INTRODUCTION TO STATISTICS FOR HEALTH SCIENCES
COURSE SYLLABUS - FALL 2016

INSTRUCTOR: **Dorina Kallogjeri**
TEACHING ASSISTANT: **Melissa Krauss**

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COURSE TIMES and LOCATION

Thursdays 4:30 -7:00
Location: Wohl Auditorium

Course Objectives: This is a basic course in statistics with particular focus on the health sciences. It is taught in a user-friendly manner with exposure to SPSS, one of the most frequently used statistical analysis software programs in clinical research. The course will teach basic statistical methods in which clinical researchers should have facility to execute their own analyses. This includes generation of descriptive statistics, correlations, t-tests, Chi-square tests, analysis of contingency tables, one-way ANOVA, and simple regression. The course will also introduce additional statistical methods about which clinical researchers should be knowledgeable, including multiple linear regression, logistic regression, and survival analysis. The more advanced topics are covered in greater depth in the second semester of this course sequence. Classes will include presentation of statistical concepts underlying specific procedures, and discussion of circumstances under which a procedure is and is not appropriate. Classes will also include demonstration of statistical procedures, and interpretation of program output. Homework and class exercises will involve executing statistical procedures covered in class with sample data sets, and interpreting the results.

Specific learning objectives:
1) Know how to select, calculate, and report the appropriate descriptive statistics in order to create descriptive tables and graphs typical in research publications.

2) Understand the principles of hypothesis testing, probability, sampling, statistical power, and when to use the different statistical tests.

3) Know how to conduct, and interpret results of basic statistical tests assessing associations and differences between variables of interest (t-tests, ANOVA, chi-square, non-parametric, correlation, and regression).

4) Be familiar with the appropriate use and interpretation of more advanced statistical tests (multiple regression, logistic regression, basic survival analysis).

5) Be proficient enough with SPSS software to conduct basic statistical tests and generate relevant results (output) and syntax related to the objectives listed above.

Textbook, Sample data

The required textbook is Marcello Pagano and Kimberlee Gauvreau, Principles of Biostatistics, 2nd edition (Duxbury, 2000).

The text comes with a data disk which you will need to complete some of the assignments. This data is also available on the book's companion website, which you can locate by searching for Pagano at: http://www.cengage.com/highered/

SPSS software

IBM-SPSS statistics software **is required** for this class. Completing class assignments often requires the use of SPSS software. Bringing a laptop with SPSS to class is encouraged. At a minimum you will need the SPSS Graduate Pack, which is a fully functioning version of the software, discounted for students (available from many online retailers including onthehub.com, studentdiscounts.com and academicsuperstore.com). It includes regression and survival analysis options not available in the base module, does not limit the number of variables or cases that can be analyzed, and allows the user to write or paste syntax for later use.

SPSS tutorials are available online:
 http://www.ats.ucla.edu/stat/SPSS/
http://bama.ua.edu/~jhartman/689/instructions.html

Optional Books that help you with SPSS use for assignments:
Discovering Statistics Using IBM SPSS Statistics by Andy Field. (any edition)
SPSS survival Manual: A Step by Step Guide to Data Analysis Using SPSS for Windows by Julie Pallant (3rd edition, McGraw-Hill, 2007)

Calculator

You should bring an electronic calculator to class because some lectures will include exercises which are facilitated by use of a calculator.

Grading Policy

Grades will be awarded based on in-class examinations and homework. The grading scale will be approximately as follows:

Grades/sub-grades			
A+ (98% to 100%)	B+ (88% to 89%)	C+ (77% to 79%)	D: 69.49% to 59.50%
A (93% to 97%)	B (83% to 87%)	C (73% to 77%)	F: 59.49% to 0%
A- (90% to 92%)	B- (80% to 82%)	C- (70% to 72%)	

Homework: 40% (8 assignments, 5 points each)
Midterm: 30%
Final: 30%

Homework
Doing homework assignments is the best preparation for the exams and the quickest way to become fluent in using statistics and SPSS software. Completed homework should be printed, stapled, and labeled and is due at the beginning of class (first 15 minutes). The TA will collect homework and distribute graded work at the start of class. There is no credit given for late homework. If you are not going to be in class, please e-mail TA to turn in your homework early or ask a classmate to turn in a printed copy for you. Students will be more prepared for lectures if they complete the reading assignments before class.

Most homework exercises will require you to execute one or more statistical procedures using SPSS, interpret program output, and write up the results. The procedures you will run will be ones that have already been covered in class. To be complete, exercises will require that you turn in printed or typed answers to each question, including references to the appropriate tables and formulas used in your analyses or a copy of the syntax used to produce the results.
Homework questions may require thoughtful interpretation of the program output, and substantive conclusions that might be drawn from the analysis. For example, an exercise might ask you to run a t-test comparing alcohol consumption among male and female college students. The questions that follow might be: **What were the results of the t-test? What conclusions should you draw from the analysis?** These are two separate questions: the first asks you to interpret the output, and the second asks you to draw a conclusion from that interpretation of the output. A sample answer to the first question might be: **Results of the t-test were significant, t (48) = 3.642, p < .001, indicating that males consumed more alcoholic beverages than females (8.42 vs. 4.94 drinks per week).** Depending on the research question, however, the substantive conclusions may vary. For example, if the question was framed in terms of finding out where to target prevention efforts, your conclusion might state: **These results suggest that interventions to reduce drinking among college age students should be focused on males.** On the other hand, if the question was about how to target alcoholic beverage advertisements, the conclusion might be: **These results suggest that advertisements will reach a larger market if directed at males.**

As in the example above, a complete answer requires that you show that you knew what numbers or statistics in the program output to interpret. You should cite the value of test statistics, probability levels, and effect size to determine what the results mean (e.g., proportion difference, mean difference, Cohen's d etc.). Vague answers such as, **We know that the males drank more because p < .05**, although they may be technically correct, don't demonstrate that you really know how to interpret the output.

Learning statistics is all about doing statistics, making mistakes and correcting those mistakes. Therefore we encourage you to complete all the homework even if you are not sure you are doing it correctly; you will get partial credit for any reasonable attempt to do the homework.
 Because statistics is often done in collaboration, we encourage you to discuss your assignments with others; however, each student must turn in individual assignments. The midterm and final must be completed independently.

Class materials
All class materials slides, data sets, and other course materials will be posted to Blackboard
https://bb.wustl.edu before class. You will need a login and password.

Office hours:
We will try to include a block of 15-30 minutes at the end of each class for questions and brief consultations. If you need help with class material or have questions about assignments outside class hours, contact the teaching assistant by email kraussm@psychiatry.wustl.edu; If you have a larger concern, email the instructor directly (kallogjerid@ent.wustl.edu). We will take questions during lectures, but may ask you to hold a question until the end of class if it seems not to be relevant to most of the students.

Exams
Exams will emphasize your understanding of statistical concepts, relationships among concepts, assumptions that underlie the use of statistics, and conditions under which the use of each statistical procedure is appropriate. Exam questions will emphasize understanding and using statistical terminology, knowing the correct analytical approach for a statistical problem, and interpreting SPSS output. You will not run SPSS analysis during exam. Some calculations may be required, and you can use an electronic calculator for these. The exams are not cumulative, but understanding of the material is.

The midterm and final will be done in class. Exams will be open-book, so you can use your class notes and other materials to answer the questions. However, time will be limited so you must have a good grasp of the material in order to complete the exams in the time allotted. Exams must be completed individually and without assistance; any violation of this rule will be considered plagiarism and appropriate disciplinary actions taken.
 If you cannot take the midterm or final on the day indicated, please contact the instructor (Dorina) at least two weeks in advance to make alternative arrangements.

Disability policy
Washington University is committed to providing accommodations and/or services to students with documented disabilities. Washington University's Cornerstone: Center for Advanced Learning Disability Resources is the University's official resource for students with disabilities and students with suspected disabilities. DR assists students with disabilities by providing guidance and accommodations to ensure equal access to our campus, both physically and academically. To learn more about its services, initiate the process of formal documentation and/or to arrange for accommodations, please contact Disability Resources http://cornerstone.wustl.edu/DisabilityResources.aspx at the start of the semester.

Class Attendance
In class participation is an important part of the coursework taken as part of the MSCI and the clinical research training programs within the CRTC. As a MSCI and CRTC program requirement, students are expected to physically attend at least **75% of class sessions** for each course they take. Students whose professional duties or personal circumstances prevent them from meeting this program attendance requirement must receive prior written approval of the instructor, and agree on an alternate plan to achieve course objectives and earn academic credit.

Lecture Schedule

Class	Date	Topic	Assignments*
1	09/01/2016	Populations & Samples, types of data. Basics of Data collection and data entry. Descriptive statistics.	Ch. 1-3 (skip 3.3, 3.4)
2	09/08/2016	Rates and standardization; Intro to probability	Ch.4,6
3	09/15/2016	Probability distributions, Sensitivity and Specificity. Sampling distribution of the mean	**HW 1 due** Ch. 7,8
4	09/22/2016	Confidence intervals; hypothesis testing	**HW 2 due** Ch. 9,10
5	09/29/2016	Comparison of means	Ch. 11-12
6	10/06/2016	Comparison of proportions; 2x2 tables	**HW 3 due** Ch. 14-15
7	10/13/2016	Multiple contingency tables Review for midterm	**HW 4 due** Ch. 16
8	**10/20/2016**	**IN-CLASS MIDTERM**	
9	10/27/2016	Nonparametric statistics	Ch. 13
10	11/03/2016	Correlation; Simple regression	**HW 5 due** Ch. 17-18
11	11/10/2016	Multiple regression	Ch. 19
12	11/17/2016	Logistic regression	**HW 6 due** Ch. 20
	NOV 24	**NO CLASS: Thanksgiving**	
13	12/01/2016	Survival analysis; Life tables	**HW 7 due** Ch. 5, 21
14	12/08/2016	Sampling theory; power calculations; review for final	**HW 8 due** Ch. 22
15	**12/15/2016**	**IN-CLASS FINAL EXAM**	

*Please read assigned chapters before the lecture. Printed homework is due at the start of each lecture.