

IIST 608: Research Methods (3476) Summer 2009

Rorissa608Summer09Syllabus.doc

Instructor:

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Office Hours: Mondays & Wednesdays, 4:30–7:00PM; by appointment (phone or email)

Class Hours: Mondays & Wednesdays, 1:00 to 4:30 PM in Draper 313B

Class Meetings: The class will meet 11 times. Check the weekly course outline for meeting dates. The final quiz is open-book, take-home. In the event of inclement weather, check 442-SNOW for an announcement on university closings.

Class Attendance: Attendance will be taken each week. This is an intensive class in statistics and research methods. Students need to attend class. In the unavoidable event of an absence, students should make arrangements with other students to pick up class notes and assignments. The instructor will allow time the first meeting of class to find a study partner.

Prerequisites: None. It is assumed that students have an understanding of basic concepts in mathematics. It is required students NOT take IIST 608 during the first semester of their graduate work in information science.

Homework: All work is due at the time assigned on each project/assignment and will not be accepted late without the express permission of the instructor. Each typed project should be submitted via Blackboard to the appropriate assignment drop box. Groups of individuals may work on the problem sets, but each individual hands in a completed assignment. The final project will be submitted (via Blackboard, to the “**Final Project**” assignment drop box) word processed, double-spaced, and will be an individual effort (no group projects). Appropriate footnoting and citation format should be followed. (Use google.com to check “MLA style”; “APA style”; or “Chicago Manual of Style” for specific bibliographic instructions—your choice as to which one.)

Readings: There is one required text: Brase & Brase for statistics, 8th edition. Powell is highly recommended since there will be readings from it. A copy of the Brase & Brase book is on reserve in the Dewey Library. The 2nd, 3rd or 4th edition is fine for Powell. Readings in the attached outline should be read for the date listed. Bring Brase & Brase to class each week.

Charles H. Brase & Corrine P. Brase. **Understandable Statistics: Concepts and Methods.** 8th edition. Houghton Mifflin and Company, Boston, MA, 2006. (We don’t use the CD. There is an online help site for the book:

http://college.hmco.com/mathematics/brase/understandable_statistics/8e/student_home.html)

Ronald R. Powell & Lynn Silipigni Connaway. **Basic Research Methods for Librarians.** 4th edition. Libraries Unlimited, Westport, CT. (Chapter 8[9, 10] in Blackboard)

Additional Class Resources: The file cabinet in the Draper student lounge contains mail folders for each student in DIS. If you do not have one, please see the staff in Draper 113 to get one. The top drawer of this file cabinet contains faculty folders for student handouts. These are not faculty mailboxes. They are

in Draper 113. Surveys, some additional course readings, as well as examples of student papers are available in Blackboard.

Bookstores: Mary Jane Books (on Western Avenue a few blocks from the downtown campus) has the texts for the course. They sell used as well as new texts.

Materials: Each member of the class should bring a calculator to each session. Square roots and memory are the most sophisticated functions that will be needed. A ruler, highlighter, and some graph paper are also needed for this class. A ring notebook to store handouts is helpful.

Student Performance Evaluation: Students are evaluated based upon the following weightings:

30% Problem sets (5 at 6% each)

35% Final project including prospectus, outline and written report

30% Quizzes (3 at 10% each)

5% Participation in class & in Blackboard, and initial Blackboard exercises (e.g., no points if I never hear your voice in class discussion)

4% extra credit for completing IRB core training <<http://www.citiprogram.org/>>

Objectives for Students: It is expected that students who finish this course will be able to:

- evaluate the design and results of published research that uses both quantitative and qualitative methodologies;
- describe the strengths and weaknesses of a variety of research methodologies;
- calculate basic descriptive statistics, and describe the purpose of bivariate and multivariate techniques in applied and theoretic research;
- demonstrate ability to analyze the results of basic descriptive statistical techniques;
- prepare a research/grant proposal that draws upon both research design and statistical knowledge gained in this class.

Time Required: This class meets for approximately seven class contact hours each week. Homework, including studying for exams, should take two to three hours per each contact hour. This implies that you will need to devote up to 28 hours per week to this class (7 hours in class; 21 to 28 hours at home). If you find yourself spending substantially more than 28 hours on average per week on this class, please see the instructor.

E-mail & Blackboard: Each student is expected to have an e-mail account for this class. Students will need to check their Blackboard mail at least twice a week. Blackboard mail is the best method for communicating with the instructor. It is necessary for students to subscribe to IST-L, the department's discussion/distribution list (listserv).

Spreadsheets: This class does require the use of spreadsheets for some statistical calculations. Students in the class are expected to have some familiarity with spreadsheets, completing one assignment in a spreadsheet package of their choice (with Microsoft Excel the default package for students without a preference.) Spreadsheet programs allow for univariate, bivariate, and multivariate analysis. The spreadsheet software is on many of the computers in Draper Hall (basement) and other computer labs on campus. The "Using Technology" sections at the end of each chapter of B&B give descriptions of how to use various statistics software packages.

Weekly Course Outline as of 5/17/2009 (subject to revision)

Date	Topics	Read for Class	Turn in/Quiz
5/27 - W	Introduction; Center and Spread	B&B: Preface, Chapters 1, 2, 3	
6/1 - M	Center and Spread again; Grant Proposals; Spreadsheets Day 1	B&B: Preface, Chapters 1, 2, 3; Appendix 1; Powell, Chapters 1, 8[9, 10]—BLS #1, #5 (as Chapter 8)*	Blackboard Exercises
6/3 - W	Probability; Research Studies; Surveys	B&B: Chapter 4; Powell, Chapters 2, 3, 4, 5; BLS #1, #4.	Quiz #1 and P.S. 1**
6/8 - M	Probability again; Normal Distributions; Data Collection	B&B: Chapters 4 & 6; Powell: Chapter 5	Prospectus
6/10 - W	Normal Distributions again; Experiments	B&B: Chapter 6; Practice area under a normal curve; Powell: Chapter 6	P.S. 2**
6/15 - M	Ethics, human subjects and institutional review	BLS #2; discussion of Miami course first 4 modules required	Quiz #2 and P.S. 3**
6/17 - W	Sampling Distributions; Historical Research	B&B: Chapter 7; Powell: Chapters 7, 8; BLS #3	Outline due
6/22 - M	Estimation; Analysis of Data; Spreadsheets Day 2	B&B: Chapter 8; Powell: Chapter 9	
6/24 - W	Hypothesis testing; Proposals	B&B: Chapter 9; Powell: Chapter 10—BLS #5 (as Chapter 8)	P.S. 4**; Project draft due (optional)
6/29 - M	Correlation/Regression; Research reports	B&B: Chapter 10; Powell: Chapter 11	Project due; HSR last date extra credit
7/1 - W	More Correlation/Regression; Chi square; wrap up	B&B: Chapter 10; Chapter 11 (selected)	Get Quiz #3;
7/6 - M	NO CLASS	QUIZ DUE	Quiz #3; P.S. 5**

* Chapter 8 (2nd ed) same as Chapter 9 (3rd edition) and Chapter 10 (4th edition). See page 16 of syllabus for chapter key. **Solution sets will be posted, in Blackboard, for problem sets the day they are handed in.

Additional readings titles in Blackboard (BLS) with numbers indicated in “Read for class” above.

BLS #1. Finding the Objects to Study

BLS #2. Protection of Human Research Subjects and Other Ethical Issues

BLS #3. Step Four: Asking Descriptive Questions

BLS #4. Survey Research

BLS #5. Writing the Research Proposal

Incompletes: No incompletes will be given in this class without the express permission of the instructor in advance of the end of the semester. Examinations will only be given on the announced days. Students who do not attend class during quiz #1 or #2 will have their averages computed with a quiz grade of 0. Students who do not turn in final papers on time should expect their grades will be averaged with a paper grade of 0. Late papers lose 5 points at the discretion of the professor.

Plagiarism and Cheating: Due to the intensive nature of this course, students are encouraged to form study groups and to work together on assignments. Learn by interacting with one another—support and help one another. However, quizzes will clearly be expected to reflect individual effort—you are expected to neither give nor receive assistance from anyone. As a policy for this course, plagiarism, self-plagiarism or cheating will result in a failing grade for the course. In addition, the instructor will pursue further disciplinary action at the University level. If you have questions about appropriately crediting the work of others in your writing, please see the instructor.

The Department of Information Studies takes academic dishonesty very seriously. Before taking classes within the Department of Information Studies, you should familiarize yourself with the Department’s

Academic Dishonesty Policy, available in both the department's Graduate Handbook and online at http://www.albany.edu/cc/informationstudies/forms/admin_forms/Academic_Dishonesty.pdf. Professors reserve the right to add to the Department's policy as they see appropriate.

Trees: This course takes up a lot of paper for problem sets. Please feel free to use the back of whatever paper you have at home that has something else on the front side. The GA and I will assume that only the front side is for your IIST 608 work. This policy includes all papers as well as problem sets for the course.

Food, Phones, and Comfort: Please feel free to bring a snack to class. Please avoid peanuts (allergies) and really aromatic foods. Please turn off your cell phone. If absolutely necessary leave it on, but exit the room as quietly as possible (hard to do with the phone ringing somewhere in your backpack!) If you have any condition that would make different presentation of materials (e.g., size of type), placement in the room, special seating, or different teaching style (where possible) beneficial to you, please see the professor. Some students have chosen to tape record lectures for future reference. Fine with me.

Helping speed up grading: Please acquire a yellow highlight marker. Use it to **highlight** the answers to problems in the problem sets that have obvious numeric answers. This makes grading go much more quickly. You can also use this method on quizzes. Please put a solid line between problems on problem sets. This will also help with the grading.

Throughout this course you should feel free to speak with the instructor about your final project/paper. The best way to find a topic will be to think about your interests, other courses you have taken, and other research that has been conducted. An hour or two spent looking at the most recent issues of **College & Research Libraries**, **Library Trends**, **the Journal of the American Society for Information Science and Technology**, or **The Reference Librarian** (only a partial list of the options) might give you a taking-off place, one of the two articles for the prospectus, and a topic to work with. Check the library for the recent issues of periodicals on the main floor.

Additional course materials in this packet:

1. Prospectus and outline description	page 5
2. Final paper description and checklist	page 6
3. Research prospectus example	page 7
4. Writing grant proposals	page 8
5. Problem sets 1 through 5	page 8
6. Methodology articles	page 11
7. Examples of quiz questions	page 11
8. Human subjects' review assignment	page 16
9. Powell chapter key for 2 nd , 3 rd , 4 th editions	page 16

[1] Final Project Prospectus and Outline Description

The final assignment has three parts:

1. A **prospectus** for the project—one to two double-spaced pages.
2. An **outline** of the final paper which will summarize the major sections of your paper, including literature themes, methodology, population, variables, budget, limitations, data collection, and data analysis methods, as well as a final section on hypothesized findings and future research.
3. A final written **paper**—seven to ten double-spaced pages, plus letter, bibliography, and attachments as appropriate.

The Prospectus (S/U grade)

In one to two double-spaced, typed pages, please describe a research project that you might undertake and for which you are writing a grant proposal. Keep in mind that you will do no data gathering for this course, so you could choose any population and any data gathering method(s), even if really doing the project would be too costly in time, talents, or funds. Keep in mind that one section of the paper is for a project budget, nonetheless. You may want to select a topic (as close as you can) that will really be your research project for a project at your work/internship, thus making double use of your course work here.

The prospectus should include:

- The research problem and question(s). Why does this research need to be done? What light will it shed on what information science problem theoretic or practical?
- At least two research projects (based upon journal articles) that have already addressed this or a related issue. What theory have these research projects drawn upon? What questions did they address? How will your research be similar to or different from these? Please cite these journal articles appropriately in the text of your prospectus, and give complete citations in footnotes or endnotes or as a reference list.
- Proposed population. Why?
- At this early stage, a list of variables that you will probably measure in your research.
- Proposed methods that you will use to collect and analyze your data.
- Strengths and limitations of this research and possible future, follow-up research.
- A one-paragraph section on what you expect your research to find (although you might be surprised).

The Outline (S/U grade)

The outline will follow the format of “The Paper” below, requiring 2 to 3 **double-spaced** pages of headings that define the organization of your paper at this stage of your thinking. Thus:

- the outline for a letter to the agency from which you are asking for money
- a working title
- a three-part abstract (one paragraph with three parts: problem, methodology, selected hypothesized findings)
- a statement of the research problem including themes from the literature
- a statement of the purpose of your research
- a statement on why the agency would want to fund this research
- a methodology outline including your proposed population, sample, list of variables and measures, data collection, and data analysis
- strengths and limitations of your study
- strengths and limitations of the method you are using to collect data
- a start at the budget
- subheadings for hypothesized findings
- subheadings for future research
- your bibliography of ten (minimum) articles for the literature review
- appended measurement instrument(s) are optional at this point although you **MUST** have one in the final paper

You may put notes in italics to the instructor for areas of concern or special attention.

[2] Final Paper/Project Description and Checklist

In order to help you with the preparation of the final copy of your research proposal, the following checklist highlights required items for that paper. You do not need to turn this checklist in at the end of the semester. Use it to keep yourself on track. Read the assignment again while preparing your final paper.

_____ 1. **Letter** to the institution that sent out the RFP (request for proposal). This will be one page, single spaced, introducing yourself, your project, the final budget amount, and some rationale about why you have selected this institution. You may find an actual organization that grants funds or make one up.

_____ 2. **Title** that reflects the research being conducted.

_____ 3. 200 word **abstract** in one paragraph including problem, method, hypothesized findings. An abstract of the proposed research (approximately 200 words). This should be one paragraph and single-spaced.

_____ 4. **Statement of the research problem**--what you want to clear up, discover, prove. A statement of the research problem including a statement of themes and theory that are associated with the problem.

_____ 5. **Purpose statement.** You could do a single purpose or multiple bullets of purposes. This section should state why you believe the funding institution should give you money to complete this project—the “so what?” of the paper.

_____ 6. **Literature review.** This will be the area to cite at least ten research articles that form background and basis for your research—from your bibliography. Use the articles to support points made in your statement; avoid starting sentences with “Bond and Adams said.....” Furthermore, this section could include your hypotheses (in the form of null and research hypotheses) or research questions. Divide the literature review into subject areas, theoretic areas, and avoid "he said" "she said" paragraphs. Discuss/focus on theory not people. Each subject area should have a separate heading in your final paper.

_____ 7. **Methodology** section that includes

- a. Population: a description of the population under study and why it was chosen
- b. Sample and sampling method including why this sample was chosen
- c. Human subjects review considerations and accommodations
- d. Variables and how they will be measured (with each variable mapped to survey or interview questions)
- e. Data collection method(s)
- f. Data analysis methods

Items (a) through (f) will each have their own subheadings in the methodology section.

_____ 8. **Strengths of your study.** Here you can include issues of bias, validity and reliability. Discuss issues with the work that you propose to do.

_____ 9. **Limitations of your study.** Here you can include issues of bias, validity and reliability. Discuss issues with the work that you propose to do.

_____ 10. **Strengths of your method(s).** Here you should discuss the strengths of surveys, interviews, focus groups, or whatever method you are using to collect data.

_____ 11. **Limitations of your method(s).** Here you should discuss the limitations of surveys, interviews, focus groups, or whatever method you are using to collect data.

_____ 12. **The budget.** This is the dollar amount that you are asking for cost in time, labor, and materials to complete this project. This is the spreadsheet of costs with formulas that add up the columns (with some attention to the visual appeal) that you created for problem set #4. Include it as a table, with discussion, in your final paper.

_____ 13. **Hypothesized findings** should deal with your educated appraisal of what you will find (based upon your readings, the theories of others, and your knowledge of the subject area). In an actual research paper, reporting findings, the hypothesized findings would be up front in the form of null and research hypotheses that you were testing either qualitatively or quantitatively.

_____ 14. **Future research possibilities** (if you or someone else were doing it)

_____ 15. **Bibliography** of at least 10 articles you referenced in your literature review.

_____ 16. **Appended materials** such as (you MUST have at least one collection instrument):

- a. draft survey instrument or
- b. interview script or
- c. letters to potential interviewees or ...

Rule #1 of appendices: Add no appendix that is not referenced in the body of the proposal and label them in the order they are referenced.

[3] Research Prospectus Example

This prospectus is designed to be an example of the sort of work that you will hand in for your own project in IIST 608. It is an example of an action research project. (**double space real one!**)

Research Problem: The University at Albany Library would like to be able to distribute electronically journal articles to science faculty members of its campus, eliminating print journals from the university library. Issues of copyright have been cleared with the various publishers. The librarians are concerned about how this new policy will be received by science faculty members. They are asking for grant monies in order to create, administer, and analyze a survey.

Research Hypothesis/Question: The science faculty members at the University at Albany will be receptive to the idea of electronic journal article dissemination. (Alternately, this could be a research question that asks if they will be receptive—depends upon how much previous research has been done.)

Previous Research: There has been a trend over the last decade that would indicate that science faculty members not only have access to equipment that would make electronic dissemination possible but also that they are engaging in research and communications that already make use of electronic technologies. As of 1992, all science faculty at the University at Albany reported access to or ownership of personal computers and communications software (Jones 1993). Furthermore, science faculty around the world have been reported to engage in scholarly debate and exchange of preprints over the Internet (Martin & Martin, 1994).

Proposed Population: In order to meet the needs of the University Library, the population for this research will be the science faculty members in the chemistry, physics, biology, and astronomy

departments at the University at Albany. The research will be limited to full time faculty members (no part-time, adjunct or emeritus).

Possible Variables: The research will study (1) access to or ownership of personal computers and communications software, (2) present ownership of pertinent journals in individuals' fields, (3) library use of appropriate scientific journals, and (4) willingness to receive articles electronically rather than in print format (including barriers to electronic delivery).

Proposed Methodology: A survey will be developed to measure access, ownership, use and willingness. Fifty percent of the faculty will be surveyed in a random, weighted sample. Descriptive statistics will be reported for the study. (Note that you could decide to do a census and survey everyone—probably a good idea when the population is small and you cannot expect a 100 percent response rate.)

Hypothesized Findings: The researcher believes that scientists at the University at Albany will be receptive to electronic delivery of pertinent journal articles, paving the way for savings for the libraries and the university as a whole.

Notes

Jones, Peter M. 1993. Bogus citation.

Martin, Martha & John R. Martin. 1994. Another bogus citation.

[4] Writing Grant Proposals

We will be going over various aspects of proposal writing in class. Try doing a search of the topic “grant writing” on the web. I did and found an enormous number of sites including materials on writing cover letters.

[5] Problem Sets for IIST 608

NOTE: Read the following carefully for all five assignments.

- See the class syllabus for due dates for each assignment.
- Problem sets are due at the beginning of class. Assignments will not be accepted late.
- Please make a copy of the assignment for discussion and for your records.
- Calculations can be done with a calculator, but do not use spreadsheets or statistical packages for calculations unless the instructor asks you to do so.
- Handwritten graphs and equations in pencil are fine. Do not take the time to try to word process equations.
- Make sure to label axes, equations, graphs and tables.
- When you are asked to write text, please use a word processing program, double-spaced with at least point 12 type.
- When doing calculations, include all your work so that the grader can locate problems. Finally, when solving mathematical problems, please **highlight your answers and put a line between problems.**
Five points off on the problem set if this is NOT done.

Problem Set 1 (Chapters 1 to 3)

A. Variable Assignment: Select one of the articles that you will use in your final paper/project and have cited in your prospectus. Identify the major variable that the researchers were measuring and then describe how they measured that variable. Write out the citation for the article as well as the variable and its operationalization. You do not need to attach a copy of the article.

B. Statistics Assignment: (7 problems)

- Chapter 1** (B&B): Page 12, question 8
Page 33, question 6
Chapter 2 (B&B): Page 86, question 4
Page 89, question 10
Chapter 3 (B&B): Page 107, question 8
Page 122, question 4
Page 151, question 12

[Check to make sure you did the variable assignment above!]

Problem Set 2 (Chapter 4; skipping chapter 5 totally)

A. Variable Assignment: Identify the major variable from your grant proposal (final project/paper). (1) Give it a name. (2) Write a definition of it in one or two sentences. (3) Describe how you might measure this variable. (4) Create three survey questions that would measure the variable using three different types of survey techniques as discussed in class. If you are proposing qualitative research, then select a quantifiable variable related to your work and do the assignment.

B. Statistics Assignment: (8 problems)

- Chapter 4** (B&B): Page 172, question 8
Page 173, question 12
Page 188, questions 1 and 2
Page 190, question 14
Page 207, question 6
Page 208, question 24
Page 208, question 26

Problem Set 3 (Chapters 6; skip control charts section and section 6.4)

A. Variable and Spreadsheet Assignment:

Make a list of the variables that you think will appear in your final project/paper. Do this using a spreadsheet program and format it landscape. Give each one [1] a name and then write a one or two sentence [2] definition for each one. Finally, based upon the research method(s) you plan on using, [3] describe how you will operationalize each variable. Note here that you are doing a section of your final paper. These could be qualitative or quantitative variables depending upon your research and data collection method. For example:

<i>Variable</i>	<i>Definition</i>	<i>Measurement method</i>
Distance traveled	Number of miles and tenths from driveway to Draper parking lot	Ask each respondent to clock and record miles on his or her car's odometer

[Statistics assignment on next page]

B. Statistics Assignment: (14 problems; 10 fairly short)

Chapter 6 (B&B): Page 305, question 8

Page 320, question 6

Page 321, questions 10, 12, 14, 16, 18, 20, 22, 24, 26, 28 (Make sure to sketch the areas as well as find the specified areas)

Page 346, question 10

Page 348, question 16

Problem Set 4 (Chapter 7 sections 7.1 and 7.2 and Chapter 8 sections 8.1 and 8.2)

A. Spreadsheet Assignment:

Create a spreadsheet that reflects the budget for your final project/ paper for this course. Include items for personnel and supplies as discussed in class. This spreadsheet will appear in your final project/paper in the budget section. For this assignment only (not for the final paper), write in two spreadsheet formulas, in pencil, that you used to complete totals for the budget. (Of the form =c6+c7+c8 or = sum(c6:c8) with an arrow from the formula to the cell where it was used.)

Variable Assignment: NONE

B. Statistics Assignment: (8 problems. NOTE: do not take the time to verify statistics that B&B already gives you.)

Chapter 7 (B&B): Page 375, question 10

Page 377, question 16

Page 391, question 2

Chapter 8 (B&B): Page 411, question 10

Page 412, question 12

Page 421, question 10

Page 422, question 14

Page 469, question 6

Problem Set 5 (Chapter 9, sections 9.1 through 9.4; and Chapter 10)

A. Variable Assignment:

Consider your final project/paper for this course and the variables that you have defined. First, decide which variable could be considered a dependent variable. Then select one variable that might be an independent variable in a bivariate regression, and positively correlated with your dependent variable. In a short paragraph discuss these two variables, why you have selected them, and what you believe the regression line would look like (create an equation in words and draw a rough graph).

Second, find another independent variable that you believe could help predict your dependent variable above and is also positively correlated. In a second short paragraph describe the relationship you believe this variable has to your dependent variable. Which of the two independent variables do you believe has a greater influence on the dependent variable?

Third, identify and discuss a variable that you believe would be negatively correlated with your dependent variable (even if you don't have one in your final paper and have to make one up). Again draw a rough graph as part of your answer.

Again, if your research proposal is qualitative, create some variables that would be related to your topic if it were quantitative and do this assignment.

B. Statistics Assignment: (10 problems)

Chapter 9 (B&B): Page 494, question 2

Page 497, question 12

Page 511, questions 4, 6, and 8

Page 536, question 3

Page 569, question 13 (small sample) [Chapter 10 problems on next page]

Chapter 10 (B&B): Page 597, questions 8 and 10

Page 616, number 6; be sure to read the directions for parts a through e on page 614 and do these also.

[6] Methodology Articles

Note: This is a very small set of examples of research articles. Read these to get a sense of how researchers in information science report their results and use different methodologies to explore their research questions.

Surveys: Margaret Stieg Dalton and Laurie Charnigo. 2004. "Historians and Their Information Sources." *College & Research Libraries* 65 (5): 400-425.

Experiment with multiple treatments: William a. Orme. 2004. "A Study of the Residual Impact of the Texas Information Literacy Tutorial on the Information-Seeking Ability of First Year College Students." *College & Research Libraries* 65 (3): 205-215.

Pre-test/Post-test: James Nichols, Barbara Shaffer, and Karen Shockey. 2003. "Changing the Face of Instruction: Is Online or In-class More Effective?" *College & Research Libraries* 64 (5): 378-388.

Content analysis: Kristin Antelman. 2004. "Do Open-Access Articles Have a Greater Research Impact?" *College & Research Libraries* 65 (5): 372-382.

[7] Examples of Quiz Questions

Descriptive Statistics

Measures of Center

1. List the three measures of center that we have gone over in class.
 - a. _____
 - b. _____
 - c. _____
- d. Which measure of center is most sensitive to outliers (data points that fall far away from the center of the distribution)? _____
- e. If all three measures are numerically the same, what does this probably say about the shape of the distribution?

Measures of Spread

2. We have looked at standard deviation, variance, range, interquartile range, and min/max all as measures of the spread of a distribution. Answer these questions either with words or with a formula if you find that easier or more intuitive.
 - a. What is the relationship between standard deviation and variance?
 - b. What is the relationship between range and min/max?
 - c. What is the relationship between range and interquartile range?

- d. Give a one sentence definition for standard deviation? Give a second sentence or two to explain how you could use standard deviations from two different data sets to compare these sets. What would you be comparing in the two sets?

Exploratory Data Analysis

3. Greensmith College Study Groups

- a. Use the following data set to construct a stem-and-leaf diagram.

The following data points were collected at Greensmith College. They concern the number of hours that pairs of undergraduate students spent doing group projects in the campus library over the course of the last two months of the semester.

63	10	26	45	45	59	50	51	12	29	32	44
47	58	59	51	51	14	19	41	42	15	15	52
17	20	22	24	29	52	54	44	36	23	37	23
49	45	23	38								

- b. Create a box-and-whiskers plot for the Greensmith College data set.
- c. What informational differences are there between the stem-and-leaf and box-and-whiskers? What do you gain and lose between the two models? (Four or five sentences)
- d. Write a paragraph (5 or 6 sentences) describing the center, spread and shape of the data set. Be as numeric as you can given the information that you have. (Do not compute variance or standard deviation for this problem.)

Probability

Probability Matrix A displays data from the reading preferences assessment of four groups of adult readers (A, B, C, D). Individuals were asked to state their preference in type of reading materials by genre. Thus, 20 people in group A preferred novels, 4 preferred mysteries, and 1 preferred poetry. Use the matrix to answer questions a through e. Show your work for partial credit. Do not recompute fractions as decimals. Unsimplified fractions are sufficient.

- a. Compute marginals and n.

Probability Matrix A

	Novel	Mystery	Poetry
A	20	4	1
B	16	2	7
C	8	9	8
D	11	0	14

- b. $P(\text{novel, given A}) =$ _____

$P(\text{mystery, given C}) =$ _____

$P(\text{poetry, given B or D}) =$ _____

$P(\text{not novel, given A or C}) =$ _____

c. $P(\text{not novel and D}) = \underline{\hspace{2cm}}$

$P(\text{not C and mystery}) = \underline{\hspace{2cm}}$

$P(A, \text{ given novel}) = \underline{\hspace{2cm}}$

$P(D, \text{ given mystery or poetry}) = \underline{\hspace{2cm}}$

d. Compute $P(\text{mystery or novel})$ using the addition rule $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

e. Compute $P(\text{mystery and novel})$ using the multiplication rule $P(A \text{ and } B) = P(B) * P(A, \text{ given } B)$

Normal Distributions

For each of the following problems (1) draw a graphic, (2) compute Z score(s), and (3) find the indicated probability under the curve using the table provided. For all problems (a through f)

$\mu = 25$ and the $\sigma = 2.5$

$$z = \frac{x - \mu}{\sigma} \qquad z_{\bar{x}} = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$$

a. $P(x < 30)$

b. $P(30 < x < 35)$

c. $P(23 < x < 24)$

d. $P(23 < \bar{x} < 24)$ where $n = 9$

e. In two or three sentences explain why the probabilities in parts c and d are not the same.

Estimation

A group of graduate students has been asked to estimate the population parameter (μ) for number of hours that professors spend counseling students about their schedules. The students randomly polled 100 faculty members and found out that they had an average (\bar{x}) of 8.5 hours per week and a standard deviation (s) of 4 hours (sample statistic) among them.

- Using the data above create an 80% confidence interval for the true population parameter for the number of hours that faculty members spend counseling. Remember that a confidence interval is defined as the range from sample statistic minus an error term through the sample statistic plus the error term. Error in this case is defined as $E = t_c \frac{s}{\sqrt{n}}$

and $t_{0.80}$ is 1.292 for an 80 percent confidence level (d.f.=99).

- Compute the range of the confidence interval (max minus min): $\underline{\hspace{2cm}}$
- Now compute a 99% confidence interval for the same data. $T_{0.99}$ is 3.499 (d.f.=99) for a 99 percent confidence level.
- Compute the range of the confidence interval (max minus min): $\underline{\hspace{2cm}}$
- Explain in mathematical terms why the answers in #2 and #4 are not the same. What is the difference between an 80% and a 99% confidence interval in terms of the percentage that you wish to be WRONG?

Hypothesis Testing

Based upon a survey of special libraries in North America, the average budget was 67 thousand dollars a year, with a standard deviation of 3,600 dollars. A sample of 52 libraries in Massachusetts was examined which had an average budget of 59 thousand dollars. Conduct hypothesis tests to see if the Massachusetts budgets were significantly less than the national average.

1. State the null hypothesis:
2. State the research/alternate hypothesis:
3. Compute the test statistic for \bar{x} where $z_{\bar{x}} = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$
4. Find/estimate the p-value for the test statistic you calculated in #3 above _____
5. Would you reject or fail to reject your null hypothesis at an alpha of .01? _____
6. Would you reject or fail to reject your null hypothesis at an alpha of .05? _____
7. In two or three sentences explain in plain English what your findings mean.

Bivariate Regression

Answer the following questions about bivariate regression.

1. Identify the specified elements in the following bivariate regression equation.

$$Y = 3.6 - .5X$$

- a. Slope _____
- b. Sign of the slope _____
- c. Y intercept _____
- d. Independent variable _____
- e. Dependent variable _____
- f. For $x = 2$, predict y . $Y =$ _____
- g. If the r for this equation were calculated at .96, how much of the correlation between the two variables is explained by the equation? _____
- h. How much of the variability between the two variables is NOT explained? _____
- i. In the space below, draw an x/y axis and graph the line for this linear regression. Identify the two points with (x, y) coordinates. Make one of the points the y intercept.

Correlation and Regression short answers

One sentence answers, please.

1. What is the difference between correlation and regression?
2. What is the difference between bivariate and multivariate regression?
3. Why might you decide to eliminate one variable from a multivariate regression research project?
(There are many answers to this; give at least one reason)
4. Draw a picture of a positive correlation on an x/y axis. Label the axes and the y intercept. (You can do this without any numbers; just draw the line and an arrow to the intercept.)

A correlation matrix

Study the following correlation matrix and then answer the questions that follow.

	C1	C2	C3
C2	-.33		
C3	-.96	.22	
C4	-.33	.65	.72

1. The strongest correlation is between which two variables in the matrix? _____ and _____
2. The weakest correlation is between which two variables in the matrix? _____ and _____
3. Identify the correlation in the matrix that has an R^2 of approximately 50%. _____ and _____
4. Examining the matrix you note that variable C1 is negatively correlated with all the other variables. In two or three sentences explain what this means. You can give an example if you wish.
5. If you were to run a bivariate regression on any two variables in the matrix and you were looking for the greatest predictive power, which two variables would you use? Why?

Human Subjects Review Course (online from Miami)

<<http://www.citiprogram.org/>>

All 608 students are required to sign up for the Miami course and to take the first 4 modules for discussion in class during week 6 (6/22/09). The rest of the course is optional and will give you up to 4 points of extra credit for the course.

Extra credit option: In order to receive extra credit for this work, please take the modules required for University at Albany, and any other modules that look interesting to you. If you are in school media you will probably want to take modules that concern children as subjects of research.

After completing the Miami course (taking the quizzes is optional although you might enjoy testing your knowledge—they are at the end of the hypertext displays, not the printable text) write up a one page, double-spaced evaluation that addresses the following points:

- you did the course
- the additional modules you covered
- what was most helpful
- what was least helpful
- your recommendation for having future students do this training
- ease of reading
- interest level of materials
- likelihood that the materials could more effectively be treated through class discussion
- importance to your understanding of materials covered in 608

You may turn in this work (the one page evaluation together with your certificate of completion) any time but it must be submitted via the appropriate assignment drop box two weeks before the end of classes (the third to last class of the course).

Powell chapter key for second, third, and fourth editions

2 nd	3 rd	4 th	
1	1	1	Research and librarianship
2	2	2	Developing the research study
		3	Selecting the research method
3	3	4	Survey research and sampling
4	4	5	Data collection techniques
5	5	6	Experimental research
	6	7	Qualitative research
6	7	8	Historical research
7	8	9	Analysis of data
8	9	10	Writing the research proposal (in Blackboard)
9	10	11	Writing the research report

The 608 syllabus uses 4th edition numbers. Use the chart above depending upon which edition you own. Read “Qualitative research” particularly if your proposal for 608 is based on analyzing text rather than numbers.