MATH 210, "Discrete Mathematics"

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Office Times

11:00 a.m. - Noon on Monday, Wednesday, and Friday
10:00 - 10:50 a.m. on Tuesday and Thursday
Other times by appointment (don't hesitate to ask for one)

OVERVIEW AND POLICIES OF THE COURSE

The Subject

Discrete mathematics is the study of *discrete sets* and the activities and phenomena that they **model**. (The set {0,1,2,3,...} of all nonnegative integers is an example of a **discrete set**. It is a **mathematical model** of the activity of counting the number of emissions in an hour from a radioactive particle. A finite set, such as $\{-1,0,1,2,e,\pi\}$, is also a discrete set. By contrast, the interval [0,1] is an example of a non-discrete set (and a model of the passage of time), and *calculus* is the study of non-discrete phenomena.[1]

The goal of the course is, not surprisingly, to master the fundamentals of discrete mathematics. To that end, by the end of the course you should be able to perform the tasks listed below.

1. Prove statements about set-inclusion.
2. Know the set operations of union and intersection.
3. Apply DeMorgan's Laws to simplify expressions involving sets.
4. Know the definition of a function.
5. Apply recursive procedures.
6. Prove theorems using induction.
7. Verify that a given set of ordered pairs is an equivalence relation.
8. Know the relationship between a partition and its equivalence relation.
9. Determine whether two graphs are isomorphic.
10. Know the conditions under which an Euler Path or Euler Circuit exists in a graph.
11. Find an Euler Path or Euler Circuit in a graph, when one exists.
12. Know the conditions under which a spanning tree exists in a graph.
13. Find a spanning tree in a graph, when one exists.
14. Understand the fundamentals of propositional calculus, Boolean Algebra, and digital logic gates.

(For more information about the objectives and content of the course, see the syllabus.)

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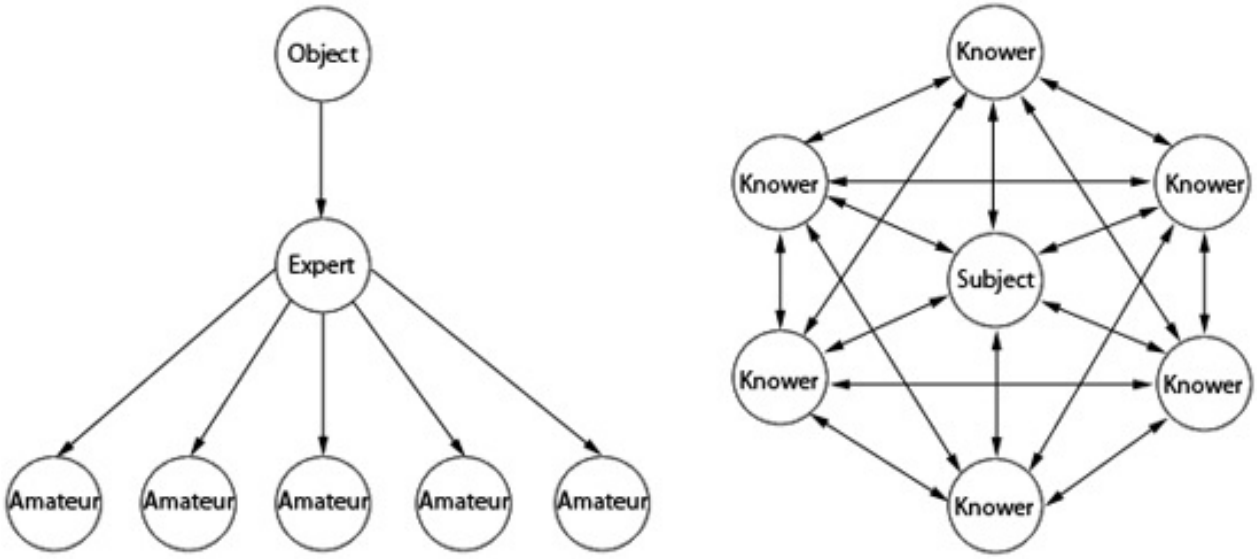
[1] By the end of the course, we shall have produced precise definitions of the terms *discrete* and *continuous*.



$(1)^2$ $(2)^3$

Figure. Learning by (1) Lecture and (2) Inquiry.

We will learn the material of the course in a manner similar to that employed by mathematicians, teachers, and computer scientists in their work. Beginning today, I will occasionally hand out notes containing definitions, axioms, problems, and theorems. Between classes, you will attempt, *on your own*, to solve the problems and prove the theorems. Each class period will be devoted almost entirely to students' presentations of their solutions to problems, proofs of theorems, and questions of any sort about the material of the course. (See the figure above.) *If you think that you need a more traditional, lecture-oriented format to succeed in your learning, please feel free to speak to me about your concern.*

Administrative Matters

Evaluation of Your Work. Your performance in the course falls into two categories: (1) homework, quizzes, and participation in class, and (2) two examinations, one at mid-term and the other at the end of the semester. I will derive your grade in Category 1 by keeping a grade-point average (GPA) of your daily work. If you miss a class, you will receive a score of 0; if you simply attend class, you will earn a 1. If you make a comment from your seat during

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1. Parker Palmer, *The Courage to Teach* (San Francisco: Jossey-Bass, 1998) 100.

2. *Ibid.*, 102.

that class, your 1 will be replaced with a 2. If you present something at the front of the classroom (even if it's incorrect) or make a particularly good comment from your seat, your score for that day will be a 3. Finally, if you do an exceptional job in front of the room or offer a stunning insight from your seat, you will earn a 4 for your day's score. I will employ this same scoring system on any homework that I ask you to turn in for a grade. At any time during the term when either you or I desire to know your GPA in homework and class participation, I will compute the average of all such scores that you have earned to that point. An average of 1.000 earns you a *D* in the homework category; a 2.000 earns a *C*; a 3.000, a *B*; and a 4.000, an *A*. When computing your homework grade, I will convert your GPA to a percentage. That number will count as *x*% of your overall grade, where *x* will be explained below.

Your score on the midterm examination will count as *y*% of your overall grade – where *y*, like *x*, will be explained below. Your score on the final examination will count as *z*% of your overall average, and will be handled in a manner similar to that of *x* and *y*.

The numbers *x*, *y*, and *z* must satisfy the following conditions:

each of x, y, and z is an integer;

x is in [30,70], y is in [10,30], and z is in [10,40];

and

$$x + y + z = 100.$$

Let me know your choices for *x*, *y*, and *z* not later than the end of the second week of the semester. You may change your choices once, but this must occur within a week of my returning to you your graded midterm examination.

The grading scale for the course, in terms of percentage points earned, is as follows:

90 - 100, A;
80 - 89, B;
70 - 79, C;
60 - 69, D;
< 60, F.

The Integrity of Your Work. I expect you to conduct yourself with honor, integrity, and concern for the other members of the class as well as for yourself. By presenting or turning in a piece of work, you will be pledging that you have neither given nor received any unauthorized help on the work. My response to discovering a violation of this pledge might include, but will not necessarily be limited to, the following:

(1) assigning a score of *0* on any offending work;
(2) assigning a grade of *F* for the course;
(3) reporting each cheater to an appropriate authority, such as the provost.

Attendance. Regular attendance of class is an important part of this course. Nevertheless, because I believe that university students should make their own decisions, I hereby declare that attendance of the class meetings of this course is optional, subject to the conditions below.

(1) The student and not the professor is responsible for the consequences of an absence. This means, for example, that I will not be obligated to repeat to an absentee material that has already been covered.

(2) A test from which a student will be or was absent may be made up only when the absentee can convince me, preferably in advance, of the necessity and worthiness of the absence.
(3) Assigned homework that is late will not be accepted.

Regarding Learning Styles and Difficulties. There are many styles of learning. Some people learn better with their eyes, some with their ears. There are many effective ways to acquire knowledge. If you have a learning style that does not seem to accommodate well to my method of teaching – in particular, if you have a learning disability – please let me know. If, for example, taking notes in class is difficult for you or hampers your learning, arrangements can almost certainly be made to help you solve this problem.

Some Thoughts at the Beginning of a Semester

I want to help you learn. I will help you with any legitimate need. I will not help you with anything that you need to do for yourself. I want this course to be an enjoyable experience for all of us, and I will do all I can to make it so.

I am making certain assumptions about you. You are here because you want to be, if only to satisfy a requirement. You want to learn the material of this course, at least to the point of earning an acceptable grade. You already believe – or you are willing to entertain the possibility – that learning in general, and mathematics or computer science in particular, is fun. *You will, throughout the semester, invest at least two hours of time outside class per hour spent in class in playing and working with the ideas of this course.* (If you do not possess all of these characteristics and you are unable or unwilling to develop them, then you should probably drop this class.)

If at any time you would like to discuss this course, this university, or any other aspect of your life, I would be happy to do so with you.

E. Lee May, Jr., Ph. D.
Professor of Mathematics and Computer Science