CSCI 394 SYLLABUS

COURSE NAME, NUMBER	Advanced DMFP Seminar, CSCI 394
SEMESTER, YEAR	Spring 2011
INSTRUCTOR	T. VanDrunen
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OFFICE HOURS	MWF 1:30-3:30 pm; Th 10:20-11:30 am
COURSE WEBSITE	http://csnew.wheaton.edu/~tvandrun/cs394

RESOURCES

There is no textbook for this course. However, if you own a copy of my *Discrete Mathematics and Functional Programming*, you should have it handy; it is also available electronically (details to follow). I also will be giving handouts throughout the semester.

COURSE DESCRIPTION

A study of topics in computing and mathematics from a functional-programming and set-theoretical approach. Graphs, trees, and their implementations and applications. Lattices and boolean algebras. Groups and semi-groups, cryptography. Complexity classes. Natural language processing.

INFORMAL DESCRIPTION

This course is supposed to be fun, for both the students and the instructor. It's not part of anyone's program of study, it doesn't fulfill any requirements, and we're not constrained by any catalog description. I will try very hard to keep the workload to something reasonable for a two-hour pure elective; feel free to let me know if I'm not doing that.

That said, the topics we will be looking at are "advanced." *Advanced* doesn't necessarily mean "hard," but usually it turns out that way. This course will require your attention, and the hope is that it will expand your brain in some new ways.

This course is mainly about topics that didn't make the cut in 243—either because they are too advanced or specialized, or because they're too difficult for the wider audience of 243, or simply because there isn't enough time. There are three categories:

1. Programming techniques in the functional paradigm. We won't set aside any time purely for this, but it will be touched on along the way as we use ML to model and apply the mathematical concepts we see.

2. Mathematical ideas that CS majors should see, but usually don't. These all build on set theory, which is the major mathematical topic of 243.

3. Computing ideas that math majors usually don't see, but would enjoy if they did. We'll come at these from a set-theoretical and functional-programming approach, too.

Nearly all of you already will have seen some topics in this course, but those will be different topics for different students. Be prepared to be called on more when we are covering a topic in which you have experience.

GOALS AND OBJECTIVES

1. Students will enjoy and appreciate the use of functional programming to solve computational and mathematical problems.

2. Students will be able to articulate the properties of various mathematical structures (in particular graphs, trees, lattices, and groups), prove theorems about them, and implement data structure related to them.

Grading:

	weight
Homework	1/3
Midterm exam	1/3
Final exam	1/3

SPECIAL EXPECTATIONS

Academic Integrity

Collaboration is permitted on all homework. Students should judge for themselves that they are getting the full benefit out of the homework. Any outside source (either published or found on the internet) must be cited; any plagiarism may result in zero credit on the entire assignment.

Attendance

Students are expected to attend all class periods *on time*. Keep in mind that in a course like this, missing one class means missing a week of class. It is courtesy to inform the instructor when a class must be missed.

Late assignments

Assignments are not accepted late. If you cannot finish by the due date, turn in what you have for partial credit.

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.

Dress and deportment.

Please dress in a way that shows you take class seriously—more like a job than a slumber party. (If you need to wear athletic clothes, for example, because of activities immediately before or after class, that's ok, but try to make yourself as professional-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.

Please talk to me before using a laptop or other electronic device for note-taking. I will discourage you from doing so; if you can convince me that it truly aides your comprehension, then I will give you a stern warning against doing anything else besides note-taking. Trying out programming concepts on your own during classtime is not productive because it takes you away from class discussion; that is what lab time is for. You cannot multi-task as well as you think you can. Moreover, please make sure other electronic devices are silenced and put away. ***Text in class and DIE.***

Office hours. I try to keep a balance: Stop by anytime, but prefer my scheduled office hours. This semester I am trying to reserve Tuesdays for uninterrupted work, but you can still come then if it's urgent. Also, any time my door is closed, it means I'm doing something uninterruptable, such as making an important phone call. Do not knock; please come back in a few minutes or send me an email.

How the class will work. Here's the pattern I intend for us to use as we pursue the material.

- On the Tuesday of the week before, I will post a few pages of introductory material for the coming week's topic. Please *print this out* and read it before the next class.

- For the first third of our meeting time on Thursday, I will present some material, building on the reading.

- For the second third of our meeting time, you will work in groups on some problems based on what we've learned. Feel free to take a five minute break or so sometime during this segment.

- For the third third, we'll come back together to look at solutions to the problems and explore the topic a little further.

- I will then assign you a few problems (generally involving a proof or two and a program or two). *All problem sets assigned on Thursday are due on Tuesday of the next week.* This is so that I can grade and get them back to you by the next class meeting.

Keeping the workload reasonable. The demands that a linear quad course make on a student's time should be one half of what a normal, 4-hour course is like, but professors have a hard time sticking to that limit. I am committed to keeping the workload in check. My guideline for each weekly assignment is that it should require as much time as *one* assignment in CSCI 243—so, that's $\frac{1}{3}$ of the homework time for CSCI 243. If that's not working out, then don't be shy about letting me know.

Examinations. The midterm is scheduled to be held in class on March 3 (the week before spring break). The final will be held during our official final exam block, which is Wednesday, May 4, 10:30 am. *Note that this is the same block as classes that meet at 8:30 on Tuesdays.* If you have a conflict, make sure you make arrangements with me or your other instructor to reschedule. I do not allow students to take finals early (which is also the college's policy), so make appropriate travel arrangements. The final will be "not explicitly" cumulative.