Discrete Mathematics - MTH 2110

Course Info Sheet – Fall 2010

Instructor Information:

Professor Sarah Spence Adams
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Email: sarah.adams@olin.edu
Meeting Times/Location: M, Th 1:00 - 2:50pm, AC417
Office Hours: M, Th after class in AC417 and by appointment
Course Assistants: Daniel Grieneisen and Nicholas Monje. Help Hours TBA in location TBA.

Discrete Mathematics is a course that will introduce you to advanced counting techniques and discrete structures such as graphs, trees, codes, and designs. It will also make you a better problem solver, mathematical 'prover,' and technical writer. You will learn to argue logically, flawlessly, and convincingly. You will improve at working hard problems in groups and individually. Like a gift that keeps on giving, with high probability, you will see some of the structures that you meet here at some later point in your career, and with probability 1, you will use the skills you gain in problem solving, critical thinking, logical reasoning, and teamwork for the rest of your natural born lives. What a bargain!

Learning Objectives:

1. Solve problems and organize precise solutions for a variety of topics in discrete mathematics. Topics include:
    a. counting techniques including permutations, combinations, the pigeonhole principle, and inclusion/exclusion and interpreting the meaning in a variety of contexts
    b. analyzing graphs, including theory-based properties and how graphs model real-world situations
    c. recurrence relations
2. Understand and be able to construct elementary proofs, including proofs by induction, involving various discrete mathematics topics
3. Improve teamwork skills through collaboratively solving/discussing problems and through collaboratively writing precise solutions/proofs
4. Self-direct a group project on a specialized topic in discrete math
5. Discuss several applications of discrete math
6. Improve oral and written communication skills through projects, class participation, homework, and tests

Text:

Discrete Mathematics and its Applications, Kenneth H. Rosen, **5th** edition, McGraw Hill, 0-07-242434-6.

Attendance:

Class meetings will vary from day to day. Sometimes, we will cover material in your book, but with different examples or applications. Sometimes we will cover material not covered in your book. Often you will be working problems in groups at your desks or at the boards. Sometimes you will be taking quizzes. Usually you will be handing in homework. I expect you to be there to participate and engage in conversation with your peers and me. If you do miss a class, it is your responsibility to seek out one of your peers to find out what you missed, including any announcements or handouts. As your class participation plays a role in your final grade (not to mention your personal learning and enrichment!), it is in your best interest not to miss any classes.

Homework:

- ***Pre-class Reading Problems*:** These problems will help focus your reading, and they are nominally due at the start of each class period. They should be fairly straightforward after reading the text and its examples. These problems will enable you to participate in class, and they give a measure of how well you pick up the material from reading on your own. Please try to solve these problems independently before seeking help. Doing these problems will prepare you to participate in class by giving you the knowledge you need to follow the day's activities. When you arrive in class, self-check your answers using the provided solutions.
- ***Group Problem Sets:*** These problem sets will be more challenging, and they will be done in pre-assigned groups. You are required to try each problem on your own before meeting with your group. You are encouraged to solve these problems only with your team-mates. Any collaboration with other students outside your group must be cited. Your group will hand in one solution set, and all group members will receive the same grade. Group compositions will likely change once during the semester.
- ***Practice Problems***: These problems will help you self-check your progress. They are not collected or graded, but you may ask me (or anyone!) questions about them at any time.

Using resources on Homework:
The following are **strictly forbidden**: You may **not** use the Instructor's Solutions Manual, you may **not** use past students' work, and you may **not** use any other source of solutions (from other schools, on the web, etc) except for the Student Solutions Manual, which is permitted and available for purchase online.

Any other resources are permitted under the following two conditions:

- You must **never simply copy** a solution or hand in a solution that you do not fully understand. By handing in a solution, you are certifying that you understand it completely and you can independently solve similar problems.
- You must **always cite** your source of help next to each problem. Simple notes like "checked answers with Luisa," "used back of book," "used solns manual," "used website X," "used Book A," "helped by Jenny" are perfectly fine. Feel free to use obvious abbreviations – I don't want citing to be a time burden. Getting in the habit of always citing sources of help is good professional practice and it is in the spirit of learning and the Honor Code.

If you do not use any sources or receive any help from friends, then please write "No Help" on the top of your paper. If you have any questions about what resources are allowed or how to cite them, please just ask!

Other requirements HW:
It is essential that all turned-in homework be neatly written or typed. On the upper right hand corner of the first page, please list your full name(s), DM, the assignment (e.g. "Group HW #1") and the due date for the assignment. You must staple all pages together. Each problem must be clearly labeled (e.g. Ch 5.4, #23) and done in order. You must show your work, which means that steps must be clearly explained. Neatness and clarity of explanation are essential; your exposition will be evaluated.

No late homework will be accepted unless there is a real emergency. Please do not ask for an exception.

Pre-tests:
To check comprehension and help prepare you for the exams, I will give two in-class pre-tests.

Tests:
You will have two take-home tests.

Projects:
In small groups, you will investigate discrete mathematics topics not covered in class. Your group will give an in-class presentation and write a report. You will assess classmates' projects.

Grades:
Group Homework: 25%
Group Project: 10%
Pre-tests: 15%
Tests: 50%
Participation and engagement: Priceless

In addition to performing excellently on the above components, in order to get an A in this course, you need to correctly answer 3 "starred" problems throughout the semester. Approximately six starred problems will appear in various places throughout the semester. Also, your participation and engagement in class can help (or hurt!) your final grade.

Laptops:
I will sometimes want you to have your laptops in class. Please refrain from talking on IM, doing email, or doing unrelated web surfing during class, as this is distracting to both me and your fellow students. If you are that bored, please talk to me about it! I will find a solution.

Office Hours:
Please come to office hours with questions big or small! Or maybe you don't even know what your questions are; I can probably still help. Sometimes a few minutes in office hours can make a big difference. If you need a special appointment, please ask.

Supplies:
I recommend that you use a loose-leaf notebook. This way, you can keep your class notes, various homework problems, various hand-outs, etc, all in order. Please save all of your work until (at least) the end of the semester.

Daily Schedule:
The schedule and all assignments are subject to change as we go. Check the calendar every day! http://faculty.olin.edu/~sadams/DM/Calendar.htm

Special Needs:
Please discuss your needs with OSL and me as soon as possible.

Honor Code:
This professor regards the Honor Code as essential to the academic integrity of the College. Please express any concerns in a timely fashion.