

Math 113 - Introduction to Applied Statistics

Fall 2003 Course Syllabus

James Jones, Professor of Mathematics
Mathematics & Sciences Division
Richland Community College

Course Meeting Information

Section 01 meets from 10:00 am to 10:50 am on Mon, Tue, Thu, and Fri in room S137.
Section 02 meets from 2:00 pm to 2:50 pm on Mon, Tue, Thu, and Fri in room S137.

Instructor Information

James Jones, Professor of Mathematics.
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Office Hours

These are the times I'm scheduled to be in my office. If these times are not convenient for you, please see me to make an appointment for some other time.

Mon: 12:00 pm - 12:50 pm, 3:00 pm - 3:15 pm
Tue: 12:00 pm - 12:50 pm, 3:00 pm - 3:15 pm
Thu: 9:30 am - 9:50 am, 12:00 pm - 12:50 pm
Fri: 12:00 pm - 12:50 pm

Text

Intro Stats, 1st edition. Richard D. De Veaux, Paul F. Velleman. Copyright 2004, Pearson Education. ISBN 0-201-70910-4 (Student Version)

Student Audience

Students who want additional mathematics, but do not want to take Math 116, College Algebra. Nursing students who intend to transfer to a four year institution that requires statistics. Students in the business area who wish to increase their mathematical knowledge.

Prerequisite

Successful completion (C or better grade) in Math 098 or satisfactory score on the Mathematics placement exam.

Course Description

MATH 113 - Introduction to Applied Statistics

Hours: 4 lecture - 0 lab - 4 credit

Math 113 is a beginning level course for the student in elementary applied statistics. Topics include basic statistical principles; graphic presentation; descriptive measures of central tendency, dispersion, and location; inferential statistics and hypothesis testing; analysis and inference of linear correlation coefficient and slope of regression line. Students will apply

statistical concepts to real world situations. Current technology will be utilized in examining statistical information. A graphing calculator is required.

Applicable toward graduation where program structure permits.

- Certificate or degree: All certificates, A.A.S., A.L.S., A.A., A.S.
- Group requirement: Mathematics
- Area of Concentration: Not applicable.

Illinois Articulation Initiative (IAI)

The mathematics component of general education focuses on quantitative reasoning to provide a base for developing a quantitatively literate college graduate. Every college graduate should be able to apply simple mathematical methods to the solution of real-world problems. A quantitatively literate college graduate should be able to:

- interpret mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them;
- represent mathematical information symbolically, visually, numerically, and verbally;
- use arithmetic, algebraic, geometric, and statistical methods to solve problems;
- estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results; and
- recognize the limitations of mathematical and statistical models.

Courses accepted in fulfilling the general education mathematics requirement emphasize the development of the student's capability to do mathematical reasoning and problem solving in settings the college graduate may encounter in the future. General education mathematics courses should not lead simply to an appreciation of the place of mathematics in society, nor should they be merely mechanical or computational in character.

To accomplish this purpose, students should have at least one course at the lower-division level that emphasizes the foundations of quantitative literacy and, preferably, a second course that solidifies and deepens this foundation to enable the student to internalize these habits of thought.

Math 113, Introduction to Applied Statistics, satisfies the Illinois Articulation Initiative Definition of a General Education Mathematics Course. It corresponds to MI 902, General Education Statistics.

For more information on the Illinois Articulation Initiative, visit their website at <http://www.itransfer.org/>

General Course Objectives

While learning statistics is certainly one of the goals of this course, it is not the only objective. Upon completion of this course, the student should be able to ...

- demonstrate comprehension and understanding in the topics of the course through symbolic, numeric, and graphic methods
- demonstrate the use of proper mathematical notation
- use technology when appropriate and know the limitations of technology
- work with others towards the completion of a common goal
- use deductive reasoning and critical thinking to solve problems

Specific Course Objectives

In all of the following objectives, the student should be able to think, show, and tell what is happening. Concentration will not be on the memorization of formulas but on the conceptual understanding of the statistics. Technology will be heavily emphasized to obtain the results, but the emphasis is on the statistics, not the technology.

Upon successful completion of this course, the student should be able to ...

- Describe a sample and know which statistics are appropriate for measuring center and spread of the data.
- Display categorical and quantitative data using pie charts, histograms, contingency tables, frequency distributions, scatter plots, and box plots as appropriate.
- Work with the standard normal distribution and determine if populations are normally distributed
- Find linear correlation and linear regression equations and know when linear correlation is not appropriate. Test to see whether the correlation is significant or not.
- Understand randomness, sampling techniques, and experiments
- Determine probabilities using probability rules and simulation techniques
- Understand and use the binomial distribution
- Understand the sampling distribution models for means and proportions
- Find confidence intervals for proportions and means of one and two samples
- Conduct hypothesis tests for proportions and means of one and two samples
- Perform chi-square goodness of fit tests and test for independence
- Conduct one-way and two-way analysis of variance problems.

A detailed topical outline of the content covered in this course is at the end of this syllabus.

Type of Instruction

Discussion, problem solving, activities, individual and group work, student questions, student participation, and lecture. Students are expected to have read the material before class and are strongly encouraged to come to class with a list of questions and to ask these questions.

Method of Evaluation

Could include any of the following: problem solving exams, objective exams, essays, research papers, oral presentations, group projects, individual projects, classroom activities, quizzes, and homework.

Grading Policy

Letter grades will be assigned to final adjusted scores as follows:

- A: 90 - 100%
- B: 80 - 89%
- C: 70 - 79%
- D: 60 - 69%
- F: below 60%

Consideration may be given to such qualities as attendance, class participation, attentiveness, attitude in class, and cooperation to produce the maximum learning situation for everyone.

The instructor will give you a grade sheet so that you can record your scores and keep track of your progress in the course. If you are concerned about your grades, see the instructor.

Late assignments lose 10% of their value per class period. The instructor reserves the right to apply this rule to missed exams as well as regular assignments.

Special Projects

Several special projects will be included in the course requirements. These will be selected from videotape reviews, research papers, research projects, group projects, and a mathematics notebook.

Written Work

All written work should be in a typed (word processor) format. There should be a cover page with the title of the assignment and the student's name. All work should be double spaced. Papers are to be stapled together in the upper left hand corner. All reference works used, including books, videos, etc., are to be cited using APA (preferred) or MLA notation. All work is to utilize the English language correctly. It is suggested that the Reading/Writing Center be utilized for assistance in the preparation of written work. If written work is submitted late, the instructor may take appropriate deductions from the grade.

Attendance Policy

Regular attendance is essential for satisfactory completion of this course. If you have excessive absences, you cannot develop to your fullest potential in the course. Students who, because of excessive absences, cannot complete the course successfully, will be administratively dropped from the class at midterm. If a student stops attending after midterm, it is the student's responsibility to withdraw to avoid an "F". The instructor has the ability, but not responsibility, to drop students who are not regularly attending at any time during the semester. The safest way to make sure you're not dropped for non-attendance is to continue to attend classes.

The student is responsible for all assignments, changes in assignments, or other verbal information given in the class, whether in attendance or not.

If a student must miss class, a call to the instructor (RCC's phone system has an answering system) is to be made, or an email message sent. When a test is going to be missed, the student should contact the instructor ahead of time if at all possible. Under certain circumstances, arrangements can be made to take the test before the scheduled time. If circumstances arise where arrangements cannot be made ahead of time, the instructor should be notified and a brief explanation of why given by either voice or email. This notification must occur before the next class period begins. At the instructor's discretion, the score on the final exam may be substituted for the missed exam.

Calculators

A [TI-82](#) or TI-83 graphing calculator is required in this course. Calculators may be used to do homework. Calculators may be used on exams and/or quizzes in class unless otherwise announced. If you are purchasing a calculator, consider getting the TI-83 instead of the TI-82. The TI-85 or TI-86 calculators are acceptable.

Additional Supplies

The student should have a pencil, red pen, ruler, and graph paper. The student is expected to bring calculators and supplies as needed to class. The calculator should be brought daily. There will be a paper punch and stapler in the classroom.

Homework

Homework out of the book may be collected for a grade. Even if it is not, the student should work as many problems as necessary to ensure a good understanding of the concepts.

Classroom Activities

This is an *applied* statistics course. We will be doing many hands-on activities during the course of the semester that require the student's presence to help gather data. If a student misses a day that is scheduled for a classroom activity, the student may request the activity sheet from the instructor, but it will not be worth more than 50% of its value. Classroom activities lose 10% of its original value for each class period late. It is the responsibility of the student to request the activity from the instructor.

Computer Software

In this course, we will concentrate on understanding the statistics and relegate the roll of finding the statistics to technology. We will be using the TI-82/TI-83 graphing calculator and the Minitab and Excel software programs. There is a CD-ROM that comes with your textbook called Active Stats. This is an excellent resource for understanding statistics and you are encouraged to go through it.

Minitab

You may not take Minitab home, it must be used here at Richland. It is installed on the computers in your classroom and the machines in the open computer lab, C239. There is a 30 day trial version of Minitab available on the web for downloading at <http://www.minitab.com/>. You may also purchase a five month copy that will last the entire semester. If you want to download the trial version, you may want to wait until the last month of the semester when we are using it more heavily. Minitab is fairly easy to use if you are familiar with a spreadsheet like Excel.

Excel

Microsoft Excel is a spreadsheet program that comes with MS Office. MS Office 2000 is loaded in the classroom and is also available on most of the machines in the College, including those in the open computer lab, C239. We will not be using any special features of Excel that depend on a particular version, so Excel 97 or newer should work fine. Excel is easy to use but difficult to use effectively. You must careful read the instructions given to you or you will get erroneous results.

ActiveStats!

ActiveStats is an interactive multimedia program to help you learn statistics. It was written by the co-author of the textbook, Paul Velleman. You should receive a copy of the software and an authorization key with your textbook. The software is ran from the CD and a small file that keeps track of your progress is saved to a disk. If you install this at home, then you can save the file to your hard disk. If you plan on using it on the schools computers, then save it to a floppy

so that you can move from computer to computer. If you use the schools computer, be sure to remove the CD from the drive before you leave.

Semester Projects

This is an *applied* statistics course. We will be doing a several projects in this course that require group work. Some time will be allocated in-class for participation, but there will be time outside of class required, also. Computer software will be used for analysis of the data.

Some of these projects will be designed by the instructor and involve the entire class. One of the projects will be a small group [project](#) designed by each individual group and approved by the instructor.

Additional Help

The student is encouraged to seek additional help when the material is not comprehended. Mathematics is a cumulative subject; therefore, getting behind is a very difficult situation for the student. There are several places where you can seek additional help in your classes.

Instructor

I try to make myself as available to the students as I can. My office hours are listed at the beginning of this syllabus, but those are just the times I'm scheduled to be in my office. Grab me and ask me questions if you see me in the hallway. Ask questions before or after class. If I'm in my office and it's not my scheduled office hours, go ahead and stop in.

The instructor should be considered the authoritative source for material related to this class. If a tutor or other student says something that disagrees with the instructor, believe the instructor.

Study Groups

Probably the best thing you can do for outside help is to form a study group with other students in your class. Work with those students and hold them accountable. You will understand things much better if you explain it to someone else and study groups will also keep you focused, involved, and current in the course.

Video tapes

There is a video tape series called "The High Stakes World of Statistics" that is on reserve in the Learning Resources Center. While not specifically tailored for our text, they do present an overview of statistics in a non-classroom setting. Celebrity guests and college students make statistics exciting and understandable. Sometimes there are problems with the accuracy of the videos, but generally speaking, they are a good resource.

Student Learning Center

The Student Learning Center is located in rooms S116, S117, and S118. There is mathematics tutoring available in room S116. The Student Learning Center and the tutoring is a service that Richland Community College offers you free of charge.

Learning Accommodation Services

There are accommodations available for students who need extended time on tests, note takers, readers, adaptive computer equipment, braille, enlarged print, accessible seating, sign language

interpreters, books on tape, taped classroom lectures, writers, or tutoring. If you need one of these services, then you should see Learning Accommodation Services in room C136. If you request an accommodation, you will be required to provide documentation that you need that accommodation.

Many of you will need additional time on tests. There is no need to go to learning accommodation services to request that. If you need additional time, just let me know and I'll allow you to continue working past the allotted time. You may need to move to another room as there may be another class coming into your room. If you're unable to finish the test by staying late, it may be possible to start the test earlier to gain additional time.

Feel free to bring a tape record to class and tape my lectures. If you need tutoring, then go to the Student Learning Center. For other services, see Learning Accommodation Services.

Academic Dishonesty

Each student is expected to be honest in his/her class work or in the submission of information to the College. Richland regards dishonesty in classroom and laboratories, on assignments and examinations, and the submission of false and misleading information to the College as a serious offense.

A student who cheats, plagiarizes, or furnishes false, misleading information to the College is subject to disciplinary action up to and including failure of a class or suspension/expulsion from the College.

Topical Outline

Hours	Topic
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|---|--|
| 9 | Exploring and Understanding Data <ul style="list-style-type: none">• Introduction to statistics and data• Displaying categorical data, bar charts, contingency tables• Displaying quantitative data, stem and leaf plots, shape, center, spread, symmetry• Describing distributions numerically, median, range, box plots, five number summary, mean, standard deviation• The standard deviation as a ruler and the normal distribution, standardized scores, 68-95-99.7 rule• Finding normal probabilities• Normal probability plots |
| 7 | Exploring Relationships Between Variables <ul style="list-style-type: none">• Scatter plots, association, and correlation• Linear regression, coefficient of determination,• Regression wisdom including linearity, extrapolation, prediction, outliers, lurking variables, and summary variables• Reexpressing the data; transformations to improve correlation |

Hours	Topic
7	Gathering Data <ul style="list-style-type: none"> • Understanding randomness, simulation • Sample surveys, populations, types of sampling • Design of experiments
8	Randomness and Probability <ul style="list-style-type: none"> • From randomness to probability, law of large numbers • Probability addition and multiplication rules • Independent and dependent events • Tree diagrams, joint probability distributions, Bayesian probabilities • Random variables and probability distributions • Expected value (mean), variance, and standard deviation • Probability models for geometric and binomial experiments
10	From the Data at Hand to the World at Large <ul style="list-style-type: none"> • Sampling distribution models for proportions and means. • Central limit theorem and standard error • Confidence intervals for proportions, margin of error and critical values • Hypothesis testing about proportions, classical approach, p-value approach • More about hypothesis testing, significance levels, errors, power • Comparing two proportions, pooled estimates
6	Learning About the World <ul style="list-style-type: none"> • Inferences about means • Student's t distribution • Confidence intervals for the population mean • Hypothesis testing for a single mean • Comparing two independent means, equal and unequal variances • Paired samples and blocks, confidence interval, hypothesis test
9	Inferences When Variables Are Related <ul style="list-style-type: none"> • Comparing Counts • Chi-square goodness of fit test (multinomial experiments) • Chi-square test for independence • Inferences for Regression, hypothesis testing for the constant and slope • Confidence intervals for predicted values • F distribution** • One-Way Analysis of Variance* • Two-Way Analysis of Variance** • Multiple Regression*

* In supplemental material included with CD.

** Covered in class but not covered in textbook.