Professor: David McClendon (2046 ASC, phone x2574 (231-591-2574 off campus), hours M 3-4, T 1-2, W 10-11, W 3-4, R 1-2 or by appointment, email: `mcclend2@ferris.edu`)

Lectures: 2:00-2:50 MTWR in SCI 136.

Web: This course has a Blackboard page at FerrisConnect (accessed through MyFSU) to which announcements and weekly assignments will be posted (check this page regularly). Solutions to the homework problems are posted to this page weekly under "Course Documents".

I also maintain a personal web page at `http://mcclendonmath.com/416.html`. This page contains the lecture notes, old exams, useful handouts, etc.

Prerequisites: C- or better in Math 414.

Textbook: There is no required textbook, but I recommend *Markov Chains* by J.R. Norris, ISBN 978-0521633963. Here are some other good books covering course material:

- *Introduction to Stochastic Processes* by Gregory Lawler, ISBN 158488651X
- *Stochastic Processes* by Sheldon Ross, ISBN 0471120626
- *Introduction to Stochastic Processes* by Hoel, Port and Stone, ISBN 0881332674

Lecture notes: You will need my lecture notes, which can be obtained in two ways:

- as a course pack, available at the bookstore
- online, at my web page as a pdf file (make sure to get the 2016 version)

You should bring the lecture notes to class every day as they contain the examples and notes from which I will teach the course.

Course material: In Math 416, we will study stochastic processes, especially Markov processes in discrete and continuous time and Brownian motion.

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

1. given a Markov chain in either discrete or continuous time, find its class structure, calculate stationary and/or steady-state distributions and mean return times, compute infinitesimal matrices, etc.
2. prove that a given process is a martingale;
3. solve problems related to stopping times 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.

Supplies: You should bring two or three colored pens or pencils to class each day to help you take good notes. Some problems we discuss are best attacked by use of color-coded pictures.

Grading policy: Your homework average counts 15%. There are three group presentations in the middle of the semester, which count 7.5%, 5% and 7.5%, respectively. There will be occasional activities which collectively count 5%. Each midterm counts 15% and your final presentation counts 15%. Grades are curved at the end of the semester, but an average of 90% will receive at least A-, an average of 80% will receive at least B-, etc.

Attendance policy: I have no formal attendance policy. That said, **nothing** is more correlated with strong performance in my classes than attendance in lectures.

Homework: There will be seven homework assignments which are due on the dates indicated on the attached course calendar. The problems come from the list of homework problems distributed on the first day of class (if you lose this list, you can download another copy from Blackboard). I will grade a subset of the homework problems each week for correctness; your work should be legible and easy to follow, and you should show all your work.

Some (many) of the homework questions will be hard! It is normal not to know how to do some of the questions. Work with others and/or come ask me for help on the problems on which you are struggling.

Group presentations: You will have three group assignments on the dates indicated on the course calendar. For the first two assignments, your group is to: (1) write up a handout for the class on your topic (I will run these off for the entire class) and (2) give a short (15 min) presentation on some aspects of the topic you are assigned. The last group assignment is to lecture on one or two sections from my lecture notes. For each presentation, you will have some time in class to work on your project; apart from that, you are to prepare on your own time.

Activities: There will be occasional activities similar to those done in Math 414; these will be done in groups. Depending on the activity, you may have to turn in solutions or write solutions on the board.

Midterms: There are three midterms on **Monday, February 15**, **Wednesday, March 16** and **Monday, April 18**. The midterms not only test your ability to do homework questions but also your understanding of the material. On each exam, you may use one $8.5'' \times 11''$ sheet of paper with anything you want written on it on both sides during the exams; you will not be permitted to use calculators or other study aids. You may make up an exam that you miss (whether your absence is excused or not) but the makeup exams are considerably more difficult. If you miss an exam, contact the professor; you are to make up the exam at the *earliest possible time*.

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 small group). As with the group presentations, 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 three days

of class time to prepare your presentation; 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.