MATH/CS 240 (Elem. Discrete Math.) SYLLABUS, Fall Semester, 2004-05
Lec. 1, TR 11:00 AM–12:15 PM, 165 Bascom Hall

Prof. Richard A. Brualdi   Text is:

Office: 725 Van Vleck Hall   *Discrete Math. & its Applics.*

                                                                 5th ed., by K. Rosen

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Office Hours (RAB): Mon. (3:30–4:30 PM), Tues. (3:30–4:30 PM), Thurs. (1:30–2:30 PM)

TA: Darren Neubauer, 622 Van Vleck Hall, neubauer@math.wisc.edu

Office Hours (DN): Tues. (1:20–2:20 PM), Wed. (2:30–3:30 PM), Thurs. (9:00–10:00 AM)

Please Read Carefully for Very Important Information

Course Content As the title *Elementary Discrete Mathematics* suggests, Math/CS 240 is a course on the fundamentals of discrete (as opposed to continuous) mathematics. It is a requirement for the BS degree programs in Computer Engineering offered by the ECE Department and in Computer Science offered by the CS Department. It is now a prerequisite for (getting into) advanced computer science courses (CS 367, 520 and 577). The course is a foundational math course for this program and is meant to be taken early in the program; it is also a good foundation for higher mathematics courses. You will be introduced to many new concepts and topics, and we shall not spend a long time on any one of them. The prerequisite for the course is Math 221 (Calculus I), and the course will be taught roughly on the level of Math 222 (Calculus II).

Briefly, the topics covered in the course include: logic, set theory, functions and their growth, Boolean functions, the integers, algorithms, relations and digraphs, inductive and recursive definitions and arguments, program correctness, divide and conquer relations, fundamentals of counting and discrete probability, recurrence relations, relations (equivalence, partial order, ...), elementary graph theory including trees, tree-searching and traversal, graph coloring, ... While there are many new concepts and topics, there are many connection between them.

Study Habits You should be devoting approximately **6 hours a week** to the course - studying your book and class-notes, thinking about the ideas and concepts and how they relate to each other, talking with some of your classmates about them (study groups are encouraged), doing exercises etc. If you are not prepared to make the effort, you should re-examine the reasons why you are taking this course. There will be regular reading and exercise assignments (see attached). *Not everything you need to know will be discussed in class, and not everything you need to know is in the book. The class and the book will reinforce each other.* We will be covering many pages in the book. *In the class lectures, you will learn what emphasis I am placing on the various topics in the course, and this should inform you on how to study what is in the book.* **The class will also inform you on what to expect on exams.** The assigned exercises also give an indication of the emphasis in the course.

In addition to the lecture you have **a once-a-week assigned discussion section with a Teaching Assistant (TA)**. In this discussion section you can get your questions answered, go over problems, review, etc. Exams will be passed back in these sections.

Exercises A list of Exercises is given at the end of this document. Exercises are to be handed in to your TA and will be graded selectively; 50 points are allotted for a discussion score. **I will email the class at the end of each week to tell you which exercise sets are due on the following Thursday.** In the discussion sections you can get your questions on the exercises answered. I have given you a minimal list of exercises; there are many other similar exercises in the book that you can choose to do if you want more to practice on. These exercises are to help you learn the material, reinforce the new concepts, and develop technique in problem-solving. If you don't do these exercises, then when it comes time for the in-class exams, you won't have the experience and facility to complete the exams in the allotted time. **The exams will be constructed with the assumption that you have practiced with the exercises and have become proficient and efficient in doing them.**

Exams and Homework There will be **two in-class exams** during the semester (**each worth 100 points**) and a **final exam** (**worth 150 points**) - see the accompanying schedule.

Grades will be based on a **total of 400 points** (see above) according to the following grade-schedule (and exams will be constructed with this standard in mind). If appropriate, I will rescale exam scores (by adding points) to take into account this schedule; with the grade-schedule you are better informed on how you are doing and how much you may need to improve.

Grade	Accomplishment level	Points
A	**superior**	370 ↑
AB	**excellent**	355 ↑
B	**proficient**	325 ↑
BC	**good**	310 ↑
C	**acceptable**	280 ↑
D	**mediocre**	230 ↑
F	**unacceptable**	0 ↑

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You are encouraged to form study groups with your classmates; things not clear to you may become obvious when you try to explain them to others or when you hear other points of view. Sometimes just verbalizing your mathematical thoughts can deepen your understanding. The exercises you hand in should be your own write-up and not copied from someone else.

Calculator Policy It is acceptable to use calculators on exams to do arithmetic computations, but the computations are to be exact. So an answer which has $\sqrt{2}$ in it is to be

presented as such and not as 1.414. In general, I am not interested in you carrying out calculations.

Attendance It is expected that each student will be present at all of the classes and discussions and will be an attentive class participant.

It is rude and disruptive to both me and your fellow students to leave a class before the class is over for the day.

Office Hours Listed on page 1. These are for students who need additional help beyond that given in the class; **office hours are not substitutes for class**.

Other Information

GUTS: GUTS (Greater University Tutoring Service) is a free peer tutoring service offered either as one on one, in small groups, or in drop-in centers. The drop-in centers are located in Gordon Commons, Helen C. White Library, Kronshage Hall, and Union South. The GUTS office is 303 Union South (263-5666). They also have an exam file in their office.

Private Tutors: The receptionist office on the 2nd floor of Van Vleck has a list of private tutors. See also http://www.math.wisc.edu/ paulson/tutor.html .

Note to McBurney Disability Resource Center students: Students of the Center who are recommended for some accommodation (e.g., extended time on exams) should contact the instructor about this no later than January 28.

The Department of Mathematics; Van Vleck Hall (VV):

Chair: D. Griffeath (219 VV)

Associate Chair: J. Robbin (313 VV)

Department Administrator: V. Whelan (223 VV)

Undergraduate Advisor: G. Mari-Beffa (309 VV)

TA Supervisor: P. Milewski (809 VV)

Undergraduate Secretary: Jane Schwantz (207 VV)

Sexual Harrassment Contact Persons: G. Mari-Beffa (309 VV) and D. Rivard (720 VV)

Access and Accommodation Coordinators: J. Robbin (313 VV)

Faculty Minority Liaison: D. Camacho (321 VV) *Information is available concerning diversity and multicultural issues (e.g. support services, academic internships and grants/fellowships). Dr. Camacho is also available to discuss minority students' concerns about mathematics courses: 263-6817. camacho@math.wisc.edu)*

SCHEDULE

We shall try to follow the schedule below but there may be small deviations (referring to sections in the book). **Check the exam schedule now so that if you have a unavoidable conflict you can drop the course.**

Week of	Sections
September 2	$1.1 - 1.3$
September 6	$1.4 - 1.8$
September 13	$10.1 - 10.2(\text{in part}), 2.1 - 2.2$
September 20	$2.3 - 2.5$
September 27	$2.6 - 2.7$
October 4	$3.1 - 3.3$
October 11	3.4
Thursday, October 14, 2004	**In-Class Exam**
October 18	$3.4 - 3.6$
October 25	$4.1, 4.3 - 4.4$
November 1	$4.5, 5.1, 6.1$
November 8	$6.2 - 6.3, 6.5$
November 15	$7.1, 7.3 - 7.4$
Tuesday, November 23, 2004	**In-Class Exam**
November 29	$7.5 - 7.6$
December 6	$8.1 - 8.2, 9.1, 9.3$
December 13	one class only - review
Tuesday, Dec. 21, 2:45 -4:45 pm	**Final Exam**

Exercise List

Below is a set of exercises for the sections covered in the courses. These are to be handed in regularly and will be selectively graded, generally on Thursdays; I will email you no later than the weekend to let you know which exercise sets are due on the following Thursday. It is fine to work on these exercises with other students in the class, but the exercises you hand in should be your own write-up and not copied from someone else.

If you need more exercises, just pick some near those assigned. There are also review questions and supplementary exercises at the end of each chapter. **This entire syllabus is available on my webpage in case you lose it.**

Section	Exercises
1.1	$1b, d, f, 3a, b, c, 5c, e, 7c, e, 9c, e, g, 21, 23d$
1.2	$6, 7f, 13, 24$
1.3	$6d, e, f, 7a, c, 9d, 10b, c, d, 13b, 22c, e, 26a, c, 31b, c, 41, 42, 43$
1.4	$4c, d, 7a, d, 8c, d, 16c, e, 19b, d, 38a, b, 41$
1.5	$12a, c, 14, 20, 21, 25, 26, 27, 28, 33, 36, 37, 49$
1.6 & 1.7	$16, 22$ & ; $3, 13, 15, 18, 21a, c, e, 23$
1.8	$1, 3a, c, 5a, c, 8d, g, 12a, d, 13a, d, 15b, e, 19b, d, 25, 26, 27, 31, 49, 55, 62$
10.1 & 10.2	$1, 2, 3c, 10, 11$ & $1, 3, 5, 11$
2.1	$3, 11, 16, 18, 21, 23, 25$
2.2	$1, 3, 5, 9, 15, 19, 21, 24$
2.3	$3, 5, 8, 9, 10, 11$
2.4	$7, 9b, g, 13, 14, 17, 21, 25, 26, 27, 28, 30, 36, 40, 43, 45, 53, 55, 57$
2.5	$1a, 3c, 19, 20, 22c, e, 24, 27, 28$
2.6	$1d, g, 3, 7, 9, 10, 11, 14, 27, 46, 47, 53$
2.7	$3b, 4c, 11, 15, 23, 29, 31c, 32$
3.1	$1, 2, 4, 7, 16, 21,$
3.2	$1, 3a, b, 15, 16, 17, 19, 23$
3.3	$3c, 7, 9, 10, 13, 21, 31a, b, 33, 36, 51$
3.4	$3, 5, 7, 8, 12, 13, 16, 18, 24, 25, 26, 27, 30$
3.5	$1, 3, 4, 7, 16, 17, 21, 22, 23$
3.6	$1, 3, 4, 7, 11$
4.1	$3, 7, 8, 15, 16, 23, 27, 28, 31, 38, 40, 42, 47,$
4.3	$4, 7, 11, 18, 21, 27, 31, 35$
4.4	$5, 6, 9, 12, 15, 28$
4.5	$1, 5, 8, 10, 13, 17, 18, 21, 23, 29, 31, 38, 41$
5.1	$5, 6, 8, 9, 12, 13, 16, 26, 28, 31$
6.1	$3a, c, 5a, c, e, g, 10, 12, 14, 23, 25, 27, 28, 35$
6.2	$3a, c, e, g, 6, 7, 8, 9, 11, 12, 13$
6.3	$1, 3, 12, 14, 15, 17, 21$
6.5	$5, 7, 10, 11, 12, 13, 15, 16, 20, 23, 24$
7.1	$5, 7, 23, 25, 30, 31, 40, 49$
7.3	$1, 3c, 13, 14, 15, 18, 27$
7.4	$16, 19a, c, e, 21, 23, 25a, c, 28c, d$
7.5	$10, 15, 18a, c, 19, 29, 42a, b, 44, 47$
7.6	$1, 3, 8, 11, 13, 16c, 18, 26, 29, 37, 38$
8.2	$21, 25, 26, 27, 29a, c, e, 35, 37$
9.1	$1, 3, 13, 21, 23$
9.3	$3, 9, 12, 15, 17, 18, 22, 23, 24$