

**MATH/CS 240 (Intro. Discrete Math.) SYLLABUS, Fall Semester, 2005-2006**  
**Lec. 1, TR 11:00 AM–12:15 PM, B102 Van Vleck Hall**

Prof. Richard A. Brualdi  
Office: 725 Van Vleck Hall

Text is:  
*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. (1:00–2:00 PM)  
TA: Anders Hendrickson, 718 Van Vleck Hall, hendrick@math.wisc.edu  
Office Hours (AH): (TBD)

**Please Read Carefully for Very Important Information**

**Course Content** As the title *Introduction to 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) although it will not be as technical as Math 222.

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 connections between them.

**Study Habits** You should spend approximately **5–6 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. 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 (I will never subtract points); 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
<i>A</i>	superior	370 ↑
<i>AB</i>	excellent	355 ↑
<i>B</i>	proficient	325 ↑
<i>BC</i>	good	310 ↑
<i>C</i>	acceptable	280 ↑
<i>D</i>	mediocre	230 ↑
<i>F</i>	unacceptable	0 ↑

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 concerned with arithmetic 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. **Office hours are not substitutes for class.**

**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 September 16, 2005.

### APPROXIMATE SCHEDULE

Check the fixed exam schedule now so that if you have a unavoidable conflict you can drop the course.

Week of	Sections
September 5	1.1 – 1.5
September 12	1.6 – 1.8, 10.1 – 10.2(in part)
September 19	2.1 – 2.3
September 26	2.4 – 2.6
October 3	2.7, 3.1 – 3.2
October 10	3.3 – 3.5
<b>Tuesday, October 18, 2004</b>	<b>In-Class Exam</b>
October 17	3.6, 4.1
October 24	4.3 – 4.5
October 31	5.1, 6.1
November 7	6.2 – 6.3, 6.5
November 14	7.1, 7.3 – 7.4
<b>Tuesday, November 22, 2004</b>	<b>In-Class Exam</b>
November 28	7.4 – 7.6
December 5	7.6, 8.1 – 8.2, 9.1
December 12	9.3, and review
<b>Tuesday, Dec. 20, 2:45 - 4:45 pm</b>	<b>Final Exam</b>

### Exercise List

Below is a set of exercises for the sections covered in the courses. These are to be handed in regularly, generally on Thursdays, and will be selectively graded; 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.

<b>Section</b>	<b>Exercises</b>
1.1	<i>1b, d, f, 3a, b, c, 5c, e, 9c, e, g, 21, 23d</i>
1.2	<i>6, 7f, 13, 24</i>
1.3	<i>6d, e, f, 7c, 9d, 10b, c, d, 13b, 26a, c, 31b, c, 41, 42, 43</i>
1.4	<i>4c7b, 8c, d, 16c, e, 19c, 38a, b, 41</i>
1.5	<i>12a, c, 14, 20, 21, 25, 26, 27, 28, 33, 36, 37, 49</i>
1.6 & 1.7	<i>16, 22 &amp; 13, 15, 18, 21a, c, e</i>
1.8	<i>1, 3a, 5b, 8d, g, 12a, d, 13a, d, 15b, e, 19b, d, 26, 27, 31, 49, 55, 62</i>
10.1 & 10.2	<i>1, 2, 3c, 10, 11 &amp; 1, 3, 5, 11</i>
2.1	<i>3, 11, 16, 18, 21, 23, 25</i>
2.2	<i>1, 3, 5, 9, 15, 19, 21, 24</i>
2.3	<i>3, 5, 8, 9, 10, 11</i>
2.4	<i>7, 9b, 13, 14, 17, 25, 26, 27, 28b, 30, 36, 40, 43, 45, 53, 55, 57</i>
2.5	<i>1a, 3c, 19, 20, 22c, e, 24, 27, 28</i>
2.6	<i>1d, g, 3, 7, 9, 10, 11, 14, 27, 46, 47, 53</i>
2.7	<i>3b, 4c, 11, 15, 23, 29, 31c, 32</i>
3.1	<i>1, 2, 4, 7, 16, 21,</i>
3.2	<i>1, 3a, b, 15, 16, 17, 19, 23</i>
3.3	<i>3c, 7, 9, 10, 13, 21, 31a, b, 33, 36, 51</i>
3.4	<i>3, 5, 7, 8, 12, 13, 16, 18, 24, 25, 26, 27, 30</i>
3.5	<i>1, 3, 4, 7, 16, 17, 21, 22, 23</i>
3.6	<i>1, 3, 4, 7, 11</i>
4.1	<i>3, 7, 8, 15, 16, 23, 27, 28, 31, 38, 40, 42, 47,</i>
4.3	<i>4, 7, 11, 18, 21, 27, 31, 35</i>
4.4	<i>5, 6, 9, 12, 15, 28</i>
4.5	<i>1, 5, 8, 10, 13, 17, 18, 21, 23, 29, 31, 38, 41</i>
5.1	<i>5, 6, 8, 9, 12, 13, 16, 26, 28, 31</i>
6.1	<i>3a, c, 5a, c, e, g, 10, 12, 14, 23, 25, 27, 28, 35</i>
6.2	<i>3a, c, e, g, 6, 7, 8, 9, 11, 12, 13</i>
6.3	<i>1, 3, 12, 14, 15, 17, 21</i>
6.5	<i>5, 7, 10, 11, 12, 13, 15, 16, 20, 23, 24</i>
7.1	<i>5, 7, 23, 25, 30, 31, 40, 49</i>
7.3	<i>1, 3c, 13, 14, 15, 18, 27</i>
7.4	<i>16, 19a, c, e, 21, 23, 25a, c, 28c, d</i>
7.5	<i>10, 15, 18a, c, 19, 29, 42a, b, 44, 47</i>
7.6	<i>1, 3, 8, 11, 13, 16c, 18, 26, 29, 37, 38</i>
8.2	<i>21, 25, 26, 27, 29a, c, e, 35, 37</i>
9.1	<i>1, 3, 13, 21, 23</i>
9.3	<i>3, 9, 12, 15, 17, 18, 22, 23, 24</i>