Math 347 Syllabus

Course Information

Course number	MATH 347
Course title	Mathematical Models
Course location	RBH 311
Course meeting times	Tuesday and Thursday 9:40-11:00
Textbook	Mark A. Meerschaert, *Mathematical Modeling*, 2nd edition
Textbook web page	http://wolfweb.unr.edu/homepage/mcubed/modeling.html
Course web page	http://www2.kenyon.edu/Depts/Math/Paquin/math347.html

Contact Information

Professor	Dana Paquin
Office	RBH 309-A
Office phone	740-427-5267
Email	paquind@kenyon.edu
Web page	http://www2.kenyon.edu/Depts/Math/Paquin/

Office Hours

Monday	1:10-3:00
Wednesday	2:10-4:00
Thursday	4:10-5:00

Additional times by appointment!

If you are unable to meet with me during the times listed above, please feel free to **set up additional times by appointment**. I encourage you to attend office hours as much as possible, even if you are not having trouble with the mathematical material. Office hours serve as an opportunity for me to get to know you, for you to get to know me, for you to ask me questions, and for you to work with me and other students on problem sets. Seeing and understanding multiple solutions and/or approaches to the same problem is an important mathematical skill, and one that can be developed through interactions during office hours.

Homework

The best way to learn mathematics is by doing mathematics; thus, homework will be assigned daily. Homework to be graded will be collected weekly, typically on Tuesdays. Homework is due at the **beginning of class** on the assigned due date, unless I specify otherwise. Late homework will NOT be accepted. If you know you will be missing class for some reason, turn in your assignment BEFORE you

leave. Extensions may be granted for extenuating circumstances, but these must be discussed with me as early as possible.

Although you are encouraged to work with other students on homework problems, you must write up your final solutions on your own, as the homework is intended to be preparation for the quizzes and exams.

The homework may involve computer exercises as well as hand-written computations and explanations. Your homework must be legible, and your explanations must be clear. When possible and appropriate, write your explanations in complete sentences using correct mathematical and English grammar. Random expressions floating in space will receive no credit. It is your job to explain your solution to the reader, not the reader's job to search for a right idea buried in what you have written. Illegible homework will not be read or graded.

The homework exercises in this course will require significant effort on your part, as well as a certain degree of creativity. The exercises will not necessarily have a unique "right answer," and you are encouraged to explore different possible solution methods. The problems that we will work on are "real problems" in the sense that they were not invented for the purpose of being solved in a textbook or classroom.

Homework assignments will be posted online (at least one week in advance) on the Math 347 Homework page (accessible through the Math 347 homepage).

Daily Reading

Reading the textbook before each course meeting is a necessity. Come to class prepared with questions and comments for discussion. Make sure that you read and *understand* the examples presented in the textbook. Although there will not be enough time to cover all of the material in a given section during class, you will still be responsible for the material (unless I specify otherwise).

The webpage for the textbook, which contains (among other things) a list of typos, is:

http://wolfweb.unr.edu/homepage/mcubed/modeling.html

Software

There will be a considerable amount of work done (both in class and outside of class) with the aid of the computer algebra system (CAS) *Maple*. *Maple* is available in Peirce 001, RBH 203, and in RBH 311 (evenings only). You are welcome to choose another CAS such as MATLAB or Mathematica.

Assessment

Your grade in this course will be based on the following components:

Homework	40%
Quizzes	10%
Projects	30%
Final Project	20%

Quizzes

There will occasionally be short quizzes designed to make sure that all students have mastered the mathematical material necessary to work on more advanced problems. Your lowest quiz grade will be dropped. Quizzes and their solutions will be posted on the Math 347 Quizzes page (accessible through the Math 347 homepage).

Exams

There will be no tests or exams in this course. You will have a final project instead of a final exam.

Projects

During the semester, you will be assigned two class projects and one final project, each of which will require the submission of a short mathematical paper. The final project will also require an oral presentation. On all of the projects, you are encouraged to work in pairs or groups of no more than three, although you are not required to do so. When working in pairs or groups, all students must be involved in all aspects of the work, and each student will receive the same grade.

The process of writing a mathematical paper has two main components. First, you must work out the mathematical details of the assigned problem. This may involve significant use of computational tools (such as Maple), graphs, and/or diagrams. Second, you must make sense of those mathematical details and present them as a clear and concise narrative. All graphs and diagrams must be accompanied by generous verbal explanations that explain the mathematical ideas. You must use correct mathematical and English grammar, and you must properly cite all sources. I will distribute sample papers in class, and post them on the Math 347 Projects page (accessible through the Math 347 homepage).

The final project will also require an oral presentation, which should provide an overview of your problem and the significant results of your paper. The oral presentation should be accompanied by the appropriate use of visual aids such as slides, handouts, etc. Your oral presentation grade will also reflect your appropriate participation in the presentations of others. You are expected to be alert and attentive during all oral presentations and to be participatory during those presentations by asking question and providing comments to the presenter.

The project due dates are as follows:

Optimization Project	Friday, September 28, 5:00 pm
Dynamical Models Project	Friday, November 9, 5:00 pm
Final Project	Wednesday, December 5, 5:00 pm

Learning Disabilities

If you have a disability which requires an accommodation in this class, please discuss your concerns with me, but you should also consult Ms. Erin Salva, (Coordinator of Disability Services; Office of the Dean for Academic Advising, PBX 5453) as soon as possible. Ms. Salva (in consultation with the L.E.A.R.N. committee) has the authority and the expertise to decide on the accommodations that are proper for your disability. Though I am happy to help you in any way I can, I cannot make any accommodations for learning (or other) disabilities without proper authorization from Ms. Salva.

Academic Honesty

In general, the rules set forth in the 2007-2008 Course of Study apply. Presenting the work of others as your own is strictly prohibited. In the case of homework, you may collaborate with others in discussing how a problem may be solved, but the work you turn in must be your own. If you submit work that contains the ideas or words of someone else, then you must provide proper citation. Assistance can not be given or received on any quiz or exam associated with this course, unless explicitly stated otherwise. Audio or video recording of class sessions is not permitted.

Course Schedule

This schedule may be adjusted as necessary.

Class	Date	Topic
1	28 Aug	1.1-1.3: One-Variable Optimization
2	30 Aug	1.1-1.3: One-Variable Optimization
3	4 Sep	2.1: Unconstrained Multivariable Optimization
4	6 Sep	2.2: Lagrange Multipliers
5	11 Sep	2.3: Sensitivity Analysis
6	13 Sep	3.3: Linear Programming
7	18 Sep	Optimization Modules/Projects
8	20 Sep	Optimization Modules/Projects
9	25 Sep	4.1-4.3: Dynamical Systems
10	27 Sep	4.1-4.3: Dynamical Systems
	28 Sep	**Optimization Projects Due 5:00 pm**
11	2 Oct	4.1-4.3: Dynamical Systems
12	4 Oct	4.1-4.3: Dynamical Systems
	9 Oct	No class: October reading days
13	11 Oct	5.1: Eigenvalue Methods
14	16 Oct	5.2: Eigenvalue Methods for Discrete Systems
15	18 Oct	5.3: Phase Portraits
16	23 Oct	6.1-6.2: Simulations of Dynamic Models
17	25 Oct	6.1-6.2: Simulations of Dynamic Models
18	30 Oct	6.4: Chaos and Fractals
19	1 Nov	Dynamical Systems Modules/Projects
20	6 Nov	Dynamical Systems Modules/Projects
21	8 Nov	7.1-7.2: Probability Models
	9 Nov	**Dynamical Models Projects Due 5:00 pm**
22	13 Nov	7.1-7.2: Probability Models
23	15 Nov	8.1-8.2: Markov Chains and Processes
	20 Nov	No class: Thanksgiving holiday
	22 Nov	No class: Thanksgiving holiday
24	27 Nov	8.1-8.2: Markov Chains and Processes
25	29 Nov	8.1-8.2: Markov Chains and Processes
26	4 Dec	In-class work on final projects
	5 Dec	**Final Projects Due, 5:00 pm**
27	6 Dec	**Final Project Presentations**
28	11 Dec	**Final Project Presentations**