An introduction to the practice and theory of multivariate statistical modeling. Topics include descriptive statistics, experiment and study design, probability, hypothesis testing, multivariate regression, single and multi-way analysis of variance, logistic regression, and data mining. Statistical software will be used extensively. Examples will be drawn from the social, biological, and physical sciences.

The student will:

1. Use techniques of descriptive statistics, experiment and study design, probability, hypothesis testing, multivariate regression, single and multi-way analysis of variance, logistic regression, and data mining to interpret data;

2. Explain the mathematical justification and limitations of the statistical techniques used;

3. Use statistical software adroitly;

4. Learn statistics and mathematics by reading, listening, exploring, and conversing in an effective manner;

5. Explain statistical and mathematical reasoning through writing in a precise and articulate manner in both informal and formal settings; and

6. Exhibit curiosity, playfulness, creativity, confidence, perseverance, interest in multiple perspectives, and a collaborative spirit.

A grade of C or higher in Math 211 Calculus I or an equivalent course.

The study of mathematics is not a spectator sport! Reading, listening, solving problems, writing explanations, reflecting upon ideas, and receiving feedback are essential to learning mathematics. Read with paper and pencil in hand, and take an anticipatory approach: try to obtain solutions, explanations, and proofs before reading what the author provides. Write down specific questions when you do not understand a portion of the reading or a lecture.

Moodle will announce reading recommendations and assignments. Class time will be devoted to activities intended to complement, deepen, and extend our understanding. Reading, class lecture and discussion, and assignments will be the primary means for learning the content of this course. There will be a midterm and final exams to focus attention on synthesizing what has been learned, and students will complete a data collection and analysis project to encourage depth of understanding.

David Housman, SC 117, dhousman@goshen.edu, 535-7405, 875-0339 (home)
See office door or http://people.goshen.edu/~dhousman/Schedule14Spring.htm for availability

MWF 3:00-3:50 p.m. in SC 107.


https://moodle.goshen.edu

The statistical environment R and Mosaic package will be used. Wolfram Mathematica may also be used. These should be available from any campus networked computer. Instructions for installing the free R and Mosaic software can be found at http://www.mosaic-web.org/go/StatisticalModeling/software.html. If desired, you can purchase or rent a student license of Mathematica for your personal computer at http://www.wolfram.com/mathematica/how-to-buy/education/students.html.
Grading
Course grades will be based on performance on assignments (50%), a midterm exam (10%), a comprehensive final exam (20%), and a project (20%). If helpful, the final exam grade will replace the midterm exam score.

Extra Credit
Receive extra credit toward your assignment grade by doing one or more of the following: (1) find errors in the text or posted course materials and describe the error in a post to the Questions and Answers forum; (2) attend a quantitative presentation (e.g., Science Speakers) or participate in a quantitatively based activity and describe in writing some interesting mathematical aspect of the presentation or activity; or (3) participate in a Career Services event and describe your most important discovery. The description should be a substantive paragraph or two and be submitted to the instructor.

Tutoring and Disabilities
Goshen College wants to help all students be as academically successful as possible. If you have a disability and require accommodations, please contact Lois Martin, the Director of the Academic Resource & Writing Center early in the semester. In order to receive accommodations, documentation concerning your disability must be on file with the Academic Resource & Writing Center, Good Library 112, x7576, lmartin@goshen.edu. All information will be held in the strictest confidence. The Academic Resource & Writing Center offers tutoring and writing assistance for all students. For further information please see http://www.goshen.edu/campuslife/arwc/.

Collaboration and Academic Integrity
You are encouraged to use all available resources in order to learn the concepts and techniques discussed in this course. In particular, conversations with other students and the instructor can be an effective learning method. Reading other books and web pages can be another effective learning method. However, copying someone else's work subverts the learning process.

For homework and labs, you may look at and discuss another student's work, but any written work developed during collaboration with another student should be destroyed before writing your own solutions. You should give written acknowledgement to people with whom you have had discussions and to any written materials (other than the text) that were helpful.

For exams, you may not use any resources unless a specific exception is stated by the instructor.

Failure to observe the above rules will result in a zero on the assignment or exam. Any violation of academic integrity will be reported to the Academic Dean. Observation of the above rules will help you learn the material well and give you the satisfaction of knowing that you have earned your grade.

Due Date Policy
Class participation, assignments, labs, and exams can only be excused, rescheduled, or made up if (1) there is a serious medical problem, a death in the immediate family, or an irreconcilable conflict with another official Goshen College activity; (2) there is written documentation signed by proper authorities; and (3) the instructor is notified prior to the due date or as soon as possible afterwards.