

K300 STATISTICAL TECHNIQUES

INSTRUCTOR

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COURSE DESCRIPTION

K300 is one-semester, 3-credit hour course designed to introduce students to the major concepts and tools for collecting, analyzing and drawing conclusions from data.

GENERAL COURSE GOALS

- Explore, organize and describe data using graphs and numerical summaries
- Explore methods for producing data that can give clear answers to specific questions
- Use probability to describe chance, variation and risk to separate reality from background noise
- Draw conclusions about a wider universe while realizing that variation is everywhere and that conclusions are uncertain

TECHNOLOGY

Students are expected to use a TI-84 or TI-89 graphing calculator throughout the course. Students who do not own their own calculator may rent one from the school.

Students will use the textbook's Web site (www.whfreeman.com/yates2e) to take online quizzes and experiment with a number of applets provided. I also have my own Web site (www.frankumstein.com) where students can download worksheets or handouts.

PRIMARY TEXTBOOK

Yates, Moore and Starnes. *The Practice of Statistics*. Second Edition. New York: W.H. Freeman and Company, 2003. ISBN: 0-7167-4773-1

EVALUATIONS USED TO DETERMINE SEMESTER GRADES

10% Assignment Quizzes/Online Quizzes-

By using assignment quizzes to grade assignments, I can actually read (and correct) the conclusions drawn *in context* of random problems; online quizzes are to be taken anytime before the day of a test.

70% Tests

20% Final Exam

FINAL GRADE FOR COURSE

Since K300 is a one-semester course, your final grade will be the percentile average of your two semester grades.

MAKE-UP WORK

If no new material was covered prior to a test, you are expected to make-up the assessment on the **first** day you return from an absence; otherwise, the test will be made-up at a mutually convenient time for you and me.

CLASSROOM BEHAVIOURAL EXPECTATIONS

Class Rules: These rules are simple; just have good manners and respect one's self and one another. These rules allow for the free flow of ideas and a sophisticated level of discussion that is an important part of this class. Behaviors that indicate that one has regressed to an earlier stage of development or one's maturational level is lacking in some areas, or that one just has high attention needs, will not be tolerated. Students who would rather sleep in class, do other work etc., need not attend class and should probably withdraw or will be withdrawn if this behavior is a problem

Electronic Devices: Any use of cell phones (including texting) is not permitted during class time. This certainly falls under the rationale explained above. The behavior is rude and detrimental to requirements of the class.

Tardy and Attendance Policies: See the student handbook

STUDENT ACADEMIC MISCONDUCT

“The *Indiana University Code of Student Rights, Responsibilities, and Conduct* describes types of misconduct for which students may be penalized, including cheating, fabrication, plagiarism and interference with other students' work, as well as actions which endanger the University and the University community and possession of firearms. The Code also indicates the procedures to be followed in these cases. **All students are required to adhere to the responsibilities outlined in the Code.**”

The definition and clarification related to cheating, plagiarism, etc. is found at:

<http://www.iu.edu/~code/code/responsibilities/academic/index.shtml>

A useful link about Plagiarism can be found at:

<http://www.indiana.edu/~wts/pamphlets/plagiarism.pdf>

COURSE OUTLINE (Go to www.frankumstein.com for specific dates and deadlines)

FALL SEMESTER		
DAY	LESSON	ASSIGNMENT
1	Introduction to Statistics	Read Pp. xii-xvii, 4-7
2	Displaying Distributions With Graphs (1.1)	1.8, 1.20, 1.23, 1.24, 1.25, 1.27, 1.28, 1.30
3	Displaying Distributions With Graphs (1.1)	Worksheet*
4	Displaying Distributions With Numbers (1.2)	1.36, 1.41, 1.43, 1.45, 1.47, 1.48, 1.51, 1.54, 1.58
5	Review	Review Problems
6	TEST	
7	Normal Distributions (2.1)	2.4, 2.7, 2.8, 2.9, 2.11, 2.12, 2.15; Worksheet
8	Standard Normal Calculations (2.2)	2.22, 2.23, 2.24, 2.27, 2.42, 2.45, 2.47, 2.49
9	Review	Review Problems
10	TEST	
11	Scatterplots (3.1)	3.15, 3.18, 3.20, 3.21
12	Correlation (3.2)	3.24, 3.30, 3.31, 3.35, 3.37, Class Stats
13	Least Squares Regression (3.3)	3.40, 3.41
14	Coefficient of Determination (3.3)	3.45, 3.47, 3.48
15	Residuals (3.3)	3.52, 3.57, 3.73
16	Review	Review Problems
17	TEST	
18	Exponential Regression (4.1)	Worksheet; 4.6, 4.11
19	Power Regression (4.1)	4.14, 4.25 (Write Power Equation)
20	Cautions About Correlation/Regression (4.2)	4.33, 4.34, 4.35, 4.41
21	Relations in Categorical Data (4.3)	4.53, 4.55, 4.63, 4.64, 4.81; Worksheet
22	Review	Review Problems
23	TEST	
24	Designing Samples (5.1)	5.8, 5.11, 5.16, 5.17, 5.18, 5.28, 5.29, 5.30
25	Designing Experiments (5.2)	5.41, 5.49, 5.53, 5.56, 5.79; AP Free Response
26	Simulating Experiments (5.3)	5.61, 5.62, 5.68, 5.84
27	Review	Review Problems
28	TEST	
29	Probability Models (6.1, 6.2)	6.4, 6.5, 6.6, 6.14, 6.18
30	Probability Rules (6.2, 6.3)	6.19, 6.20, 6.26, 6.28, 6.36
31	Conditional Probability (6.3)	6.30, 6.64, 6.67, 6.68, 6.83, 6.85
32	Venn Diagrams	6.50, 6.51, 6.52, 6.53; Worksheet
33	Review	Review Problems
34	TEST	
35	Discrete/Continuous Random Variables	7.2, 7.7, 7.10, 7.15, 7.20
36	Means/Variances of Random Variables (7.2)	7.22, 7.25, 7.26, 7.29
37	Means/Variances of Random Variables (7.2)	7.36, 7.44, 7.46, 7.60, 7.62
38	Review	Review Problems
39	TEST	
40	Final Exam <i>Review</i>	Handout
41	FINAL EXAM	

*All worksheets and handouts used can be accessed for downloading or review at:

<http://www.frankumstein.com/statwkshts.htm>

SPRING SEMESTER

BLOCK DAY	LESSON	ASSIGNMENT
1	The Binomial Distribution (8.1)	8... 1, 9, 12, 15bc
2	The Binomial Distribution (8.1)	8... 16, 18, 27, 29, 61
3	The Geometric Distribution (8.2)	8... 37, 41 (X = 1 to 5), 44, 45, 49 (X = 1 to 5)
4	Review	Review Problems
5	TEST	
6	Sampling Distributions (9.1)	9... 7ab, 14, 15, 17
7	Sample Means (9.2)	9... 45, 49, 51, 53
8	Sample Proportions (9.2)	9... 20, 21, 22, 23ab, 43
9	Review	Review Problems
10	TEST	
11	Estimating With Confidence (10.1)	10... 1, 2, 3, 5
12	Estimating With Confidence (10.1)	10... 8, 9, 13, 15, 17
13	Tests of Significance (10.2)	10... 27, 29, 30, 31, 32, 33, 35, 36
14	Tests of Significance (10.2)	10... 39, 40, 42, 44, 53
15	Making Sense of Significance (10.3)	10... 58, 59, 62, 63
16	Inference As Decision (10.4)	10... 67, 75, 82, 85, 89
17	Review	Review Problems
18	TEST	
19	Inference for the Mean of a Population (11.1)	11... 7, 8, 9, 10, 11
20	Inference for the Mean of a Population (11.1)	11... 27, 28, 31bc, 36
21	Comparing Two Means (11.2)	11... 50, 53, 56, 57
22	Review	Review Problems
23	TEST	
24	Inference for a Population Proportion (12.1)	12... 7, 15, 17, 18
25	Comparing Two Proportions (12.2)	12... 30, 31, 32, 33
26	Which Test to Use; Review	Handout; Review Problems
27	TEST	
28	Test for Goodness of Fit (13.1)	13... 1, 2, 3, 8, 13
29	Inference for Two-Way Tables (13.2)	Worksheet
30	Inference about the Model (14.1)	Worksheet
31	Format of AP Exam	Handouts
32	Practice AP Exam	
33	Practice AP Exam	
34	Practice AP Exam	
35	Practice AP Exam	
36	Grading and Scoring AP/IB Exams	Warm-Up Exercises
37	Reflections & Reactions	Handouts
38	Project Guidelines	Handout (See Last Page)
39	Project	
40	Project	
41	Project	
42	Project	
43	PROJECT REPORT	

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PROJECT GUIDELINES

DESCRIPTION

In lieu of a final exam, you will:

- a) Identify a researchable (testable) hypothesis
- b) Design a properly controlled experiment (or observational study) to test it
- c) Carry-out the experiment/study and collect the data (obtaining ≥ 30 values)
- d) Analyze the resulting data

GROUP SIZE

You may do this project by yourself or with a partner. However, if you do the project with a partner, I will expect more than with an individual project.

PROPOSAL

You must have an approved project no later than _____. To get approval, you must clearly complete the Project Proposal Form. If relevant, you must also make sure that your experiment/survey will be safe and ethical for human subjects.

TYPED AND DOUBLE-SPACED REPORT due no later than _____ and must include the following (in order):

- | | |
|-----------|---|
| 5 points | A cover sheet with title (posed as a question), name(s) and date |
| 10 points | A summary of what your report is about |
| 10 points | Your null and alternative hypotheses clearly stated in words and mathematically |
| 10 points | A description of how you carried-out your experiment/study and a discussion on why/how you designed the experiment/study |
| 10 points | A description of things that went wrong and any suggestions on what you would have done differently |
| 25 points | A description of the statistical test you used to test your hypothesis and the reason(s) for choosing the test you chose. Show all calculations and find a P-value and/or a confidence interval |
| 10 points | A conclusion about your hypothesis using language that your Grandmother or Grandfather could understand |

APPENDIX*

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| 10 points | All the data you gathered displayed in a table. If applicable, include good data summaries (means, standard deviations, 5-number summaries etc.) and a commentary on these summary statistics |
| 10 points | A graph (or many graphs) of your data and commentary on what it shows. Use a box-plot, stem and leaf plot, scatterplot, histogram and/or pie chart. |

*Use MINITAB software when possible