

STATISTICAL APPROACHES FOR DEVELOPMENT AND FAMILY RESEARCHERS

Lecture: Room G401 Lilly Hall of Life Sciences (LILY)
Tuesday & Thursday, 3:00 – 4:15 p.m.

Lab: Room 277 Stanley Coulter Hall (SC)
Wednesday, 9:30 – 10:20 a.m.

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Class Website: <http://itap.purdue.edu/tlt/blackboard/>

The course webpage is hosted by Blackboard Learn. When you login to Blackboard you should automatically have access to the webpage. The webpage will contain: overheads from presentations given in lecture, in-class exercises, lab assignments and data sets, homework assignments, supplemental readings, exam review sheets, etc.

Required Texts:

Frankfort-Nachmias, C., & Leon-Guerrero, A. (2011). Social statistics for a diverse society (6th ed.). Thousand Oaks, CA: Pine Forge Press. (**referred to as SSDS in the schedule**)

Cardinal, R. N., & Aitken, M. R. F. (2006). ANOVA for the behavioural sciences researcher.

Mahwah, NJ: Lawrence Erlbaum Associates. (**referred to as ANOVA in the schedule**)

Course Description and Objectives:

This course is designed to provide you with a basic understanding of foundational concepts and tools used in statistical analysis in the behavioral sciences, with a focus on analysis of experimental data. While theoretical and mathematical basics of statistical methods will be covered, emphasis is placed on the conceptual and interpretive understanding of the methods. The first half of the course covers a broad range of topics, including: probability, central tendency, variability, the normal distribution, sampling and sampling distributions, estimation, hypothesis testing, association, regression & correlation, experimental designs, and reliability & validity. The second half of the course is focused on ANOVA modeling. The point is for students to develop an ability to apply these statistical methods to their substantive research questions and to understand and communicate their meaning.

Learning objectives:

- Develop a basic understanding of probability, sampling, and inferential theory underlying statistical methods
- Formulate testable hypotheses
- Apply proper statistical tests to evaluate hypotheses
- Properly interpret the statistical estimates and tests that we cover in the course
- Run data analysis using SPSS and SAS statistical software
- Improve analytic and critical thinking skills
- Improve written and verbal communication of analytic results
- Understand ANOVA modeling methods
- Use statistical methods to test research questions using real data and statistical software

Communication:

The course has a listserv, which I frequently use to communicate with the class. Updates and reminders on upcoming readings and homework assignments are provided through email. Changes to the schedule are also provided this way. Students may communicate with the class via the listserv. It is often a good tool to ask questions when they may be useful to others students. (Note that your email address will be made available to the class when you use the listserv.)

Course Components:

Readings: Reading assignments include readings from the required texts as well as supplemented course readings which will be provided on the course webpage. Reading assignments will be given during class and through the listserv. While reading about statistics may be unappealing, it should greatly help with your understanding of the material presented in class. Therefore, I encourage you to keep up with the reading as best you can. It is best to read statistics in shorter sections rather than reading through entire chapters in one sitting.

Homework: There will be approximately five homework assignments over the course of the semester. These generally will involve application of class topics to real data using statistical software. The focus will be on proper application and interpretation of statistical analyses, but will also include some calculations and problem solving. You may work together with others on assignments, but you should produce your own assignment, particularly with respect to written components. Homework will account for 20% of your final grade.

Computing Lab Participation & Assignments: Attendance at computing labs is required. There will be an in-lab assignment most weeks. Sometimes this can be completed during the lab, but often you will need to finish it up on your own time. You are encouraged to work together on lab assignments, but turn in an individual product. Computing lab participation and assignments will account for 20% of your final grade. You may miss up to two labs and two lab assignments without penalty.

Statistical Software: We will learn how to analyze data using SPSS and SAS. These packages will be used for lab assignments and most of the homework assignments. These packages are available in all ITaP instructional labs across campus as well as through software remote. SAS and SPSS software may be purchased through Purdue Software Distribution for your personal computers.

Exams: There are two exams during the course of the semester. Each exam will represent 20% of your final grade. A major component of the exams will be interpretation of statistics we learn about in the class in short answer format.

Final Paper: There is a final research paper for this course. The paper will focus on methods and therefore will not include a full literature review. The paper will include a short introduction, a description of the questions and hypotheses to be tested, a detailed description of the methods used, a detailed description of the results, and conclusions. You may use a data set of your choosing. I will ask that you choose a data set about two-thirds the way through the semester. The final paper will represent 20% of your final grade.

Grading: Your grade will be weighted based on the following course component percentages:

| | |
|--------------|-----|
| Homework: | 20% |
| Exam I: | 20% |
| Exam II: | 20% |
| Final Paper: | 20% |
| Lab: | 20% |

Final grades will be assigned according to the following scale:

| | | |
|----|-------|-----|
| A: | > | 90% |
| B: | 80% - | 89% |
| C: | < | 80% |

Academic Integrity:

Students are advised to familiarize themselves with the University's regulations regarding student conduct in academic endeavors. This information is located at the following website: http://www.purdue.edu/univregs/pages/stu_conduct/stu_regulations.html. Students who are suspected to be in violation of the University's regulations regarding academic dishonesty, including but not limited to plagiarism and cheating, will be dealt with in accordance with University policy. This may result in a referral to the Office of the Dean of Students and penalties for the assignment(s) in question.

Campus Emergencies:

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. I will try to send out messages through the class listserv regarding emergencies affecting our class. Also, get information about changes in this course on the course Blackboard web page or email me at slchrist@purdue.edu.

Emergency information and updates will be posted on Purdue's homepage at <http://www.purdue.edu>. Students should sign up for emergency text messages here: <http://www.purdue.edu/securepurdue/>. Also, the following webpage details university policies and procedures during various emergency events: https://www.purdue.edu/emergency_preparedness/flipchart/index.html.

Schedule:

The tentative schedule of topics and readings is provided below. There will inevitably be changes to this schedule and specific readings throughout the semester. I will provide updated schedules as we move through the course topics.

Tentative Schedule

| Week | Topics Covered | Readings |
|--------------|--|--|
| Aug. 20 & 22 | Course Overview and Basic Concepts Describing & Exploring Data: Frequency Distributions | Thompson, pp. 1 – 13 SSDS ^a , chapters 1 - 2 |
| Aug. 27 & 29 | Describing & Exploring Data: Graphics & Central Tendency | SSDS ^a , chapters 3 - 4 |
| Sept. 3 & 5 | Describing & Exploring Data: Variability The Normal Distribution | SSDS ^a , chapters 5 - 6 |

Tentative Schedule Continued

| Week | Topics Covered | Readings |
|----------------|--|--|
| Sept. 10 & 12 | Basic Probability Concepts Sampling Distributions and Estimation (Inference) | Walsh, pp. 55 – 61 SSDS ^a , chapters 7 - 8 |
| Sept. 17 & 19 | Hypothesis Testing Effect Size and Power of a Test | SSDS ^a , chapter 9 Howell, pp. 229 - 238 |
| Sept. 24 & 26 | Cross Tabulation and the Chi-Square | SSDS ^a , chapters 10 - 11 |
| Oct. 1 & 3 | Measures of Association: Lamda, Gamma, Correlation & Regression | SSDS ^a , chapters 12 - 13 |
| Oct. 8 | FALL BREAK – NO CLASS | |
| Oct. 10 | Review for Exam I | |
| Oct. 15 | EXAM I | |
| Oct. 17 | Simple ANOVA | SSDS ^a , chapter 14 ANOVA ^b , chapter 1 |
| Oct. 22 & 24 | Simple ANOVA Multiple Testing, Error and Power of the Test | TBD |
| Oct. 29 & 31 | FACTORIAL ANOVA | TBD |

Tentative Schedule Continued

| Week | Topics Covered | Readings |
|----------------|--|-----------------|
| Nov. 5 & 7 | Repeated Measures ANOVA | TBD |
| Nov. 12 & 14 | ANCOVA | TBD |
| Nov. 19 | GLM: the General Linear Model | TBD |
| Nov. 21 | Review for Exam II | TBD |
| Nov. 26 | EXAM II | |
| Nov. 28 | THANKSGIVING BREAK – NO CLASS NO LAB ON Nov. 27 | |
| Dec. 4 & 6 | Catch – Up | |
| Dec. 11 | FINAL PAPER DUE BY 5 P.M. | |

^a Frankfort-Nachmias, C., & Leon-Guerrero, A. (2011). Social statistics for a diverse society (6th ed.). Thousand Oaks, CA: Pine Forge Press.

^b Cardinal, R. N., & Aitken, M. R. F. (2006). ANOVA for the behavioural sciences researcher. Mahwah, NJ: Lawrence Erlbaum Associates.