Combinatorics
Loyola University Chicago – Math/Comp 423.001 – Spring 2013
Course Syllabus & Ground Rules

Course Details
Class Meetings: Cuneo Hall, Room 003; Tu/Th 11:30–12:45 p.m.
Office Hours: Loyola Hall, Room 302; Mon 12:30–1:30 p.m., Tue 1:45–2:45 p.m., & Wed 1:30–2:30 p.m.
FINAL EXAM:
• when: Tuesday, April 30, 9:00–11:00 a.m.

Course Texts:

Instructor Coordinates
Aaron Lauve
Loyola Hall, Room 302
lauve@math.luc.edu
773.508.3727
www.math.luc.edu/~lauve

Contact
Communication by email is welcome. Please include 423 in the subject line. Expect a reply within 48 hours.

Course Web Page
Relevant course material will be posted on Blackboard and at www.math.luc.edu/~lauve/423.html.

Important Dates
In-term exam dates are tentative. Scheduled dates will be announced at least a week in advance.

<table>
<thead>
<tr>
<th>Exam #1</th>
<th>March 14</th>
<th>Spring Break</th>
<th>3/4–8</th>
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<tbody>
<tr>
<td>Exam #2</td>
<td>April 18</td>
<td>Last day to drop with a “W”</td>
<td>March 25</td>
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<tr>
<td>Final Exam</td>
<td>April 30</td>
<td>Last day of class</td>
<td>4/26</td>
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Requests to reschedule your final exam will be heard only for extenuating circumstances (e.g., three exams in one day is not deemed burdensome enough) and must be made through your Dean’s office.

Course Summary
SYLLABUS. Chapters 1–10 of the text, with additional topics chosen from 11–20 as times allows. Topics: Permutations, binomial theorem, compositions, partitions, Stirling numbers, Catalan numbers, graphs, trees, Eulerian walks, Hamiltonian cycles, electrical networks, graph colorings, chromatic polynomials, combinatorial algorithms, optimization, among others. Techniques: Pigeon-hole principle, mathematical induction, inclusion-exclusion principle, recurrence relations, generating functions, matrix-tree theorem, Polya theory, Ramsey theory, pattern avoidance, probabilistic methods, partial orders, combinatorial algorithms, among others.

Prerequisites. Math 313 or Comp 211.

Technology
It may be occasionally convenient to use Excel or Mathematica during lecture or on homework assignments. Mathematica is *free* for every Loyola University student (myits.luc.edu/mathematica). If you need help installing it, let me know. (You’ll need to log in using your Loyola Network ID.)
Course Components
Homework. Homework will come in two flavors: “warm-up” problems and “exercises.” They should be turned in at the start of class, separately, and stapled if appropriate.

Warm-up (10%): Generally, a few of these will be due each class period. These problems already have solutions printed in the text. Each of your solutions of this type will have two portions: a numeric self-grade between 0 and 3, with 3 being a perfect score; a short sentence of the form: “I got it myself,” “I made some progress, but gave up and looked at the solution,” “I looked at the solution and still don’t get it,” etc. (N.B.: This is an ideal chance for you to ask specific questions about material from the course, for me to address either in class or office hours.) A self-score of 2 or higher on 90% of the assigned problems throughout the semester will result in a perfect score (100%) on this portion of your grade; on 80% will give 90%; etc. Scores of 1 will be treated as 2s for the above purpose if and only if they are accompanied by a reasonable question for me.

Exercises (20%): These comprise your more traditional “homework assignments.” Due nearly every week, they should be submitted stapled and on single-sided paper. Each will be graded out of ten points. Each solution here must be written carefully, using complete sentences with correct english and mathematical grammar and punctuation. (In case a number is all that is asked for, you should (briefly) illustrate the ideas/computations behind your answer.) I will generally grade three of the problems carefully, giving each a score between 0 and 3. The final point: I reserve the right to subtract one point from any assignment for: sloppy or illegible work; or not following directions (see above).

Presentation. You will deliver one 60–90 minute on a topic of your choosing (and my approval). See Page 4 for details.

Exams. There will be two in-term exams and a final exam. The final exam will be cumulative.

Course Grade
Course components will be weighted as follows when computing the final course grade:

\[ \text{Hw} \ (10\% \ + \ 20\%) \ + \ \text{Pr} \ (10\%) \ + \ \text{Ex} \ (3 \times \ 20\%) = 100\% \]

Some curving away from the standard scale (91/A – 81/B – 71/C) may be necessary but is not expected.

Getting Help
You are expected to read and comprehend much beyond what is covered in lecture. Use your book well: learn the definitions and theorems; read and understand the proofs; read the examples’ solutions. Please, SEEK HELP if you are falling behind. Form study groups, work lots of problems, come to my office hours, meet me outside of my office hours, find a tutor, find online resources (e.g., ocw.mit.edu/courses/mathematics/18-315-combinatorial-theory-introduction-to-graph-theory-extremal-and-enumerative-combinatorics-spring-2005/), get inspired (www.youtube.com/user/vihart), etc.

Escape Routes
At any time, even after the last date for W-dropping the course, students who are experiencing medical or personal difficulties should not hesitate to consult their advisors or the Student Development Office (www.luc.edu/studentdevelopment/) or their dean. Don’t allow yourself to be overwhelmed by such problems; Loyola has resource persons who may be able to help you. (e.g., www.luc.edu/wellness/tools/mentalhealth and www.luc.edu/bct)
Disability Services
The Americans with Disabilities Act (ADA) is a federal statute that provides comprehensive civil rights protection for persons with disabilities. It requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodation, please contact the SSWD office: in the Sullivan Center, suite 117, phone 773.508.3700, fax 773.508.3810, or online at www.luc.edu/sswd/.

Academic Integrity
The Academic Standards and Regulations web page
www.luc.edu/academics/catalog/undergrad/reg.shtml
outlines the definition and ramifications of cheating at Loyola University (the “Academic Integrity” link) as well as the resources available to you should you be accused of cheating (the “Academic Grievance Procedure” link). By attending this course, you agree to uphold the high standards of Loyola. If you are found cheating on an exam, you will receive a zero(0) for the exam, you will not be allowed to drop the course, and the incident will be reported to your academic dean and recorded in your permanent file.

Course Etiquette
Sleeping in class happens and is always forgiven. Reading newspapers or surfing the web is impolite and is a distraction to your instructor; please find a better use for your time. Please set your cell phones to “silent” upon entering class; these are a distraction to everyone. Likewise, talking with your neighbor while I am lecturing is unacceptable.

Finally, and most importantly, respect for others is stressed above all else; please allow me the first chance to answer your fellow students’ questions. I expect everybody to participate in class discussions, but that begins by fostering an environment where we do not hesitate to ask our questions.

Undergraduate Students
There are undergraduate students among you. Obviously, the lectures will be the same for each audience. The chief difference between the undergraduate and graduate versions of this is that the graduate students will work more, and more-difficult, homework problems than the undergraduates. (They will be charged with giving presentations, as outlined on Page 4. The comparable burden on the undergraduates is the authoring of blog or facebook posts.)

Odds and Ends
Make-Up Quizzes/Exams. If a real emergency or University-sponsored event arises which prevents you from appearing at a scheduled examination time, you must notify me prior to the next regularly scheduled class (and before the examination if possible). Make-up examinations will be administered only at my discretion. If a student fails to appear for a make-up at the mutually arranged time, no further opportunities will be extended. Failure to contact me as stated above or sufficiently document the extenuating circumstances of your absence will result in a grade of zero on the examination.

Loyola email. On the occasion that I need to contact students outside of class, this is the only sensible way to proceed. If you would rather not use your @luc.edu email account, ... tough! If you do not receive an email message from me on Monday, January 21, please let me know.

Use of the Internet. For both course delivery and course assessment, students are expected to have easy access to the internet. If this presents a problem, please let me know as soon as possible.
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Course Component: Presentation

For 10% of their final grade, graduate students will deliver a 60–90 minute lecture to the class, provide a one to two page handout for the class (summarizing the lecture), and develop a short homework assignment for the class.

Handout & Lecture
Possible Topics. I will cover Chapters 1–10 carefully, and 18 as time permits. Any material from the remaining chapters is fair game. Alternatively, you may find something entirely different that interests you. (Obviously, it should be combinatorics related; I can help with this if you’d like.) N.B. Students like applications.

Calendar. You will schedule an appointment to talk with me about your idea for a presentation. This appointment should take place by February 14. The following slots are available. They will be assigned on a first-come, first-served basis. Email me your first and second choice at any point after 6:00 a.m., Monday, January 21.

Available Presentation Dates

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<td>April</td>
<td>16, 23</td>
<td>11, 25</td>
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Two days before your presentation, you must submit a sample handout for my critique and give me an outline of what you plan to cover during your lecture.

Homework If you material from the textbook to discuss, then choose two or three problems from each of the “regular” and “supplemental” exercises that you think are appropriate. (It would be useful if you put these on your handout; otherwise, I’ll just announce them in class.) It is very likely that some of these questions will find their way onto the final exam. Be sure they are neither too difficult nor too off-topic.

Grading
Your grade will be out of 20 points.

- **Handout:** One point will be subtracted for each (English) spelling or grammar mistake. Two points will be subtracted for each mathematical mistake.
- **Presentation:** Five points will be subtracted if there is judged to be too much math during your lecture. Ten points will be subtracted if there is judged to be an insufficient amount of math during your lecture. (Note: this “math” is not meant to include only “equations” and “formulas” but “mathematical ideas” as well.) Two points each will be subtracted if presenter is viewed as: not well-organized; unsure of the material; having exceptionally poor boardwork; not making an effort to connect to audience (e.g., projecting voice, occasional eye-contact or requests for feedback); etc.
- **Homework:** Failure to develop a homework assignment for the class will result in a five point deduction.