

MA 216 Discrete Mathematical Structures and Proof

Fall 2007 Syllabus

Professor: Dr. Kay Somers

Office: PPHAC 220

Telephone: 610-861-1403

E-mail: mekbs01@moravian.edu

Class meetings and location: Monday, Wednesday, and Friday, 8:50 to 10:00 a.m., PPHAC 335

Office hours: Monday, Wednesday, and Friday, 10:15 to 11:15 a.m.; Monday, 2:00 to 3:00 p.m., and by appt.

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

Course Content and Organization

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 of the Scheinerman text. However, not all sections in each of these chapters will be included. Topics include: Fundamentals (Definition, Theorem, Proof, Counterexample, Boolean Algebra); Collections (Lists, Factorial, Sets, Subsets, Quantifiers, Operations, Combinatorial Proof); Counting and Relations (Equivalence Relations, Partitions, Binomial Coefficients, Counting Multisets, Inclusion-Exclusion); More Proof (Contradiction, Smallest Counterexample, Induction, Recurrence Relations); Functions (The Pigeonhole Principle, Composition, Permutations, Symmetry, Assorted Notation including Big oh and Little oh); Number Theory (Dividing, Greatest Common Divisor, Modular Arithmetic, The Chinese Remainder Theorem, Factoring); Graphs (Fundamentals of Graph Theory, Subgraphs, Trees, Eulerian Graphs, Coloring, Planar Graphs).

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
- help you learn how to construct mathematical proofs
- help you learn how to write mathematical proofs
- help you learn how to communicate mathematical ideas to different audiences
- help you learn about basic mathematical structures that are useful for further study of mathematics and related sciences

Assessment

Attendance

Attendance is listed first under assessment because 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. In addition, this course is about participating in the discovery of mathematics, not just learning facts and algorithms. 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.

Readings and ungraded homework

Daily reading and ungraded 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. Keep your work on these ungraded assignments in an organized notebook so you can easily refer to it. You may be randomly called on to answer questions on the readings and problems for that day. You are encouraged to work with your classmates on the ungraded 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 ungraded problems and when preparing for exams, in a way that copying from another source cannot.

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.

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 papers for this course. They will be due on **Friday, October 19** and **Monday, November 19**. Detailed information about the topics and requirements for the papers will be given in class.

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 28** and **Wednesday, November 7**. 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 (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.

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.

Possibility of changes

The dates, policies and course requirements stated in this syllabus are subject to change in the event of unforeseen circumstances.

Accommodations

Any student who wishes to disclose a disability and request accommodations under the Americans with Disabilities Act (ADA) for this course first must meet with either Mrs. Laurie Roth in the Office of Learning Services (for learning disabilities and/or ADD/ADHD) or Dr. Ronald Kline in the Counseling Center (for all other disabilities).

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.