

Course Description and Syllabus
Scientific Methods in Geology (GEOL 4/52035), Sections 1 and 2
Kent State University
Fall 2011

(<http://www.personal.kent.edu/~jortiz/earthstats/>)

Instructor: Dr. Joseph D. Ortiz
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Lecture: TR 1:10-2:00 pm, Room 234 or Room 303 as directed.
Lab (Section 1): T 11:00-12:40 am, Room 234 or Room 303 as directed.
Lab (Section 2): T 11:00-12:40 am, Room 234 or Room 303 as directed.
Office Hours: TR 10:00-11:00am, W 2:15-3:45 pm, 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 science, technology, engineering and math (STEM). 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" exercises 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 one semester of Calculus and/or Linear Algebra will be helpful. Experience with computational software is helpful by not required. Enrollment will be limited, interested students should contact the instructor for permission.

Texts: *Mathematics, A simple tool for Geologists*, 2nd Edition by David Waltham, ISBN 0-632-05345-3.
Statistics and Data Analysis in Geology, 3rd Edition, John C. Davis, ISBN 0-471-17275-8.

Course web site: <http://www.personal.kent.edu/~jortiz/earthstats/>

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:

		Notes
<i>Grading Policy</i>	<i>Basic Statistical Relationships</i>	<i>A short glossary of linear algebra terms</i>
<i>Bibliography of Quantitative Methods Resources</i>	<i>Links to Online Quantitative Methods Resources</i>	<i>Accommodation for Students with Special Needs</i>

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". Students can deliver their labs electronically using the KSU dropbox designated for this class (<https://dropbox.kent.edu/login.cfm?id=1199>). Upload the file to the directory associated with each assignment.

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, you must use your university email account. Include your first and last name 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. University Calendar: The official university calendar, which provides information on deadlines for university-related transactions can be found at:
http://www.kent.edu/registrar/calendars/stu_important_fall.cfm
2. Enrollment Status: The official late registration deadline for this course is **September 29, 2011** (see the university calendar for late registration deadlines and late fee information, etc.). University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule (using Student Tools in FlashFast) prior to the deadline indicated. Registration errors must be corrected prior to the deadline.
3. Academic Honor Code: In accordance with University Policy, Chapter 3, Section 01.8, all students 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. If you have any questions, please read the full section of the policy at [University Policy, Chapter 3, Section, 01.8](#).
4. Drop and Withdrawal: The last day to drop a class before a grade of W is applied is September 11, 2011. Withdrawal from any or all courses is permitted up to the withdrawal date for the semester, or until the prorated deadline for flexibly scheduled sections. The deadline to withdraw with a grade of W is November 6, 2011. After that time, students are considered to be committed to all remaining courses and must complete them. If students are unable to complete the semester because of extreme circumstances that first occur after the deadline, students should consult their college or campus dean's office. No approval is required to withdraw from a course during the withdrawal period. For more information see:
http://www.kent.edu/registrar/calendars/stu_important_fall.cfm
5. Students with Documented Accommodation needs: Students who require health-related accommodations must verify their eligibility through the Office of Student Accessibility Services (SAS) on the Ground Floor of the DeWeese Health Center (330-672-3391 or <http://www.kent.edu/sas>). In accordance with University policy, if you have a documented need for a health-related accommodation 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. If you have any questions regarding a potential accommodation need, please contact the instructor and SAS as soon as possible.

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 lab exercises given during the term. We will start these lab projects in class, but students are expected to complete them outside of class. They will be graded to allow you to gauge your progress and provide you with credit for class participation. Grades will be based on the assigned work as follows:

Midterm exams (17.5% each)	35%
Cumulative Final Exam	35%
Lab projects	15%
Term Research Project	15%
Total	100%

Lab projects: 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 may include a mix of 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 explanation 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 exams. 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 visit health services due to an illness, you can request a time stamped receipt to document your visit. 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:

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

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. Grades may or may not be assessed on a curved scale

depending on the outcome of each assignment. Student who never attend, or stop attending will receive grades of NF or SF in accordance with university policy.

Class Schedule¹ and Reading Assignments
Scientific Method

Week	Class Topics	Readings²
1 (8/30,9/1)	Why be quantitative?	Waltham 1, Davis 1
2 (9/6,8/)	Sampling, Experimental Design and propagation of errors	Waltham 1, Davis 1
3 (9/13,15/)	Data Presentation	Waltham 2, 6
4 (9/20,22/)	Descriptive Statistics	Waltham 2, Davis 2
5 (9/27,29/)	Descriptive Statistics Thursday: Midterm 1	Waltham 2, Davis 2
6 (10/4,6/)	Hypothesis testing	Waltham 7, Davis 2
7 (10/11,13/)	Hypothesis testing	Waltham 7, Davis 2
8 (10/18,20/)	Covariance and Correlation Simple Linear Regression	Davis 4
9 (10/25,27/)	Introduction to ANOVA	Davis 5
10 (11/1,3/)	ANOVA (Take home assignment)	Davis 5
11 (11/8,10/)	ANOVA/Mutivariate Analysis Thursday: Midterm 2	Davis 3, 5
12 (11/15,17/)	Mutivariate Analysis	Davis 5, 6, Handouts provided
13 (11/22/)	Mutivariate Analysis (R Nov 23, Thanksgiving Break, no classes)	Davis 4, Handouts provided
14 (11/29,12/1/)	Mutivariate Analysis	Davis 4, Handouts provided
15 (12/6,12/8)	Presentation of Class Projects, Review	
End of class sessions		
16	Final Exam, Monday, Dec. 12, 12:45 pm - 3:00 pm	

1. Depending on class needs, we may increase or decrease the time allocated to individual topics

2. Additional online sources will be handed out in class or 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/>).