Professor: David McClendon (2046 ASC, phone x2574 (231-591-2574 off campus), hours 1-2 MTR or by appointment, email: DavidMcClendon@ferris.edu)

Lectures: 2:00-2:50 MTWR in STR 126.

Web: http://mcclendonmath.com/416.html

Prerequisite: C- or better in MATH 414.

Lecture notes: You will need my lecture notes, which can be obtained either:

- as a course pack, available at the bookstore, or
- online, at my web page as a pdf file

Bring the lecture notes to class every day. As always, I recommend bringing colored pens or pencils to class.

Course material: Stochastic processes, especially Markov processes in discrete and continuous time, martingales and Brownian motion.

Learning outcomes: Upon completion of MATH 416, it is my hope and expectation that you will be able to:

1. perform computations related to (discrete- or continuous-time) Markov chains;
2. determine whether or not a stochastic process is a martingale;
3. solve problems related to optional stopping, especially hitting time problems for random walk and gambler's ruin;
4. understand and apply the properties of Brownian motion; and
5. gain experience communicating technical mathematical ideas to a broad audience.

Grading policy: Homework and activities we do in class collectively count 25%. Two group presentations: 7.5% each. Three midterms: 15% each. Final presentation: 15%. Grades are curved at the end of the semester; 90% is at least an A-, 80% is at least a B-, etc.

Attendance policy: No formal attendance policy.

Homework: Weekly homework assignments, taken from Chapter 5 of my lecture notes, are due on the dates indicated on the course calendar.

20 of the problems are marked with ($\star$). These problems are especially interesting. Over the course of the semester, you are responsible for completing at least 7 of the 20 problems marked with ($\star$). The other 13, you may omit, but if you complete more than 7 ($\star$) problems, you will receive extra credit.

Some (many) of the homework questions will be hard! Work with others and/or come ask me for help on the problems on which you are struggling.

Group presentation # 1: In early February, you will complete a group assignment on a topic that will be randomly assigned. Your group will: (1) write up a handout for the class on your topic (I will distribute your handout to the entire class) and (2) give a

short (≈15 min) presentation on the key aspects of the topic you are assigned. You will have some time in class to work on your project; apart from that, you are to prepare on your own time.

Group presentation # 2: In early April, your group will give a lecture on a short section of my lecture notes. I will provide you with some guidance on what to say, and leave some things for you to work out with your group.

There will be homework questions, and perhaps exam questions, related to the material you present in your presentations, so you need to do a good job!

Activities: There will be occasional activities similar to those done in MATH 414.

Midterms: There are three midterm exams which you will do at home. Each exam has a 60-minute time limit. On each exam, you may use one $8.5'' \times 11''$ sheet of paper with anything you want written on it on both sides; you will not be permitted to use calculators or other study aids.

Final presentations: In place of a final exam, you will do a final presentation during the last week of class (you can work alone or in a group). As with the first group presentation, you are to make a handout for the audience and give a presentation on aspects of your topic, but this time your presentation should be more substantial (and last an entire class period). I will have a list of topics from which you can choose; you may choose a different topic if I approve it in advance. You will have roughly four days of class time to prepare; apart from that, you are to prepare on your own time.

Getting help: Whenever my office door is open, you can knock and enter. Feel free to ask me how to do any or all of the homework questions.

Students with disabilities who require reasonable accommodations to fully participate in course activities or meet course requirements should register with the Educational Counseling and Disability Services office (x3057, ecds@ferris.edu). While ECDS will send me a letter outlining the accommodations to make for you, I would appreciate it if you could contact me immediately for assistance with any necessary classroom accommodations.

Academic dishonesty: Papers will be monitored for "magic answers". Issues with academic dishonesty are taken very seriously, will almost always result in an F for the class, and will be referred to the Office of Student Conduct.