CSCI 243 SYLLABUS

COURSE NAME, NUMBER	Discrete Mathematics and Functional Programming, CSCI 243
SEMESTER, YEAR	Fall 2010
INSTRUCTOR	T. VanDrunen
OFFICE / TELEPHONE / EMAIL	Sci 163 752-5692 Thomas.VanDrunen@wheaton.edu
OFFICE HOURS	MWF 9:15-10:20 am; Tu 2:15-3:45 pm; Th 9:00-11:30 am
COURSE WEBSITE	`http://csnew.wheaton.edu/~tvandrun/cs243`

RESOURCES VanDrunen, Thomas. *Discrete Mathematics and Functional Programming.* 2010. Available only at the Wheaton College bookstore.

COURSE DESCRIPTION

Sets, logic, the nature of proof, induction, algorithms, algorithm correctness, relations, lattices, functions, and graphs. Functional programming and recursion using the ML programming language.

GOALS AND OBJECTIVES

1. Students will be able to articulate the operations of formal reasoning.
   - Using sets for categorical thinking.
   - Using the rules of logic for deduction and inference.
   - Using relations, functions, and graphs for modeling relationships among categories.
   - Using types in ML for representing sets and functions.
2. Students will be able to compose mathematical proofs.
   - Using direct proof, proof by contradiction, and mathematical induction.
   - Proving properties of sets, correctness of algorithms, properties of relations, properties of functions, and properties of graphs.
3. Students will be able to compose algorithms.
   - Using imperative/iterative techniques.
   - Using a recursive system of functions.
4. Students will be able to compose programs in the ML programming language.

ASSESSMENT PROCEDURES

1. Proof-writing assignments will give students practice in writing proofs on the various topics and help them identify concepts on which they need more work.
2. Program-writing assignments will give students practice in writing programs and implementing algorithms; they will also demonstrate the connection between mathematical propositions and algorithms.
3. Tests and final exam will evaluate students' mastery of these skills.

Grading:

	weight
Homework	25
Test 1	15
Test 2	15
Test 3	15
Final exam	30

I also will give one homework point of extra credit for every minor error in the textbook which you are the first to bring to my notice. Discovering bigger mistakes or making higher-level suggestions may be rewarded more significantly, on my discretion.

SPECIAL EXPECTATIONS

Academic Integrity

Students are encouraged to discuss homework problems and ideas for solutions. However, your solutions, proofs, and programs must be your own. If you are having trouble debugging a program you have written, you may show it to a classmate to receive help; likewise you may inspect a classmate's incorrect program to give help. However, you should not show *correct* code to a classmate, nor should you look at another student's correct code, to give or receive help. Programs on which students have unfairly collaborated will not be accepted.

Assignments

Unless otherwise specified, assignments are due at the class period after it was assigned. I will collect the assignments at the end of class. However, you are granted an automatic grace period until 5:00 pm that day. Assignments not complete by class time can be put in the instructor's box. If you have not completed the assginment by the end of the grace period (5:00 pm), then turn in what you have for partial credit.

Attendance

Students are expected to attend all class periods. It is courtesy to inform the instructor when a class must be missed.

Examinations

The final exam is Thursday, Dec 16, at 8:00 AM. I do not allow students to take finals early (which is also the college's policy), so make appropriate travel arrangements.

Special needs

Whenever possible, classroom activities and testing procedures will be adjusted to respond to requests for accommodation by students with disabilities who have documented their situation with the registrar and who have arranged to have the documentation forwarded to the course instructor. Computer Science students who need special adjustments made to computer hardware or software in order to facilitate their participation must also document their needs with the registrar in advance before any accommodation will be attempted.

Office hours

I try to keep a balance: Stop by anytime, but prefer my scheduled office hours. This semester I am trying to reserve Tuesday mornings for uninterrupted work. If possible, please find another time to stop by with questions (but if the matter is urgent or no other time is possible, then you may still stop by then). Also, any time my door is closed, it means I'm doing something uninterruptable, such as making an important phone call. Rather than knocking, please come back in a few minutes or send me an email.

Dress and deportment

Please dress in a way that shows you take class seriously. Do not wear sweat pants or other slumber-party wear to class. (If you need to wear athletic clothes because of activities before or after class, that's ok, but try to make yourself as profession-looking as possible.) If you must eat during class (for schedule or health reasons), please let the instructor know ahead of time; we will talk about how to minimize the distraction.

Electronic devices

Do not use laptops during class (unless you are using it for a presentation or similar purpose). If you feel you will take better notes on your laptop, then talk to me. I will give you a stern warning against doing anything else besides note-taking on your laptop during class. Please make sure other electronic devices are silenced and put away. ***Text in class and DIE.***

Readings. The course manual serves as an extended syllabus, textbook, and collected handouts. I recommend you use it to take notes in (though you may also want a notebook to work out solutions to in-class exercises).

You will be expected to read the relevant material in the course manual before class. See the course website for a schedule of topics and readings (this will be updated as we go along). For some readings, it is your responsibility to master the material before class—it is background material, and I'll assume you have read and understand it; we won't talk about it in class. For a lot of sections, you will be responsible for reading the section ahead of time and learning the definitions and concepts; class time will focus on working through exercises. Finally, there are a few cases where I will lecture on the same material as is in the manual. In those cases, it is an indication that the material is hard. You still need to skim the section beforehand to have a better chance of understanding it in class.

Specially scheduled days. Two special events will disrupt normal class schedules this fall. On Friday, Sept 17, President Ryken will be inaugurated. On that day, classes normally meeting after chapel will be shifted one hour earlier; hence *our class will meet from 1:00-2:05 that day.* On Friday, Oct 1, the new science building will be dedicated. *Classes normally meeting at 2:00, including ours, are cancelled that day.*

Some advice. I have observed the experiences of many students in this course over the past several years. Here are a few suggestions for how to succeed in the class:

- **Keep up with the material.** The material in this class keeps on building on itself. If you don't understand something, don't just shrug it off and move on. Even if it doesn't seem like last week's material is being used this week, last week's material is going to come back later.
- **Go easy on the note-taking.** Sounds like strange advice. But I feel sorry for the students who seem to think that their main task in class is to transcribe everything written on the board. So busy writing, they don't have time to process what's going on in class. I wrote the course manual in a way that should minimize the need to take notes. I'd rather you put your energy into *thinking.*
- When all else fails, **ask for help.** A lot of learning in a class like this happens during office hours.