Combinatorics
Loyola University Chicago – Math 318.001 – 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 318 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/318.html.

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

Exam #1 March 14 Spring Break 3/4–8
Exam #2 April 18 Last day to drop with a “W” March 25
Final Exam April 30 Last day of class 4/26

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 162.

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).

Found Math. This component of the course may be satisfied in two distinct ways. Either author a “blog post” for blogs.luc.edu/mathstats/ or “share” five found articles or news tidbits with www.facebook.com/lucmathstats. Evidently, these efforts should have something to do with combinatorics. 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:

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

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 recourses 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.

Master’s Students
There are master’s students among you. They will be charged with giving presentations on additional combinatorial topics (either applications or material in later chapters of the text) Pay attention(!), because they will also be assigning exercises that may appear on homework and exams.

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.
Course Component: Found Math
For 10% of their final grade, students will either author a “blog post” for blogs.luc.edu/mathstats/ or “share” five found articles or news tidbits with www.facebook.com/lucmathstats.

Blogging
This should be something along the lines of a book report. See the following for some examples of what I have in mind:

- Generating Functions (Nilo De Roock; The Mathematics Blog)
- Huffman Codes (Steven Pigeon; Harder, Better, Faster, Stronger Blog)
- Archimedean Tilings (John Baez; Azimuth Blog)

**Watchout:** this one is about two or three times more lengthy and in-depth than I expect.

Possible Topics. We will cover Chapters 1–10 carefully, and 18 as time permits. Anything from other chapters (not presented by the master’s students) is fair game. Also anything else that strikes your fancy is most welcome. In either case, an extra two points will be given if you choose something relevant to your major.

Calendar. You will schedule an appointment to talk with me about your idea for a post. This appointment should take place by March 1. You must offer a draft for critique (without penalty, see below) by April 23. Final post must be submitted to our Blackboard blog by Wednesday, May 1st. (Whenever you are ready, I will help you post it to the Math Department’s blog site.)

Grading. Your grade will be out of 20 points. One point will be subtracted for each misspelling or grammar mistake. Two points will be subtracted for each mathematical mistake. Five points will be subtracted if there is judged to be an insufficient amount of math. (Note: this “math” is not restricted to “equations” and “formulas” but extends to “mathematical ideas” as well.) Ten points will be subtracted if there is sufficient evidence to suspect plagiarism.

Sharing
Found something math and modeling related on your daily stroll around the internet? Share it. This can be a news article, a blog post, or an especially illuminating webpage that helped you understand a math/modeling concept (from class or otherwise).

You may not simply share a link or picture. You must include (at least) two sentences introducing/describing what you’ve shared. An extra half point will be given if you choose something relevant to your major.

Calendar. You must share (at least) five things by the end of the course (due by May 1st). You must share at least two items in February and in March, and at least one in either January or April. You may use our Blackboard blog for scratchwork, but ultimately they should be shared on the Math Department’s facebook page.

Grading. Each will be scored out of five points. If you share more, I will take your top five scores. (Note, however, that I will only consider your first 10 shared items when making this determination.) I will deduct 1 point for each spelling or grammatical mistake. Accompanying text deemed inadequate will result in a 2 point deduction. Shared items deemed mathematically irrelevant will lose 3 points. Vulgar or otherwise inappropriate posts will be deleted and subtracted from your count of 10 that I am willing to look at.