

Math 113 - Introduction to Applied Statistics

Summer 2003 Course Syllabus

James Jones, Professor of Mathematics
Richland Community College

Course Meeting Information:

Section 01 meets from 8:00 am to 9:50 am on Mon, Tue, Wed, and Thu in room S137.

Instructor Information:

James Jones, Professor of Mathematics.

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Office hours are not required for summer courses but I am available for students between 12:00 pm and 1:00 pm on class days.

Texts:

- ! Elementary Statistics, 8th edition. Mario F. Triola. Copyright 2001, Addison Wesley Longman, Inc. (Required)
- ! Statdisk: Student Laboratory Manual and Workbook, 8th edition. Mario F. Triola. Copyright 2001, Addison Wesley Longman, Inc. (Required)
- ! Student's Solution Manual. Mario F. Triola. Copyright 2001, Addison Wesley Longman, Inc. (Optional - Not recommended)

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.

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

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, quizzes, 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 will 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.

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.

Additional Help:

Office hours will be announced. 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.

If your class(es) leave you puzzled, the Student Learning Center is a service that Richland Community College offers you. It is available free of charge to all RCC students.

Be sure to get help before it is too late.

Homework:

Homework out of the book is not collected for a grade. However, some of the problems on the exams are similar to the "Basic Skills and Concepts" exercises in the book. For this reason, I strongly urge you to work as many of those problems as possible. When a problem out of the "Beyond the Basics" section needs looked at, the instructor will point this out in class.

Laboratory Manual:

There will be several problems in each chapter assigned out of the [laboratory manual](#). They will be collected and a grade taken on them. Do not expect your numerical values to be the same as someone else in the class. You may get different answers. You may work together in groups on the exercises, but each person needs to turn in a complete set of exercises (that is, one copy per person, not one copy per group). The laboratory exercises are due on the day of the exam for that chapter, however, they will be discussed on review day, so you should have them done by then.

The Statdisk manual assignments may be turned in late, but it will lose 10% of its original value for each class period late.

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 some software packages, Minitab, Excel, and the software written for your book, Statdisk.

Statdisk

There is a CD included in your textbook that has the Statdisk software on it. You may take that home and install it on your home computer. If you didn't get a CD with the software, let the instructor know. Statdisk is fairly easy to use, even for computer novices, but you need to read the laboratory manual for instructions as it isn't always obvious what to do.

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 want to wait until the last month of the semester when we are using it more heavily to download it. 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.

Semester Projects:

This is an *applied* statistics course. We will be doing a couple of lengthy 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.

Topical Outline:

Hours	Topic
3	Introduction to Statistics <ul style="list-style-type: none">! Definitions! Levels of measurement! Types of sampling! Abuses of statistics
7	Descriptive Statistics <ul style="list-style-type: none">! Frequency distributions! Graphs: Histograms, Stem and leaf plots, Scatter plots! Measures of center (mean, median, mode, midrange), skewness! Measure of dispersion (range, variation, variance, st. dev.)! Measures of position (z-scores, percentiles, quartiles)! Exploratory Data Analysis (5-number summary, box plot)
6	Probability <ul style="list-style-type: none">! Notation! Classical probability (equally likely events), empirical probability (relative frequencies)! Law of large numbers! Complementary events! "and" probabilities, "or" probabilities, conditional probabilities, marginal probabilities.! Simulations! Counting techniques
5	Discrete Probability Distributions <ul style="list-style-type: none">! Random variables! Probability rules! Mean, variance, and st. deviation of a discrete probability distribution! Expected value! Binomial probability distribution! Binomial probabilities! Mean, variance, and st. deviation of a binomial distribution
6	Normal Probability Distributions <ul style="list-style-type: none">! Continuous probability distributions (brief coverage of uniform)! Standard normal distribution.! Finding probabilities when z-score is known.! Finding z-score when area is known.! Non-standard normal distributions! The Central Limit Theorem! Normal approximation to binomial (only when it is appropriate)! Determining normality (histogram, normal probability plot, Anderson Darling test)

Hours	Topic
5	Estimation and Sample Sizes ! Point estimates and interval estimates ! Properties of a good estimator ! Confidence intervals for the population mean, proportion, and variance. ! Student's t distribution ! Chi-square distribution ! Sample size determination
7	One Sample Hypothesis Testing ! Concepts of hypothesis testing ! Classical approach and probability value approach ! Testing one population mean ! Testing one population proportion ! Testing one population variance / st. deviation
6	Two Sample Hypothesis Testing ! Testing paired (dependent) means ! Testing two independent means with large sample sizes ! Testing two proportions ! F distribution ! Testing two population variances ! Testing two means with small sample sizes
6	Correlation and Regression ! Simple linear correlation ! Properties of correlation coefficient ! Hypothesis testing for significant linear correlation. ! Simple linear regression ! Estimation ! Multiple regression
4	Multinomial Experiments and Contingency Tables ! Multinomial experiments ! Chi-squared goodness of fit test ! Contingency tables ! Test for independence
4	Analysis of Variance ! One way analysis of variance ! Balanced two-way analysis of variance