Course Description and Syllabus
Scientific Method (GEOL 4/5/72035)
Kent State University
Fall 2005
(http://www.personal.kent.edu/~jortiz/earthstats/home.html)

Instructor: Dr. Joseph D. Ortiz
Office: McGilvrey 334/336C
Phone: 330-672-2225
Email: jortiz@kent.edu
Mailbox: Dept. of Geology Main Office (McGilvrey 221)

Lecture: M,W,F 3:20-4:10 pm, McGilvrey 303, or 240 for exams
Office Hours: M 10:00-11:30am, R 3:20-4:30pm, or by appointment.

Course Rationale and Objectives: Students graduating from college today face an increasingly technical and computer oriented society that demands a quantitatively skilled work force. This is especially true within the fields of math and science. This upper level course will provide participants with a broad introduction to quantitative and statistical methods commonly used by research scientists. This objective will be accomplished through lectures, selected readings from the primary literature, and computer exercises built around existing climate and environmental data sets. Emphasis will be placed on developing an understanding of the concepts underlying various methods and gaining the insights needed to determine which tests are appropriate for a particular application or data set.

Approach: An important aspect of the course will be the "hands on" computational experience working with real world data sets on personal computers using a variety of software applications. Students will be encouraged to use their own data sets or data sets provided by their advisor for the final project. Working with real world data will help to give immediate relevance to the examples presented in class and on laboratory assignments. The internet provides an excellent source of data that will be appealing to students with broad academic interests (see below).

Expected outcome: Participants will gain an appreciation for statistical methods and considerable experience working with computational software as research tools. This will allow them to develop quantitative skills that will be helpful in a wide variety of potential career choices.

Pre-requisites: Basic computer skills, Algebra, and once semester of Calculus and/or Linear Algebra will be helpful. Experience with computational software helpful by not required. Enrollment will be limited, interested students should contact the instructor for permission.

Text: *Mathematics, A simple tool for Geologists,* 2nd Edition by David Waltham, ISBN 0-632-05345-3

Course web site: http://www.personal.kent.edu/~jortiz/earthstats/home.html

Many helpful resources are available on the course web site. Students are advised to familiarize themselves with the web site early in the semester and then to make use of these resources throughout the semester. Please see the instructor if you need help accessing the web site. This web site lets you check your grades online and contains information about:

Syllabus
Grading Policy
A simple UNIX cheat sheet
Bibliography of Quantitative Methods Resources
Class Schedule
Basic Statistical Relationships
Academic Calendar
Links to Online Quantitative Methods Resources
Reading Assignments, Online Notes
Announcements (as needed)
A short glossary of linear algebra terms
Accommodation for Students with Special Needs

Note that as with all internet resources, access to or availability of the website cannot be guaranteed. Exams will not be rescheduled. Please use the resources available on the web site in advance of exams. To check your grades, using your university email name and password, login to flashline (http://flashline.kent.edu) and go to "My Courses", or go directly to WebCT (http://class.kent.edu).

Office Hours and Consultation with the Instructor: I want you to do well in this course! I welcome questions from all students either in person, by email, or by phone. Whether you are doing well in the course, find it challenging, or are on academic probation, attending office hours can help make the course a more enriching experience. To ensure your own privacy when sending electronic messages, please use your university email account. Include your first and last name on any electronic correspondence. You should however, include no more than the first five digits of your student ID number (SSN) on any electronic correspondence. Please cc a copy of any important messages that you send to the instructor back to yourself so that you have a record.

University Policies: The following University policies apply to anyone enrolled in this course:

1. Enrollment Status: Students are responsible for ensuring that they are properly enrolled in their classes. You are advised to review your official class schedule during the first two weeks of the semester and prior to the drop and withdrawl dates to ensure that you are properly enrolled in this class and section.

2. Academic Honor Code: All students in the course are expected to abide by the academic honor code, as specified in the University's "Digest of Rules and Regulations". The use of other's intellectual property without giving them appropriate credit is a serious academic offense. This includes misrepresenting the source, nature or other conditions of your academic work to get undeserved credit. It is the University's policy that cheating or plagiarism can result in receiving a failing grade for the work or course or other more serious disciplinary action. Repeat offenses can result in dismissal from the University.

3. Drop and Withdrawal: For Fall 2005, the last day to drop from the class without receiving a grade of "W" is September 11, 2005. The last day to withdraw from the class with a grade of "W" is November 6, 2005. For more information, see the Fall semester withdrawl page on the registrar's web site.

4. Students with disabilities: In accordance with University policy, if you have a documented disability and require accommodations to obtain equal access to this course, please contact the instructor at the beginning of the semester or when given an assignment for which an accommodation is required. Students with disabilities must verify their eligibility through the Office of Student Disability Services (SDS) in the Michael Schwartz Student Services Center (330-672-3391).

5. Final Exam Dates: Please check the final exam schedule for the classes in which you are enrolled. In the event that you have a conflict with another scheduled exam, the instructor will make suitable arrangements. Students who have conflicts or more than three examinations on the same day should consult with the Dean of his or her college at the earliest possible time for assistance in making alternative arrangements.

Grading Policy: Students are expected to attend class, do the reading, and consult the web site throughout the term. These steps will help you to learn the material covered on the exams. There will also be several, in-class activities given during the term. They will allow you to gauge your progress and provide you with credit for class participation. Grades will be based on a subset of the assigned work as follows:

Midterm exams (17.5% each)	35%
Cumulative Final Exam	35%
In-class activities	15%
Term Research Project	15%
Total	100%

In-class activities: These will consist of computer and or analytical exercises we begin in class but which may require additional work outside of the class setting. They will be designed to reinforced concepts presented in class.

Exams: Written, in-class exams will test your knowledge of the material. These will include computational exercise and conceptual essay questions. Remember to write out your answers in a clear methodical fashion and to show all work.

Make-up Exams: Students are expected to manage their academic and personal activities responsibly during the term. Students who miss an exam must provide a legitimate written excuse in a timely manner in order to receive a make-up exam. Make-up exams will consist of several essays and short answer questions that cover the same material as the in-class multiple-choice exam. Legitimate excuses for missing an exam include written documentation for the following: conflict with another Kent State University academic activity (such as an off campus field trip), your own illness, a death in the family, and military or intercollegiate athletic commitments. If you are involved in military or official university athletic activities, review the exam schedule at the beginning of the term and consult with the instructor prior to the exam if you have a conflict. If you have an illness, personal crisis or family tragedy that results in missing an exam, you must contact the instructor by phone or email no later than 48 hours after the scheduled start time of the exam. It is very important that you provide your name and a telephone number where you can be reached in your phone or email message.

How grades are calculated: Grades are based on a weighted average of your class scores using the following equation:

Class GPA = 0.35*(Average Midterm GPA) + 0.35*(Final Exam GPA)
+ 0.15*(Average In-class Activity GPA) + 0.15*(Term Research Project)

Your Class GPA is then converted to a letter grade using the table below.

Class GPA	4.10 to 4.30	3.71 to 4.09	3.50 to 3.70	3.29 to 3.49	2.71 to 3.28	2.50 to 2.70	2.23 to 2.49	1.71 to 2.20	1.50 to 1.70	1.29 to 1.49	0.71 to 1.28	0.50 to 0.70	0
Letter Grade	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

To help you gauge your progress during the term (and to minimize round off error) I calculate mid-semester grades on a plus/minus scale. Note however, that your final grade for the course will be reported on the official university grade scale of: A, B, C, D, F by merging the plus/minus categories for each letter grade. Student who never attend, or stop attending will receive grades of NF or SF in accordance with university policy.

Class Schedule and Reading Assignments
Scientific Method

Week	Class Topics	Readings from Waltham*
1	Why be quantitative?	Chapters 1, 6, handouts
2	Quantitative approaches ***(M, Sept 5, Labor Day, no classes)***	Chapter 1, 6, handouts
3	Theoretical considerations	handouts
4	Analytical approaches	Chapter 3
5	Analytical approaches ***Friday: Midterm 1***	Chapter 4
6	Descriptive Statistics	Chapter 7; Topics 1, online notes
7	Hypothesis testing	Chapter 7; Topics 2, online notes
8	Correlation	Topic 3, Online notes; handouts
9	Regression	Chapter 2, 7, Topic 4, Online notes
10	Introduction to ANOVA	Topics 5-6, Online notes; handouts
11	Discriminant Functions ***(F, Nov 11 Veterans Day, no class)***	Topic 7, Online notes; handouts
12	Time Series ***(Friday: Midterm 2)***	Topics 9-11, Online notes; handouts
13	Scale Analysis of Differential Equations ***(W, F Nov 23, 25, Thanksgiving Break, no classes)***	Chapter 8, handouts
14	Scale Analysis of Differential Equations	Chapter 8, handouts
15	Presentation of Class projects, Review	
	End of class sessions	
16	***Final Exam, Thursday, Dec. 15, 7:45 - 10:00 a.m.***	

***Readings from Waltham unless otherwise noted. Online sources are provided on the website. Any changes to the readings will be announced in class and listed on the class web (see:** http://www.personal.kent.edu/~jortiz/earthstats/home.html**).**