

Professor: David McClendon (ASC 2046, phone x2574 (231-591-2574 off campus), hours MW 2-3 in ASC 2050, TR 9-10 in ASC 2046, or by appointment, email: DavidMcClendon@ferris.edu)

Lectures: 8:00-8:50 MTWR in STR 207.

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

Prerequisite: C- or better in MATH 414.

Lecture notes: You need the same lecture notes that you obtained for MATH 414. 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 in-class group work counts 30%. Early semester presentation: 7.5%. Three midterms: 15% each. Final presentation: 17.5%. 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: There will be regular homework assignments, similar to MATH 414.

Several of the problems are marked with some number of (★) points—these problems are especially interesting. Over the course of the semester, you are responsible for earning 125 (★) points. Any (★) points you earn beyond that are extra credit.

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

Early semester presentation: In early February, you will complete an assignment in pairs on a topic that will be randomly assigned. Your pair 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.

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

Midterms: There are three midterm exams which you will do in class. Each exam has a 60-minute time limit. On each exam, you may use a calculator and 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 other study aids.

Final presentation: 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 small group). As with the early semester 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 several 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 [Disability and Accessibility Resource Center](#) office (x3057, DARC@ferris.edu). While DARC 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.