Professor: David McClendon (2046 ASC, phone x2574 (231-591-2574 off campus), hours MT 5-6, TWR 2-3, or by appointment, email: `mcclend2@ferris.edu`)

Lectures: 4:00-4:50 MTWR in SCI 336.

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). The page contains lecture notes, old quizzes and exams, as well as many useful handouts.

Prerequisites: Single- and multi-variable calculus (Math 220, 230 and 320) are the most important prerequisites: you should be proficient at differentiating and integrating functions and have some recollection of material related to infinite series. Multivariable calculus is also useful (computations of partial derivatives and multiple integrals). Ferris also lists Math 251 or Math 314 as a prerequisite; in truth, I think these are less useful and much of the material of Math 314 may be repeated. We'll also use a bit of linear algebra (multiplication of matrices, matrix inverses, dot products, transposes and determinants).

Textbook: There is no required textbook. Good references include:
A First Course in Probability by Ross, ISBN 0-13-185662-6.
Knowing the Odds: An Introduction to Probability by Walsh, ISBN 0-8218-8532-4.
Introduction to Probability Theory by Hoel, Port and Stone, ISBN 0-395-04636-X.
John E. Freund's Mathematical Statistics with Applications, by Miller and Miller, ISBN 0-13-142706-7.
A less technical reference is *Introduction to Probability* by Grinstead and Snell, available for free online at the following address:
`http://www.dartmouth.edu/~chance/teaching_aids/books_articles/`
    `probability_book/amsbook.mac.pdf`

Lecture notes: I have typed my Math 414 lecture notes and divided them into 8 pdfs, which are available on Blackboard. You should bring these to class daily, as they contain the material I will cover and contain the examples we will work through. The lecture notes do have some (intentional) gaps in them which I will fill in during lecture (for instance, the example problems do not have solutions provided). The appropriate packet of lecture notes for each day's class can be found on the attached calendar.

Course material: Math 414 is called "Statistics" but is really a course in probability theory. Essentially, probability is the branch of mathematics which tries to make predictions about data which will come from the repetition of some experiment which might have several different outcomes. In Math 414, we will cover most of "the basics" of probability theory: combinatorics, discrete and continuous probability distributions, conditional probability and independence, joint distributions, expected value and variance, moment generating functions, laws of large numbers and the Central Limit Theorem. This corresponds roughly to the material on Actuarial Exam P.

Probability theory is a really nice branch of math that has applications to a wide range of real-world problems, most especially in economics and business but also in the hard-core sciences.

Learning outcomes: Upon completion of Math 414, it is my hope and expectation that you will become proficient in probability theory. This includes the ability to:

1. Use the language of sample spaces and events to model probabilistic problems;
2. Solve elementary combinatorics problems;
3. Calculate probabilities of events and probabilities associated to discrete and continuous random variables;
4. Derive density and/or distribution functions for random variables defined as a transformation of other random variables;
5. Compute marginals given a joint distribution, and determine whether or not random variables are independent;
6. Compute and interpret expected values, moments and generating functions, variance and covariance;
7. Write arguments mimicking the proof of the Central Limit Theorem;
8. Apply the Central Limit Theorem to solve problems associated to sums and averages of i.i.d. random variables.

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 20%; your worst midterm counts 10%; the other three midterms count 15%; the in-class activities count 5% and the final exam counts 20%. 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 weekly assignments which are due in class (usually on Wednesdays); the problems due are listed on the attached course calendar and 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.

Activities: We will frequently spend a class period working on an activity (usually on Thursdays; the dates are listed on the attached course calendar). These vary in style (some review concepts from previous math courses; others review or reinforce ideas from Math 414) and logistics (sometimes, you will present solutions at the board and sometimes, you will submit written work). For each activity, you will get a grade which combines the correctness of your work with your participation with the rest of your group and with the class.

Midterms: There are four midterms on **Wednesday, September 17**, **Wednesday, October 8**, **Wednesday, October 29** and **Wednesday, December 3**. 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 exam: The final exam covers the whole semester. As with the midterms, you may use one $8.5'' \times 11''$ sheet of paper with anything you want written on it. If you miss the final, you can take a makeup but the makeup final will be significantly harder.

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. You can also seek assistance from students who have taken 414/416 from me in the past.

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 accomodations to make for you, I would appreciate it if you could contact me immediately for assistance with any necessary classroom accomodations.

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.