**QUANTITATIVE REASONING IN THE GEOSCIENCES**

**GEO 138 – Fall 2005 MC-QR 3 F,S**

***Catalog Course Description***

*Introduction to modern techniques used to visualize and analyze quantitative data in the geosciences.*

***Prerequisites***

*MAT 111 or 120 or 130 or 145, or cons inst req. May not be taken under the CT/NC option. Not for cr if had ECO 138, POL 138, PSY 138, or MQM 100.*

The objective of this course will be to introduce you to basic statistical procedures and methodologies used by geographers. Data and the use of statistics is all around us on television, in the newspapers, magazines, and on the radio. Maybe we do not realize it, but we all routinely use it everyday. After you have completed this class, you will not only be better equipped to objectively evaluate statistical conclusions presented by the media, but you will also be able to effectively collect and analyze quantitative information by yourself.

Instructor: Dr. Dagmar Budikova

Class Time: MWF 11:00-11:50 am in MLT 210

Office Hours: MW 9:00-11:00 am or by appointment

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Course WebCT: https://webct.ilstu.edu

**Structure of Class**

The class will meet three times each week, 50 minutes at a time for three lectures. Lecture time has been designed to present new material and illustrate it with several examples. Each lecture will be initiated with a 'question' session. During this time, you have the opportunity to raise any problems that you may have come across in your reading and/or assigned exercises.

**Required textbook and other materials**

1. Moore, D. S. *The Basic Practice of Statistics*, 3rd Edition, W. H. Freeman and Company, New York.
2. Calculator.

**Classroom Expectations**

Material presented in this course is 'cumulative', which means that what we learn on Monday will be important to understand material presented on Wednesday and in all lectures to follow. For this reason, it is important that you attend classes at all times, and as a result, I make attendance MANDATORY. Notice that a portion of your grade will be placed on your attendance.

**Assignments and Evaluation**

The total grade of 100% will be divided in the following manner:

Test #1 – Wednesday, September 21, 2005 15%

Test #2 – Wednesday, October 26, 2005 20%

Final Examination - Cumulative 25%

5 Homework Exercises 20%

8 Quizzes 10%

Attendance/Participation (5 instances) 10%

The grading scale unless otherwise stated:

≥ 90 = A; ≥ 80 = B; ≥ 70 = C; ≥ 60 = D; < 60 = F

All **tests** will be in a multiple choice question format. They will be 50 minutes in length each. Each test will include material covered during class. For details see class schedule below.

The **final exam** will be *cumulative*. It has been scheduled during the final exam period.

Each Monday, you will be **assigned homework**. During the following week, I will collect this homework from all students but choose only a half for grading. At the end of the semester, each of you will have five (5) graded homework assignments that will count towards your final grade. Late penalty for homework: **20% per day, unless I am provided with a legitimate reason.**

**Quizzes** will be given at the beginning of class, 10 in total. Results from eight best quizzes will be counted towards the final grade. **Quizzes cannot be made up.** Each quiz will consist of material covered during the previous week. See syllabus schedule below for details.

**Attendance** in this class is mandatory, and will be taken 5 times during the semester, at random. Note that each time you miss a class when attendance will be taken, will cost you 2% off your final grade. This can mean the difference between an A and B.

**Class Schedule and Content**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Week of** | **Lecture Content** | **Readings** | **Quizzes (Wed)** | **Hwrk**  **Deadline** |
| Aug 22nd | Why study statistics; class introduction; examining distributions using graphs – Histograms, stemplots | Ch. 1 | No quiz |  |
| Aug 29th | Describing distributions with numbers; center, spread, median, mean, standard deviation, quartiles, box plots, five-number summary | Ch. 2 | Quiz #1 |  |
| Sep 5th | *No Classes – Monday – Labor Day*  Normal distributions; density curves; 68-95-99.7 rule;  Standard normal distribution; normal distribution calculations | Ch. 3 | Quiz #2 | HW #1 |
| Sep 12th | Examining relationships; scatter plots; correlation | Ch. 4 | Quiz #3 | HW #2 |
| Sep 19th | Least-squares regression; residuals; outliers; influential points, lurking variables | Ch. 5 | **TEST #1** |  |
| Sep 26th | Sampling | Ch. 7 | Quiz #4 | HW #3 |
| Oct 3rd | Sampling distributions; law of large numbers; central limit theorem | Ch. 10 | Quiz #5 | HW #4 |
| Oct 10th | Confidence intervals; statistical inference; confidence interval for the mean | Ch. 13 | Quiz #6 | HW #5 |
| Oct 17th | How confidence intervals behave; choosing a sample size;  assumptions of confidence interval calculations | Ch. 13 |  |  |
| Oct 24th | Tests of significance | Ch. 14 | **TEST #2** |  |
| Oct 31st | Tests of significance continued | Ch. 14 | Quiz #7 | HW #6 |
| Nov 7th | Inference in practice | Ch. 14  Ch. 15 | Quiz #8 | HW #7 |
| Nov 14th | Inference about population mean | Ch. 15 | Quiz #9 | HW #8 |
| Nov 21st | *Thanksgiving Holiday* | | | |
| Nov 28th | Inference about population mean – 2-sample problems | Ch. 16 | *Course evals*  Quiz #10 | HW #9 |
| Dec 5th | Inference about population mean – 2-sample problems continued | Ch. 15 | **Final Exam Review** | HW #10 |

**Note: Any part of this syllabus is subject to modifications, which will be announced in class.**