

MATH 443: GRAPH THEORY

January 2018

This outline has two pages

SCHEDULE: Section 201, 3:00-4:00 MWF in MATH 102

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OFFICE HOURS: tentatively 3-4 TTh, (we can sometimes use MATX 1118 as a study room), but you can try anytime (I usually arrive by 9:00)

WEBSITE: <http://www.math.ubc.ca/~anstee/math443/math443.html>

TEXT: One possibility is *Graph theory* by Reinhard Diestel which is a Springer book and so available for free download. I found the text too idiosyncratic compared to standard treatments. Doug West h

OUTLINE: This is an honours course and so it will be dominated by proofs. Students find Graph Theory a very appealing subject because of the ease of drawing pictures. In addition the subject doesn't require a huge array of tools at an introductory level. But it can require much cleverness and flexibility. Not for your average Majors student. The course will be organized with about 2 hours of lecture each week and 1 hour of students presenting solutions to problems. We will be unable to cover the text in complete detail and certainly expect the students to do some home reading. Special requests of topics by students will be entertained. The following outline is possibly way too ambitious. The chapters are from Diestel which I will probably not be following.

- Graph Definitions, Paths, cycles and trails, Degrees, Trees etc (Ch. 1)
- Matchings and Factors (e.g. Tutte's Theorem) (Ch. 2)
- Connectivity and Paths (e.g. Mengers Theorem) (Ch. 3 3.1,3.2,3.3)
- Planar Graphs (e.g. Kuratowski's Theorem) (Ch. 4 4.4)
- Colouring of Graphs (e.g. vertex colouring Brooks Theorem) (Ch. 5 5.1,5.2)
- (e.g. edge colouring and Vizing's Theorem) (5.3)
- Circulations (Ch 6, 6.1)
- Ramsey Theory (Ch 9 9.1)

GRADING: The breakdown is 50% final, 15% midterm, 20% assignments and 15% problem presentations.

ASSIGNMENTS: There will be about 6 assignments. Students may work together on assignments but must write up their work independently. Copying is forbidden. Any 2 (or more) assignments with some virtually identical answers deemed the result of copying will be given 0 total credit. The students are reminded of the plagiarism policies of the University.

PROBLEM PRESENTATION: I will give students a list of problems (probably 40 by the end of the course) different from the assignment problems. At appropriate intervals I will ask students to indicate on a sheet whether the students are ready to present, partly ready to present or not ready to present. Then I will select some presenters from those who say they are ready. Some portion

of the grade comes from the sheet and some from the presentation. Grading of the presentations will form the bulk of this portion of the term grade and presentations will be graded on clarity, completeness and the delivery. Everyone presents at least 2 problems by the end of the course. The grade for this will essentially replace a midterm. Students are reminded that judicious scaling is employed.

MIDTERMS: One 50 minute midterm scheduled for Thursday Oct. 24.

FINAL: 3 hours

MISSED WORK: From time to time students may be unable to finish assignments or attend midterms or the final exam. In the case of the Final Exam, the students should contact the Faculty of Science office and the missed final will be handled in a formal way. In the case of assignments, please contact me before class time on the due date, and given your reasons for the missed work. Assuming the reasons are legitimate, I will note that you will be missing the assignment. A missed midterm/quiz can be handled in a similar way, if you contact me before the test time. In such circumstances your grade is computed out of a smaller number than 100 and then scaled appropriately to get a grade out of 100. For example, if a midterm counts 15% and a student informs me in advance of legitimate reasons for missing the midterm, the student would have a grade computed out of 85 and then this would be scaled to a grade out of 100 by multiplying by $100/85$. Without advance notice (to me by email or phone message to Math Office etc) the default will be a grade of 0 in the missed work but you may contact me. A student must finish a significant amount of term work in order to pass.