**Sociology 103A: Statistical Methods**

**Course Outline -- Winter 2015**

**Class**: Tuesday and Thursday 8:00 - 9:45 a.m., at Humanity Lecture Hall 206.

**Instructor**: Hiroshi Fukurai, hfukurai@ucsc.edu

 **Office Hours:** Tuesday 2-5:00 p.m., and/or by appointment.

**TAs**:

Kati Barahona-Lopez, kvbaraho@ucsc.edu

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**Textbooks:**

Healey, Joseph F. 2012. *Statistics: A Tool for Social Research (****9th Edition****,* ***NOT 10th Edition****)*. Belmont, CA: Wadsworth/Thompson.

The text is available at **Literary Guillotine** at 204 Locust Street, Downtown Santa Cruz, 457-1195.

*Reader for Sociology 103A: SPSS, Data Sets, Codebook, and Statistical Analysis*. Available at the Literary Guillotine.

**Course Contents & Prerequisites:**

1. Team Assignment: All weekly assignments and credit works are turned in by a team of two students: (1) By Friday of the second week of the quarter (January 16th), you must determine your partner, preferably one in your TA section and notify your TA about the name of your partner. This team of students turns in one assignment every week; (2) Extra credit work (see below) is also turned in as a team effort, thereby receiving the identical credit for their work.
2. Extra Credit Work (see “**Extra Credit for the Course (5%)**“ below for full explanation): You can turn in up to 5 extra credit reports, i.e., one fully explained and elaborated work is worth 1% of a total grade. Suppose if your final standardized score is 88% and you turned in 5 fully elaborated, excellent analytic reports, your final score becomes 93% (88% plus 5%), and you receive a grade of A, instead of B+. Please take a full advantage of this extra credit work.
3. This class covers fundamental statistical concepts and applications, as well as both **descriptive and inferential** statistical analyses, including exploratory data analysis (EDA, such as stem-and-leaf, box-plot, etc.), **hypothesis testing** (i.e., chi-square and t distributions in one and multiple samples), ANOVA, and various **measures of association** (chi-square test of independence, lambda, gamma, correlation coefficient, bivariate & multiple regression, among many others). The course also covers **binomial probability** and **experiment**, the important statistical concept not traditionally covered in an introductory statistics course in behavioral sciences.
4. The Class Reader (available at the Literary Guillotine) provides important information which is not available in Healey's textbook, including three kinds of data sets you must use to complete your assignments: (1) **UC AFFIRMATIVE ACTION SURVEY**, (2) **CRIME, JUSTICE, & TRIAL**, and (3) **GENERAL SOCIAL SURVEY, 2010**. The reader provides original survey questionnaires, specific questions asked in the surveys, variable and value labels, and frequency distributions, as well as how to access these data sets, run statistical analysis, and obtain empirical outputs.
5. The Class Reader also provides information on binomial probability and distribution, and examples of binomial experiments. The Reader also provides schematic maps in connecting what you learned in lectures to what's been covered in the text and reader, as well as two empirical papers that examined juror representations in two prominent criminal cases in Santa Cruz and Mendocino counties, California, showing the actual application of statistical methods learned in the statistics course like this class.
6. The Class Reader also has a list of very useful distribution tables, including two Z (normal) probability distributions (one & two tailed), student t distribution, chi-square distribution, and F distribution. You may be asked to look at them during lectures, so please bring the reader with you to every lecture.
7. The Class Reader also has a User (or Training) manual for **PSPP** Statistical Program in Appendix 3. We no longer need to hand-calculate means or standard deviations. That’s why we use computers. PSPP is an open and free statistical software. While most weekly assignments require the use of **SPSS** available in computers at Ming Ong Lab (you can also purchase SPSS – Check IBM/SPSS online), some assignments also require you to run PSPP. So please download and install it in your computer (PSPP for mac: Click [here](http://mac.softpedia.com/get/Math-Scientific/PSPP.shtml); for PC, check [here](http://pspp.awardspace.com/) – or you can google it yourself and find out the most closest download site for download). In some exercises, you can use PSPP to compare the results produced by SPSS. Ideally both results should be identical, unless the use of options may differ between two softwares, which happens in some statistical options. Nonetheless, in many exercises, you may use PSPP to check and validate your results produced by SPSS.
8. Last Word on Team Collaboration: Oftentimes, some student complains the lack of effort by another student in their team. Please make sure that you develop a collaborative working relation with your partner, determine a time and space to get together, exchange findings and information on assignments or extra credit works, and work together to compose the final product. Your scores are based on the collaborative work product only, not on individuated opinions on atomized unequal work distribution.

**Course Requirement:**

1. Attendance: Both Attendance and participation in lectures and TA sections are **essential** for getting the most out of the course materials and thus those are **mandatory**. Each student must enroll in one of 10 TA sections, and missing two sections is grounds for not passing the course. Students who fail to attend lectures and participate in TA sections will thus fail the course.

2. Mid-term Exams and Final Exam: There will be two mid-term exams. Mid-term examinations will cover all the readings, lectures, and exercises in the section of the course immediately preceding the exam. The final examination will be comprehensive, covering all the materials in the course. There is **NO MAKE-UP EXAM**, unless a prior arrangement with an absolutely justifiable reason has been made with TA and an instructor well before a scheduled date of the exam. Then the test may be given prior to the scheduled data of the exam.

3. Homework Assignments: The assignment must be turned in by a team effort(see above). The assignment will cover questions in text, as well as exercises in computer data analyses. The homework assignment will place great emphasis on statistical procedures to generate empirical outputs and ways to interpret statistical results. Students must turn in their assignment on time to their TAs.

4. Computer Analysis: You use **SPSS**, a user-friendly statistical program for most assignments. The program is found in computers at Ming Ong Lab, and each student is required to learn the program, i.e., how to access data sets, choose appropriate statistical methods, run statistical analysis, generate necessary outputs, and interpret statistical results. As indicated earlier, you may also use **PSPP**, depending upon the assignment. Unless indicated in the assignment, you use SPSS for assignments and other data analysis. The more detailed information on how to run the program (SPSS and PSPP), access data, interpret results, etc., will be given in class. So don't need to worry.

**Evaluations:**

 Evaluations in the course will be based on the following elements: Attendance in class & TA section= 5%; Homework assignments =30%; First Mid-term exam=15%; Second Mid-term exam=20%; and Final Examination=30%. Extra-credit work may be available while doing your homework assignments (up to 5%).

**Lab Sections Attendance (10 TA sections):**

1. Enrollment: As stated earlier, each student must be enrolled in a TA section. Your attendance is required. The assignment instruction will provide you basic instructions on how to access SPSS and data sets, run appropriate statistical analyses, generate statistical outputs, and interpret the statistical results. TA also assists you in accessing and running the program.

2. Statistical Consultants -- Your TA or Instructor: Some statistical consulting on SPSS may be available at the Center for Statistical Analysis in Social Sciences (CSASS) ([here](http://csass.ucsc.edu/)). Your TA (some of them work at CSASS) plus an instructor will answer your questions on SPSS-related issues and problems.

3. TA Consulting Hours: All TAs will have a regular office hour every week. During the posted TA office hour, students are invited to bring in any problems or questions concerning homework assignments and/or reading materials. Please arrange your schedule so that you can see your TA if you need help.

4. TA section Schedules: You must be assigned to one of 10 TA sections at Ming Ong Lab. As stated earlier, the attendance is mandatory.

5. Switching a Section: If a student seeks to switch into a section that is already full, s/he may only do so by finding a student in that session who is willing to swap sections. In such a case, both students must go see Sociology Undergraduate Advisor Tina Nikfarjam and complete the swap during [drop-in advising hours](http://sociology.ucsc.edu/undergraduate/advising/index.html) or by appointment.

**Successful Class Preparation and Strategies for This Course:**

The following is a set of preparatory strategies to keep up with course materials, thereby making your learning experience an enjoyable and positive one. You must remember that one lecture more or less covers one chapter (in some weeks, two chapters in one lecture) and thus you must **keep up with your reading regularly**.

1. Attend all lectures and TA sections. All the materials covered in the course are cumulative – new knowledge is built upon previous materials covered in class. Thus, if you even miss one lecture, it would be equivalent to missing a whole week worth of materials.
2. Try to capture the concept. For example, what is sampling distribution? Or sampling distribution of sample means? Rather than trying to memorize how they are computed, please try to understand what they conceptually mean and how they are used in real examples. This is where your ability to capture and reconfigure abstract ideas into more simplified concept and concrete logic can greatly help you understand the materials. In doing so, you may skip some of the numerical examples – especially those with long and complicated equations or formulas.
3. Review the materials covered in class. Class lectures provide many examples and give you digested forms of complicated concepts or statistical logic. Make sure to go over lecture notes and go over examples until you understand the logic behind concepts or examples.
4. Complete practice problems on your assignments and make sure that you are able to understand the logic of what you are doing. While the assignment is completed on a student team effort, each student is expected to go over the assigned questions and SPSS exercises. Exam questions will ensure that you mastered the understanding of concepts and meaning of procedures behind statistical exercises.
5. Study for the exams by reviewing concepts and doing practice problems on assignments, textbook (see problems/exercises at the end of chapters), as well as examples and materials covered in class. THERE ARE NO SURPRISES in the exam!! Answers were provided to some of problems/exercises at the back of your text. If you would like additional problems and questions, please ask your TA or instructor.
6. Try to keep your mind focused on bigger questions and possible research inquiries. For example, what questions should I ask to examine possible gender bias in job hiring? What kind of statistical methods should I use to analyze people’s attitudes toward the use of CIA drones in Pakistan or Somalia? How can I generate empirical information to examine relations between racial identity and college admission? To whom should I direct such questions and what kind of statistical methods should I employ to examine such a relationship? In other words, statistical methods may remain useless until you propose critical questions that you want to examine and analyze. Be cognizant of social and political realities that we all inhabit and be ready to apply your statistical skills to deconstruct realities from empirically-informed critical perspectives.
7. Statistical skills may help you analyze realities in a critical way. Refine your statistical knowledge and computer skills using SPSS & PSPP. There are many more innovative ways to analyze and establish data sets, create new data sets for your own research, merge and purge data sets, etc. You may explore those options in order to refine and improve your statistical skills and empirical imagination.

**Extra Credit for the Course (5%):**

Statistical figures and analyses are used daily for multiple purposes. Now this extra credit assignment will give you up to 5% towards your final grade. Please watch the following program, *Democracy Now!* (one-hour weekday global news program available online here, or [www.democracynow.org](http://www.democracynow.org)), identify two statistical figures used in their reports **in the same week**, examine what they are (i.e., a total sum, means, proportions/percentages, ratios, what-ever coefficients, or else) and who computed them (polling institutes, news agencies, census bureau, foreign governments, etc.) for what purpose (opinion surveys, institutional research, interviews, etc.), and whether or not these reported figures are correct (i.e., you need to find the source where empirical figures first originated, and assess any disclaimer(s) or different figures, if any), and provide a one-page, single-spaced synopsis on the backgrounds on the topics related to the numerical figures. The report must turn **every Tuesday morning at 8 a.m. in class**. You see some of examples below.

Example of Elaboration:

1. DN show (October 7, 2014, [here](http://www.democracynow.org/blog/2014/10/7/ferguson_october_youth_organizers_plan_weekend)) quoted President Obama’s speech that “One recent poll showed that the majority of Americans think the criminal justice system doesn’t treat people of all races equally. … That’s not just blacks, not just Latinos or Asians or Native Americans saying things may not be fair; that’s most Americans.” If you decided to examine this poll result as **one of two statistical figures** to compose a weekly report, you need to check the accuracy of his speech, i.e., which opinion poll his assertion came from, sample size, actual percentage based on race/ethnicity, or other cognizable categories, or a margin of error (you will learn what it is and how to compute it), and elaborate why Obama used these figures and what these numbers mean in U.S. race relations.
2. Recent DN show (Nov. 11, 2013, check [here](http://www.democracynow.org/2013/11/11/the_untold_story_of_war_us)) indicated that everyday, 22 veterans commit suicide, according to the “2012 Department of Veterans Affairs report.” You obtain an original DVA report ([here](http://www.va.gov/opa/docs/suicide-data-report-2012-final.pdf)), verify a statistical figure, explain how the “average” was computed, plus any other new figures (suicide rate based on gender, or varied war-experiences – Vietnam, first Persian-Gulf, Afghanistan, Iraq, etc), plus any disclaimers (from other sources) and any other relevant information (i.e., suicide among active soldiers or general population, etc.), and finally elaborate any socio-political ramifications that this figure represents in U.S. foreign policies overseas.
	1. Another DN show (November 24, 2014) reported that a CNN poll said “82% of the U.S. public disapproved of continued war in Afghanistan.” You may find where the figure came from, the poll’s sample size, an actual question posed to respondents, and margin of error, any more recent figure on the issue (by other news/polling agencies), any disclaimers, and what the figure means in the U.S. foreign policy in Afghanistan.
3. In a DN show (October 28, 2014, [here](http://www.democracynow.org/2014/10/28/monsanto_bigag_spend_millions_to_fight)), Sheldon Krimsky, co-editor of the new book, *The GMO Deception: What You Need to Know About the Food, Corporation and Government Agencies Putting Our Families and Our Environment at Risk* (2014), said, recent poll showed that “most consumers feel there should be labeling on GMOs to give them a choice,” and warned the danger of GMO food for both humans and environment. You may find out where the poll figure came from, i.e., agency(ies) that took the poll, the population from which sample is taken (adults, or residents of some states, special consumers, or else), sample size, margin of error, including any other opinion polls and figures on the same issue. Lastly, you may explain why the GMO issue is (or is not) important and why public opinion was taken for what purpose.
4. In last month’s DN show (December 23, 2014, check [here](http://www.democracynow.org/shows) for archive), Col. Lawrence Wilkerson, former chief of staff to Secretary of State Colin Powell, said that 39 detainees “died in detention” and many of them were killed by torture. You may investigate where the figure came from, by whom and what method(s) (direct observations, hear-say, or else) the figure was generated, and what that number means in today’s government’s “war on terror” policy. You may also elaborate the legality on the use of so called “enhanced interrogation techniques” (aka torture) based on the international law, and explain the reason for its continued use in the U.S. military prisons overseas (called black sites).
5. After Edward Snowden revealed a massive NSA surveillance in June 2013, a DN program on Feb. 11, 2014 ([here](http://www.democracynow.org/2014/2/11/the_day_we_fight_back_activism)) interviewed Rainey Reitman, an activism director of the Electronic Frontier Foundation, who said “we have polls of public opinion showing overwhelming the [sic] American people do want reform [which leads to] … privacy protections for people [domestic and] overseas.” You may elaborate where the polls came from, and their results, plus socio-political ramifications of NSA massive surveillance in the U.S. and abroad.

You may turn in your first report on **Jan. 20th** (Tuesday on 3th week) and last report on **March 10th** (Tuesday on 10th week). You can turn in a max of 5 reports for the quarter. As stated earlier, your report is a product of your team effort, must examine two figures from DN report(s) for the same week, and provide your careful and thoughtful elaboration of these figures and their socio-political implications.

COURSE SCHEDULES

Week 1: Overview of the Course & the Introduction

 Chapter 1: What is Statistics?

 Chapter 2: Basic Descriptive Statistics

Week 2: Numerical Description of Data

 Chapter 3: Measures of Central Tendency

 Chapter 4: Measures of Dispersion

Week 3: Normal Curve and Z scores, Binomial and "Normal" Probabilities

 Reader: Binomial Probability -- What is probability – A useful discrete variable

 Chapter 5: Normal Curve: Probability and Z scores

Week 4: Estimation and Inference

 Chapter 6: Introduction to Inferential Statistics: Sampling Distribution

 Chapter 7: Estimation Procedures

Week 5: Hypothesis Testing (1): One Sample & Two Samples

 Chapter 8: Statistical Tests of Hypotheses: One Sample

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First Mid-Term Exam – February 3 (Tuesday)

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Week 6: ANOVA and Cross-Classified Data Analysis

 Chapter 9: Hypothesis: Two Samples

 Chapter 10: Analysis of Variance (ANOVA)

Week 7: Cross-Classified Data Analysis (1): Nominal & Ordinal Levels

 Chapter 11: Chi-Square

 Chapter 12: Measures of Association: Nominal Variables

Week 8: Cross-Classified Data Analysis (2): Ordinal and (3) Interval-Ratio Levels

 Chapter 13: Measures of Association: Ordinal Variables

 Chapter 14: Measures of Association: Interval-Ration Variables

Week 9: Measures of Association: Multiple Regression

 Chapter 15: Elaborating Bivariate Table

 Chapter 16: Partial Correlation and Multiple Regression

Week 10: Putting All Together

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Second Mid-Term Exam – March 12 (Thursday)

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Final's Week

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Final Exam – March 17: 8-11 a.m. (Tuesday)

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