

MA 216 Discrete Mathematical Structures and Proof

Fall 2011 Syllabus

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Class meetings and location: Monday, Wednesday, and Friday, 1:10 to 2:20 p.m., PPHAC 233

Office hours: Monday, Wednesday, and Friday, 11:45 a.m. to 1:00 p.m., by appointment, and whenever you find me in my office.

Textbook: *Mathematics: A Discrete Introduction*, second edition, by Edward Scheinerman

Course Content and Organization

In this class you will experience the excitement, satisfaction, and fun of being a mathematician!

The course focuses on a study of mathematical logic and types of mathematical proof, including induction and combinatorial arguments. We will investigate set theory, relations, functions, cardinality of sets, algorithm analysis, basic number theory, recurrences and graphs.

We will explore most sections in Chapters 1 through 5, 7, and 9, as time permits, in the Scheinerman text. Topics include: the foundations of logic and proofs; basic structures such as sets, functions, and sequences; the fundamentals of algorithms and the integers; induction and recursion; counting principles, including the pigeonhole principle and inclusion-exclusion; relations; an introduction to graphs and graph models.

The class will be a mixture of short lectures, questions and discussion, and classroom activities that you will investigate. Active participation during class meetings is expected from each of you. Some activities will involve students working together in pairs or small groups and some activities will involve individual work.

Course Goals

The main purpose of this course is to provide you with the necessary skills and background to successfully study and communicate advanced mathematics and computer science topics.

Mathematical writing is an essential part of the course. Specific course goals are to

- improve your ability to read and understand mathematical definitions and proofs
- learn how to construct mathematical proofs
- learn how to write mathematical proofs
- learn how to communicate mathematical ideas to different audiences
- learn about basic discrete mathematical structures that are useful for problem-solving and also for further study of mathematics and related sciences

Assessment

Attendance—Be present!

Attendance is listed first under assessment because this course is about participating in the discovery of mathematics. In addition, your understanding of the material in this course will be assessed during every class meeting. If you are not in class, you cannot show mastery of the day's work during that class. Thus, *attendance is required*. Each unexcused absence will adversely affect your class participation grade. Please talk to me in advance if you must miss class for some reason beyond your control. Students are responsible for all work covered in class and all assignments, even if you must be absent from class. Also, common courtesy demands that you be on time for class and do not leave the room during class (unless you are ill). This will help you, your classmates, and your professor focus on what we all came to do. Finally, please keep all cell phones on silent or off and in your backpack or bag, or otherwise off your person.

Readings and daily homework

Daily reading and problem assignments from the text will be given; you are expected to come to class prepared to explain problem solutions and to ask questions on anything that is unclear. As an added incentive to arrive to class on time and to work seriously on the daily problem assignments, at the beginning of most classes, we will randomly choose one homework problem for you to re-write and hand-in to be evaluated. You will be asked to re-write the solution to the problem using only your notes, without referring to your text. These problems will be graded 0/2, 1/2, or 2/2. A 2/2 can be earned by successfully solving the problem, or by showing work so far, and asking questions that show you worked seriously on the problem. Your two lowest daily problem grades will be dropped. You are encouraged to work with your classmates on the daily problems, but please do not consult other books or the internet. Finding a solution in another source will not help you learn to think for yourself. Giving and receiving explanations can be very helpful when working on problems and when preparing for exams, in a way that copying from another source cannot.

Longer hand-in homework and writing assignments

There will be regular graded hand-in homework assignments and writing activities. You will be told in advance when homework will be collected and graded. On some of these assignments, early drafts will be submitted, and then you will have the opportunity to revise your work. Your grade on the first draft will reflect the effort on that draft and the grade on both the draft and the final product will be incorporated into the total grade for the assignment.

All hand-in homework and writing assignments must be completed by you alone unless otherwise stated in writing. You may consult Dr. Somers, but you may not consult any other people and you may not look for the solution in another book or on the internet. The Academic Honesty Policy guidelines for Mathematics courses, which are attached, are to be followed on all assignments.

Papers

There will be two short papers for this course. They will be due on **Friday, October 20** and **Monday, November 21**. Detailed information about the topics and requirements for the papers will be given in class.

Word-Processed Homework

You are **strongly encouraged** to use a word processor for all hand-in homework. It will be especially helpful to you when you need to revise and resubmit a draft of an assignment, and don't need to recopy the whole assignment. Because there will be math symbols in the text of your solutions and proofs, you may use any word processing package with equation capability. If you know LaTeX, that would be good to use. Microsoft Word 2007, on the campus network, also has an equation editor. If you are not familiar with it, here is a website from the University of Waterloo that gives some basic instructions—it's not difficult to learn if you know Word.

<http://ist.uwaterloo.ca/ec/equations/equation2007.html>

If you use an earlier version of Word and are not familiar with its equation editor, you can search the web for information on using it. I will be happy to answer questions on using the equation editor in Word.

Exams

There will be two in-class exams and a cumulative final exam. You will have the whole class period to work on the in-class exams, which will be given on **Friday, September 30** and **Wednesday, November 9**. The final exam is scheduled by the College and will be given on **Friday, December 9, at 1:30 p.m.** Please mark these dates on your calendar. Make-up tests will be given only under extreme circumstances and with appropriate documentation. (This is a fairness issue; it is really impossible to construct fair make-up exams for a class like this one.)

Grading

Your grade will be based on class participation and daily graded problems (15%); two in-class exams (15% each, for a total of 30%); a cumulative final exam (20%); and graded homework, writing assignments, and papers (35%).

Extra help

You are encouraged to see Dr. Somers for extra help during office hours or to arrange an appointment for extra help, if needed. The Writing Center is also a good resource. If you need the services of the Writing Center, please call 610-861-1392.

General recommendations for success

- Be on time for class and stay focused on the work of the class during the entire period. (Temporarily forget about text messages, e-mail, other coursework, and so on.)
- Keep a reliable record of all assignments, if they are to be collected or not, and when they are due.
- Prepare for each class by completing the reading assignments. When you read, read with pencil or pen and paper in front of you, and take notes, write out definitions in your own words, create your own examples, work out the examples in the text, and write down your questions.
- Keep an organized three-ring binder that contains all completed classroom activities, exams, and other course material, including your notes taken during class and your notes on the readings.
- Begin to work on the homework problems, writing assignments, and papers as soon as they are assigned.
- Find one, two, or more students from this class with whom to discuss the course material outside of class.
- Come see me for help whenever you have unanswered questions.

Accommodations

Any student who wishes to request accommodations under the Americans with Disabilities Act (ADA) for this course should contact Mr. Joe Kempfer, Assistant Director of Learning Services for Disability Support, 1307 Main Street (extension 1510.) Accommodations cannot be provided until authorization is received from the Office of Learning Services.

Possibility of changes

This syllabus is a guideline for the course. It may be necessary to make changes during the semester. I will announce any changes in class.

ACADEMIC HONESTY POLICY GUIDELINES

MATHEMATICS COURSES

The Department of Mathematics and Computer Science supports and is governed by the *Academic Honesty Policy of Moravian College* as stated in the Moravian College Student Handbook. The following statements will help clarify the policies of members of the Mathematics faculty.

In all homework assignments which are to be graded, you may use your class notes and any books or library sources. When you use the ideas or thoughts of others, however, you must acknowledge the source. For graded homework assignments, you may not use a solution manual or the help, orally or in written form, of an individual other than your instructor. If you receive help from anyone other than your instructor or if you fail to reference your sources, you will be violating the *Academic Honesty Policy of Moravian College*. For homework which is not to be graded, if you choose, you may work with your fellow students. You are responsible for understanding and being able to explain the solution of all assigned problems, both graded and ungraded.

All in-class or take-home tests and quizzes are to be completed by you alone without the aid of books, study sheets, or formula sheets unless specifically allowed by your instructor for a particular test.