and writing a summary. It provides an opportunity for students to explore a topic related to the course in greater depth and practice their mathematical exposition. Projects are typeset, preferably in **\LaTeX**. It is worth 30% of your final grade. Graduate students enrolled in 529 are expected to present more substantial work on their projects.

**Oral final exam** There will have a brief oral exam worth 20% of the final grade. It will test basic understanding of the ideas presented in the course. For example, definitions, theorem statements, implications between theorems, short proofs from the course, tight examples to theorems and exercise-type questions of relatively low difficulty.

### Time Commitment

Lectures are 3 hours per week. Students who view the lectures asynchronously on Brightspace are able to alter the playback speed, which will affect the total time commitment.

It is estimated that each assignment will take between 2 and 7 hours to complete, including uploading solutions. Students who are under severe pressure during the term may wish to skip one assignment as a way of “pulling a relief valve.” Alternatively, students who underperform on one assignment have the opportunity to complete all 6 in order to improve their grade.
The project is expected to require a substantial time commitment, on the order of 8 to 17 hours of undivided attention. Naturally, your level of experience in reading research papers and in academic writing, as well as your prior exposure to topics related to extremal combinatorics, will affect the amount of time that it takes.

The oral final exam will be short in duration and will be scheduled during the final exam period. The main time commitment will come from studying for the test. The study time required should be similar to any normal test, and differs among individuals.

Course Schedule

A complete schedule of the course can be found on this page: [www.math.uvic.ca/~noelj/492_529_schedule2021.html](http://www.math.uvic.ca/~noelj/492_529_schedule2021.html). This schedule contains the release and due dates of assignments and the due date of the project. It also contains the plan for each lecture topic with the relevant pages of the course notes and links to lecture slides. The exact content of each lecture may be adjusted as the course develops. The schedule will be updated to reflect any changes.

Missing Work

Only your best 5 out of 6 assignments will be counted towards your final grade. Therefore, you may miss one assignment without any penalty. Students should not expect any concessions to be made for additional late or missing assignments. Instances of additional late or missing assignments with justification will be dealt with on a case-by-case basis. Every student must complete a project and oral exam. If you do not complete the project or oral exam, then you may receive a grade of ‘N.’ The lecturer will make every effort to be flexible in scheduling the oral exams to accommodate students.

Retroactive withdrawals are available to students who are able to provide their Associate Dean with documentation showing that accident, illness, or affliction has prevented them from making a serious attempt at the course.

How to Succeed in this Course

You are encouraged to read the lecture notes before and after class, pay close attention in class and ask questions in class or office hours if anything isn’t clear. The starting point is to absorb the definitions and what the theorems say. Build up from there to understanding the proofs.

Policies and Ethics

Online Academic Integrity

This course will be conducted entirely online. Experience shows that in the past, a number of students have attempted to exploit the lack of supervision to commit Academic Integrity
violations.

Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offences.

The responsibility of the institution Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage through cheating on essays, exams, and projects.

The responsibility of the student Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the students transcript, or a suspension.

It is your responsibility to understand the University’s policy on academic integrity.

- web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html# (Undergraduate)
- web.uvic.ca/calendar/grad/academic-regulations/academic-integrity.html (Graduate).

**Attendance**

The university Calendar states ‘Students are expected to attend all classes in which they are enrolled.’ Our courses are conducted on that basis. If you miss an announcement (information concerning midterms, corrections to assignment, etc.) because you did not attend class, you must accept the consequences of not having learned of the change. Recorded classes can be viewed asynchronously if you are unable to attend the synchronous Zoom session, which provides additional opportunities to keep up with announcements.

- web.uvic.ca/calendar/undergrad/info/regulations/attendance.html (Undergraduate).
- web.uvic.ca/calendar/grad/academic-regulations/attendance.html# (Graduate).

**Guidelines on Religious Observances**

Where classes or examinations are scheduled on the holy days of a religion, students may notify their instructors, at least two weeks in advance, of their intention to observe the holy day(s) by absenting themselves from classes or examinations. Instructors will provide reasonable opportunities for such students to make up work or missed examinations.
Accessibility

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the Centre for Accessible Learning (CAL) as soon as possible. The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. [uvic.ca/cal](http://uvic.ca/cal). The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Student Wellbeing

This course is being taught during the very challenging times of the COVID-19 pandemic. You may have complex challenges that affect your learning in this course. Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. Supports are available to students in online/distance courses as well as on campus courses. You are not alone.

**Student Wellness Centre:** The Student Wellness Centre (SWC) is made up of Counselling, Health and Multifaith. The SWC aims to provide holistic care to support UVic students wellbeing emotionally, physically and spiritually. The SWC team includes counsellors, doctors, nurses, administrative staff, chaplains and other practitioners. [www.uvic.ca/current-students/home/wellness-centre/](http://www.uvic.ca/current-students/home/wellness-centre/)

**What you can expect of us:** Our goal is to create a supportive learning environment for you. We care about your success and will be providing many resources to help you succeed. We will treat the COVID-19 situation with empathy and try to help you the best we can.

**What we expect of you:** We expect you to treat this course with the seriousness you would a face-to-face course, genuinely trying to learn the material as best you can. We expect you to act with Academic Integrity.

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