MATH 579: Combinatorics

Fall 2013 (TR 5:30-6:45pm, GMCS-328)

Vadim Ponomarenko GMCS, Room 511 (619)594-6176

`vponomarenko@mail.sdsu.edu` `rohan.sdsu.edu/~vadim`

Office hours: Wednesdays 9:45-12:45, and by appointment

Overview:
Combinatorics is concerned with the sizes of finite sets. For example, consider the set of all possible different necklaces made with m beads, chosen from a tub of n different beads. A variety of tools have been developed to find the size of such a set exactly, or perhaps to find an estimate or bound.

Textbook:
A Walk Through Combinatorics, by Miklós Bóna, 3rd edition (older editions are permissible, but contain fewer exercises and more errors). This course will cover chapters 1-8.2, omitting 6.2. There is also a supplement on recurrence relations, which is available on the instructor's website. Students are expected to read the text; it is quite brief and easy to understand. It contains many exercises, some with brief solutions and some without.

Portfolio:
Students are expected to keep a portfolio in a three-ring binder or something similar, containing a detailed and complete solution to *every* exercise in the text (those marked + or ++ are optional). These portfolios will not be collected or checked, except upon a student's request; however, they will be an invaluable resource in preparing for exams.

Students are NOT required to personally solve every exercise appearing in their portfolios; they are strongly encouraged to collaborate with classmates. However, before accepting a classmate's solution into their portfolio, students are expected to carefully check it for completeness and correctness.

Learning Objectives:
There are three distinct phases to solving a combinatorial problem. Generally, the first phase is the most difficult to learn, and the last phase is the easiest. Students will learn all three in this course. First, the problem must be categorized as to which combinatorial tool would be appropriate. Second, a model must be created that translates the abstract formulation of the problem into the symbols required for the combinatorial tools to work. Third, the combinatorial tools must be applied to the symbols.

Students will, on exams, mimic solutions to specific problems; this allows students to demonstrate mastery of the third phase even while still learning the earlier phases.

Students will, at home, produce solutions to problems of specific types; this allows students to achieve mastery of the second phase even while still learning the first phase. Their mastery of this phase will be demonstrated on exams, when they mimic solutions they themselves produced earlier.

Students will, on exams, find solutions to problems of unknown types; this allows students to demonstrate mastery of all three phases.

Exams:
Exams will be closed book, closed notes; the final will be open book, open notes. A calculator (preferably scientific) will be required for the exams. Students will pick three questions to complete. One will be easier, worth 5-8 points. One will be harder, worth 5-12 points. The other questions will be worth 5-10 points. A blank response will still be worth 5 points; to earn more students must demonstrate mastery of the material. Depending on the choice of questions, students may earn over 30/30; however it is also possible to have a perfect exam but only earn 28/30. (NOTE: the solutions in the text are often incomplete, and would not earn full credit).

EXAM SCHEDULE:

Thu.	Sep. 5	Chapter 1	Tue.	Oct. 8	Chapter 4	Thu.	Nov. 7	Chapter 7
Tue.	Sep. 17	Chapter 2	Thu	Oct. 17	Chapter 5.1-5.2	Tue.	Nov. 19	Recurrences
Thu.	Sep. 26	Chapter 3	Tue.	Oct. 29	Chapter 5.3-6.1	Thu.	Dec. 5	Chapter 8.1

FINAL EXAM: Tuesday, Dec. 12 3:30-5:30

Attendance:
Students are expected to attend every class; otherwise, they are personally responsible for copying notes from a classmate. Makeup exams are not given under any circumstances.

Grading:
The lowest of nine exam scores will be dropped, to account for emergencies. The 8 remaining exams will be worth 8% of the course grade each. Class participation will be worth 6% of the course grade. The final exam will be worth 30% of the course grade. The minimal grade requirements are as follows:

A	A-	B+	B	B-	C+	C	C-	D+	D	F
92.0	90.0	88.0	82.0	80.0	78.0	72.0	70.0	68.0	62.0	0

Extra Credit:
On exam days, students may choose one problem from their portfolio to submit with their exams, to testify to their mastery of the material. The problem chosen must be relevant to the material on the exam, and must have been solved entirely alone, with no assistance from any other person. Depending on the quality of the solution, and the difficulty of the problem, extra credit of up to 5 points (out of 30) may be awarded. This may increase the exam score above 100%.

Classmate Contact Info: