Course Information

Description

The class will emphasize both mathematical thinking and understanding mathematical tools, with some commentary on programming and implementation issues. The goals of this class are

1) to become familiar with mathematical tools in general, and with the types of mathematical tools used in software engineering for specification, formal modeling, and programming in specific.

2) to gain multiple perspectives on the primary mathematical techniques of logic, induction, proof, functions, relations, and graphs.

Homework will consist of substantial *thinking and reflection* on mathematical ideas and content, plus short *selected exercises* on each topic. Problems and readings from the text will accompany each class topic, however the lectures and class discussions will not necessarily duplicate or refer to textual materials. In-class exercises will not be graded. No graded tests, no final exam. The final assignment will be to outline the field of mathematics as you understand it.

My general attitude is that each student is a mature adult responsible for his/her own learning and motivation. As well, each student is an individual who will learn best with individually tailored content and experiences. I will provide all standard educational structures for students to choose between (assignments by the instructor, structured environments, multiple resources and references, and self-motivated exploration). I expect each student to know the style of both teaching and learning which best encourages his/her own positive educational experience. I also expect each student to be aware of his/her own goals and motivations for being here, and his/her own needs and expectations for success. Of course, you will need to let me know your goals and needs for me to effectively address them.

Text

Edgar G. Goodaire and Michael M. Parmenter, *Discrete Mathematics with Graph Theory*, Prentice-Hall, 1998.

This undergraduate text covers the elementary concepts of discrete mathematics. All students are expected to read or to skim *all* material in the book, and to do selected exercises on topics you do not fully undertstand.

The text is a supplement to the lectures and class time, not the primary content. Students are expected to do text book exercises as part of reading, to the extent needed for individual understanding. Class participation is *in addition to* the text readings and problems.

Unless specifically requested, the following chapters and sections of the text will *not* be covered in depth in class, although I will mention each briefly:

Chapter	*Topic*	*Pages*
3.3	Prime Numbers	118-133
5	Principles of Counting	211-239
6	Permutations and Combinations	240-274

Lecture notes and special readings for each class will be distributed in hardcopy prior to class meetings.

Evaluation

Available grades:

non-completion: Incomplete, Withdraw, etc.

completion: A A- B+ B B- C

- A: reserved for superior performance
- A- or B+: expected grade for conscientious performance
- B: adequate work
- B-: barely adequate
- C: equivalent to failing

Grading Options:

1. Grading Contract: specify a set of behaviors and an associated grade.
2. Performance Quality: attendance, participation, assigned exercises
3. Self-determined: negotiate with instructor

Discussion:

If you already understand the subject, if you plan to excel, or if you need clear performance goals for motivation, then **Option 1** is a good idea. If you prefer a clearly defined agenda, if you do well with concrete task assignments, or if you need a schedule of activities for motivation, then **Option 2** is a good idea. If you are not concerned about grades, if you intend to do what you choose anyway, or if you are self-motivated, then **Option 3** is a good idea.

I will notify any student who is not on a trajectory for personal success.

Course Syllabus

Meeting	Topic	Text	Exercises
1)	introduction, overview of mathematics		ch0 exercises
2)	formal systems, theories of computation		
3)	propositional logic		ch0 due
4)	history of logic		
5)	proof strategies	Ch 0	proof exercises
6)	predicate calculus		
7)	boundary logic		
8)	induction and recursion	Ch 4	induction exercises
9)	set theory	Ch 1	
10)	relational structure	Ch 1	
11)	functional structure	Ch 2	algebraic exercises
12)	algebraic systems		
13)	exotic numbers	Ch 3,5	
14)	algorithms	Ch 7	
15)	graphs and trees	Ch 8	
16)	paths and circuits	Ch 9,10	graph exercises
17)	graph algorithms	Ch 12,13,14	final project
18)	grammars, FSMs		
19)	review		final project due
20)	closure		