

COURSE CHANGE FORM

Complete 1a – 1f & 2a – 2c. Fill out the remainder of the form as applicable for items being changed.

1. General Information.						
a.	Submitted by the College of: <u>Arts and Sciences</u>	Today's Date: <u>8/30/2011</u>				
b.	Department/Division: <u>Psychology</u>					
c.	Is there a change in "ownership" of the course?				YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
	If YES, what college/department will offer the course instead? _____					
d.	What type of change is being proposed? <input checked="" type="checkbox"/> Major <input type="checkbox"/> Minor ¹ (place cursor here for minor change[OSC1] definition)					
e.	Contact Person Name: <u>Betty Lorch</u> <u>Robert Lorch</u>	Email: <u>elorch@uky.edu</u> <u>rlorch@uky.edu</u>	Phone: <u>257-6850</u> <u>257-6826</u>			
f.	Requested Effective Date: <input type="checkbox"/> Semester Following Approval	OR	<input checked="" type="checkbox"/> Specific Term ² : <u>Summer</u>			
2. Designation and Description of Proposed Course.						
a.	Current Prefix and Number: <u>PSY 216</u>	Proposed Prefix & Number: <u>same</u>				
b.	Full Title: <u>Applications of Statistics in Psychology</u>	Proposed Title: <u>same</u>				
c.	Current Transcript Title (if full title is more than 40 characters): _____					
c.	Proposed Transcript Title (if full title is more than 40 characters): _____					
d.	Current Cross-listing: <input checked="" type="checkbox"/> N/A	OR	Currently ³ Cross-listed with (Prefix & Number): _____			
	Proposed – <input type="checkbox"/> ADD ³ Cross-listing (Prefix & Number): _____					
	Proposed – <input type="checkbox"/> REMOVE ^{3,4} Cross-listing (Prefix & Number): _____					
e.	Courses must be described by <u>at least one</u> of the meeting patterns below. Include number of actual contact hours⁵ for each meeting pattern type.					
Current:	<u>3</u> Lecture	<u>2</u> Laboratory ⁵	_____ Recitation	_____ Discussion	_____ Indep. Study	
	_____ Clinical	_____ Colloquium	_____ Practicum	_____ Research	_____ Residency	
	_____ Seminar	_____ Studio	_____ Other – Please explain: _____			
Proposed:	<u>3</u> Lecture	<u>2</u> Laboratory	_____ Recitation	_____ Discussion	_____ Indep. Study	
	_____ Clinical	_____ Colloquium	_____ Practicum	_____ Research	_____ Residency	
	_____ Seminar	_____ Studio	<u>4</u> Other – Please explain:	<u>4 other when taught online ;</u> <u>3 lec/2 lab when taught in class</u>		
f.	Current Grading System: <input checked="" type="checkbox"/> Letter (A, B, C, etc.)	<input type="checkbox"/> Pass/Fail				
	Proposed Grading System: <input checked="" type="checkbox"/> Letter (A, B, C, etc.)	<input type="checkbox"/> Pass/Fail				

¹ See comment description regarding minor course change. *Minor changes are sent directly from dean's office to Senate Council Chair.* If Chair deems the change as "not minor," the form will be sent to appropriate academic Council for normal processing and contact person is informed.

² Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.

³ Signature of the chair of the cross-listing department is required on the Signature Routing Log.

⁴ Removing a cross-listing does not drop the other course – it merely unlinks the two courses.

⁵ Generally, undergrad courses are developed such that one semester hr of credit represents 1 hr of classroom meeting per wk for a semester, exclusive of any lab meeting. Lab meeting generally represents at least two hrs per wk for a semester for 1 credit hour. (See SR 5.2.1.)

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g.	Current number of credit hours: <u>4</u>	<i>Proposed number of credit hours:</i> <u>no change</u>	
h.	Currently, is this course repeatable for additional credit?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
	<i>Proposed to be repeatable for additional credit?</i>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
	<i>If YES: Maximum number of credit hours:</i> _____		
	<i>If YES: Will this course allow multiple registrations during the same semester?</i>	YES <input type="checkbox"/>	NO <input type="checkbox"/>
i.	Current Course Description for Bulletin:	<u>An introduction to statistical procedures used in making decisions based on psychological data. May not be used to satisfy the laboratory requirement in the College of Arts and Sciences.</u>	
	<i>Proposed Course Description for Bulletin:</i>	<u>same</u>	
j.	Current Prerequisites, if any:	<u>PSY 100 or equivalent, and PSY major or consent of instructor</u>	
	<i>Proposed Prerequisites, if any:</i>	<u>same</u>	
k.	Current Distance Learning(DL) Status:	<input type="checkbox"/> N/A <input type="checkbox"/> Already approved for DL* <input checked="" type="checkbox"/> Please Add ⁶ <input type="checkbox"/> Please Drop	
	*If already approved for DL, the Distance Learning Form must also be submitted <u>unless</u> the department affirms (by checking this box <input type="checkbox"/>) that the proposed changes do not affect DL delivery.		
l.	Current Supplementary Teaching Component, if any:	<input type="checkbox"/> Community-Based Experience <input type="checkbox"/> Service Learning <input type="checkbox"/> Both	
	<i>Proposed Supplementary Teaching Component:</i>	<input type="checkbox"/> Community-Based Experience <input type="checkbox"/> Service Learning <input type="checkbox"/> Both	
3.	Currently, is this course taught off campus?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
	<i>Proposed to be taught off campus?</i>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
4.	Are significant changes in content/teaching objectives of the course being proposed?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
	If YES, explain and offer brief rationale: _____		
5.	Course Relationship to Program(s).		
a.	Are there other depts and/or pgms that could be affected by the proposed change?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
	If YES, identify the depts. and/or pgms: _____		
b.	Will modifying this course result in a new requirement⁷ for ANY program?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
	If YES ⁷ , list the program(s) here: _____		
6.	Information to be Placed on Syllabus.		
a.	<input type="checkbox"/> Check box if changed to 400G or 500.	If <u>changed to</u> 400G- or 500-level course you must send in a syllabus and <i>you must include the differentiation</i> between undergraduate and graduate students by: (i) requiring additional assignments by the graduate students; and/or (ii) establishing different grading criteria in the course for graduate students. (See SR 3.1.4.)	

⁶ You must *also* submit the Distance Learning Form in order for the course to be considered for DL delivery.

⁷ In order to change a program, a program change form must also be submitted.

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Signature Routing Log

General Information:

Course Prefix and Number: PSY 216 (adding DL option)

Proposal Contact Person Name: Betty Lorch Phone: elorch@uky.edu Email: elorch@uky.edu
Robert Lorch rlorch@uky.edu rlorch@uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
Department of Psychology	April 2011 and 8/15/2011	Rich Milich / 7-4396 / milich@uky.edu	
A&S Undergraduate Program	9/15/11	Anna Bosch / 7-6689 / bosch@uky.edu	
		/ /	
		/ /	
		/ /	

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision ⁸
Undergraduate Council	2/14/2012	Sharon Gill	
Graduate Council			
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

⁸ Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

Distance Learning Form

This form must accompany every submission of a new/change course form that requests distance learning delivery. This form may be required when changing a course already approved for DL delivery. **All fields are required!**

Introduction/Definition: For the purposes of the Commission on Colleges Southern Association of Colleges and Schools accreditation review, *distance learning* is defined as a formal educational process in which the majority of the instruction (interaction between students and instructors and among students) in a course occurs when students and instructors are not in the same place. Instruction may be synchronous or asynchronous. A distance learning (DL) course may employ correspondence study, or audio, video, or computer technologies.

A number of specific requirements are listed for DL courses. **The *department* proposing the change in delivery method is responsible for ensuring that the requirements below are satisfied at the individual course level.** It is the responsibility of the instructor to have read and understood the university-level assurances regarding an equivalent experience for students utilizing DL (available at <http://www.uky.edu/USC/New/forms.htm>).

Course Number and Prefix: PSY 216	Date: 08/05/2011
Instructor Name: Elizabeth Lorch or Robert Lorch	Instructor Email: elorch@email.uky.edu or rlorch@email.uky.edu
Check the method below that best reflects how the majority of course of the course content will be delivered.	
Internet/Web-based <input checked="" type="checkbox"/>	Interactive Video <input type="checkbox"/>
Hybrid <input type="checkbox"/>	

<i>Curriculum and Instruction</i>	
1.	<p>How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?</p> <p>A major component of this course will be for students to complete exercises to aid in the understanding of statistical concepts. Students will have opportunities to interact with one another as they complete these exercises, and many will be done with instructor guidance at scheduled chat times. Blackboard discussion board will support asynchronous communication and AdobeConnect will support regular synchronous meetings. The syllabus will adhere to all University Senate Guidelines.</p>
2.	<p>How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc.</p> <p>The course objectives and text will be the same as in the classroom-based course. The nature of exercises, homework assignments, and exams will be maintained at the same level of rigor as in the classroom-based course; the online version will incorporate increased opportunities for feedback and guidance of student work through AdobeConnect and Blackboard.</p>
3.	<p>How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc.</p> <p>The course developers will work with the A&S technical team to use best practices for password-protected submission of student work and interactive monitoring of exams or quizzes. Password protection for Blackboard and AdobeConnect is provided through UKIT, and exams will be proctored through an approved NCTA or KCTCS proctoring facility and/or by TAs. In addition, the authentic problem-based assessment methods used in this courses reduce the likelihood of cheating. The syllabus will specify the same rules and the same consequences for academic offenses as in the classroom-based version.</p>
4.	<p>Will offering this course via DL result in at least 25% or at least 50%* (based on total credit hours required for</p>

Abbreviations: TASC = Teaching and Academic Support Center DL = distance learning DLP = Distance Learning Programs

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	<p>completion) of a degree program being offered via any form of DL, as defined above? No; at present the department does not offer enough courses online for this to be possible; for the future the department is reviewing limits on the number of hours that can be applied to the major.</p> <p>If yes, which percentage, and which program(s)?</p> <p><i>*As a general rule, if approval of a course for DL delivery results in 50% or more of a program being delivered through DL, the effective date of the course's DL delivery will be six months from the date of approval.</i></p>
5.	<p>How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting?</p> <p>Students will be advised of the range of services that can support their success in the course and that can provide information concerning the relation of the course to their academic program and to their career plans. Contact information for services available through the Distance Learning Library Service and Academic Accommodations managed by the Disability Resources Center are identified on the syllabus. Students have access to standard resources for resolving academic complaints and are encouraged to utilize the Office of the Ombud for these purposes.</p>
<i>Library and Learning Resources</i>	
6.	<p>How do course requirements ensure that students make appropriate use of learning resources?</p> <p>Library resources will not be required for this course, as is the case for the classroom-based version of the class. Via Blackboard, students will have access to supplementary exercises and problems beyond those required for the class in addition to Distance Learning Library resources.</p>
7.	<p>Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.</p> <p>As is the case for the classroom-based version of the class, access to laboratories or specialized equipment is not required. Minimum Technical Requirements, including computer hardware and software and internet connection, are identified on the syllabus. All software required for the course is available free to students through download.uky.edu.</p>
<i>Student Services</i>	
8.	<p>How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Teaching and Academic Support Center (http://www.uky.edu/TASC/index.php) and the Information Technology Customer Service Center (http://www.uky.edu/UKIT/)?</p> <p>Students are provided the following statement in the syllabus: "If you experience technical difficulties contact the Customer Service Center at 859-218-HELP (4357) or by e-mail at helpdesk@uky.edu. Please also inform the course instructor when you are having technical difficulties. "</p>
9.	<p>Will the course be delivered via services available through the Teaching and Academic Support Center?</p> <p>Yes <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p> <p>If no, explain how students enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.</p> <p>See item #8</p>

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10.	<p>Does the syllabus contain all the required components, below? <input checked="" type="checkbox"/> Yes</p> <ul style="list-style-type: none"> <input type="checkbox"/> Instructor's <i>virtual</i> office hours, if any. <input type="checkbox"/> The technological requirements for the course. <input type="checkbox"/> Contact information for TASC (http://www.uky.edu/TASC/; 859-257-8272) and Information Technology Customer Service Center (http://www.uky.edu/UKIT/; 859-257-1300). <input type="checkbox"/> Procedure for resolving technical complaints. <input type="checkbox"/> Preferred method for reaching instructor, e.g. email, phone, text message. <input type="checkbox"/> Maximum timeframe for responding to student communications. <input type="checkbox"/> Language pertaining academic accommodations: <ul style="list-style-type: none"> <input type="checkbox"/> "If you have a documented disability that requires academic accommodations in this course, please make your request to the University Disability Resource Center. The Center will require current disability documentation. When accommodations are approved, the Center will provide me with a Letter of Accommodation which details the recommended accommodations. Contact the Disability Resource Center, Jake Karnes, Director at 859-257-2754 or jkarnes@email.uky.edu." <input type="checkbox"/> Information on Distance Learning Library Services (http://www.uky.edu/Libraries/DLLS) <ul style="list-style-type: none"> <input type="checkbox"/> Carla Cantagallo, DL Librarian <input type="checkbox"/> Local phone number: 859 257-0500, ext. 2171; long-distance phone number: (800) 828-0439 (option #6) <input type="checkbox"/> Email: dllservice@email.uky.edu <input type="checkbox"/> DL Interlibrary Loan Service: http://www.uky.edu/Libraries/libpage.php?lweb_id=253&llib_id=16
11.	<p>I, the instructor of record, have read and understood all of the university-level statements regarding DL.</p> <p>Instructor Name: Elizabeth P. Lorch Instructor Signature:</p>

Applications of Statistics in Psychology
PSY 216, [section number]
Summer II (8-week) 2012
June 7, 2012 - August 2, 2012

This is an online course. To access the course visit <http://elearning.uky.edu> and login to Blackboard with your **LINK BLUE** username and password. Select our course from the list of courses you have or have had access to.

Blackboard: Bb is a course management system that consolidates all course info and links into one location which students can access to read assignments, view videos, handouts, or other resources, and submit assignments each week. Bb organizes course materials and archives our course.

We will use **Blackboard** and **Adobe Connect** among other online tools to conduct the class. With **Adobe Connect**, you will attend virtual labs and have an opportunity to work with the instructor and with other students.

Instructor: TBD

Office phone: TBA

Office address: TBA

UK e-mail address: My e-mail address is xxxxx@uky.edu. This is the best way to contact me. Please use the **Send Email** option in Blackboard. This tool automatically puts the course number in the subject line. This will help facilitate a quicker response from me.

Course Developers: Elizabeth Lorch and Robert F. Lorch, Jr.

Virtual Office Hours:

Generally, the fastest way to contact me is through e-mail. I will respond within one business day (whenever possible, I will try to respond on the same day to messages received before 3pm M-F). For face-to-face, telephone, or SKYPE appointments: please e-mail me to set up a meeting time.

Role in the Core Curriculum: In combination with PSY 215, this course satisfies the **Statistical Inferential Reasoning** requirement in the Core Curriculum.

Bulletin course description

An introduction to statistical procedures used in making decisions based on psychological data. May not be used to satisfy the laboratory requirement in the College of Arts and Sciences.

Prereqs: PSY 100 or equivalent, and PSY major or consent of instructor

Goals and Objectives of the Course

The aims of this course are to help you develop an understanding of major concepts that underlie the use and interpretation of statistics in psychological research, and to help you learn how to choose and carry out statistical procedures that are appropriate for different research purposes. Psychologists are interested in understanding a variety of phenomena and they use a wide variety of methods and measures to study the objects of their interest. Regardless of the content or conditions for study, statistics serve as important tools for making sense out of the data that are collected. We need statistics to **describe** the data clearly and communicate the findings to others. We also need statistics **infer** general conclusions from a limited number of observations. In this course, we'll cover both the descriptive and inferential functions of statistics. We'll examine a variety of ways to describe data, and will discuss reasons to choose particular methods. Likewise, we'll develop a general logic of how to make inferences from data, and then cover a number of different statistical tests that are appropriate for different situations (but all of which use the general logic).

Statistics as procedures vs. statistics as reasoning. One important objective of this course is to introduce you to basic procedures for analyzing data. Thus, we will study procedures for presenting data (e.g., tables and graphs) and for conducting “tests” that will allow us to make general conclusions from a relatively small set of observations. A more important objective of the course is to help you become an intelligent user of statistics. This involves developing a deep understanding of the logic of statistical reasoning. Executing a statistical procedure is relatively easy; intelligent use of statistics is not easy. The bottom line message: You’re not likely to learn very much or do very well in the course if you focus only on the mechanics of executing procedures; you must push yourself to understand the logic that underlies the procedures and their interpretation.

Student Learning Outcomes (learning outcomes specific to each section of the course appear at the beginning of each section):

By the end of the course you should be able to:

1. Choose appropriate summary statistics to describe data sets and communicate relevant information with summary statistics, tables, and graphs.
2. Interpret tables, graphs, and summary statistics and use these to guide reasoning about relevant topics.
3. Demonstrate knowledge of basic concepts of probability theory and apply this knowledge to computing and interpreting probabilities of complex events.
4. Demonstrate knowledge of how probability information underlies reasoning in various situations, including knowledge of common errors in reasoning about probabilities.
5. Demonstrate understanding of the concepts of sampling distributions, the Central Limit Theorem, and hypothesis testing, and be able to test hypotheses based on different sampling distributions.
6. Demonstrate understanding of the concepts of Type I and Type II errors, statistical power, confidence intervals, and effect size, and be able to apply all of these to reasoning about conclusions and interpretations of experiments.

Required Course Readings/Viewing Materials:

Pagano, R. (2009). *Understanding statistics in the behavioral sciences (9th edition)*. Pacific Grove, CA: Brooks/Cole Publishing Co.

Modules for course presentation (see below) occasionally will have additional reading linked to them, but these will be made available directly on Blackboard. Required problem sets also will be available on Blackboard and are listed in the assignment schedule.

Books may be purchased from the following stores.

- Kennedy Bookstore, 405 S. Limestone, (859) 252-0331
or go to the website: <http://www.kennedys.com>
- Wildcat Text Books, 563 S. Limestone, (859) 225-7771
or go to the website: <http://www.wildcattext.com>
- UK Bookstore 106 Student Center Annex, (859) 257-6304
or go to the website: <http://www.uk.bkstr.com>

You can also purchase textbooks through any of the Internet bookstores, but you will need to rush shipping for them because **you will need to begin reading the first day** of the 8 week session.

Distance Learning Library Services will not be required for this course.

Minimum Technology Requirements:

Complete the following steps to make sure your computer is correctly configured and the necessary software is installed. **Note: You will not be able to access course material if you fail to complete these steps.**

1. Go to this site to check the **minimum hardware, software and browser requirements**:<http://wiki.uky.edu/blackboard/Wiki%20Pages/Bb9%20Hardware%20and%20Software%20Requirements.aspx>
2. Internet Explorer is NOT recommended for Blackboard. **Firefox is the recommended Internet browser for the course.** Go to <https://download.uky.edu/> to download a free version of Firefox. Log in with your **LINK BLUE** id and password and search for **Firefox**.
3. Go to <http://java.com/en/> and click on the **Free Java Download** button. Run the installer to get the latest version.
4. You will also need **Flash, Adobe Acrobat Reader, Adobe Connect, and QuickTime** movie player. Go to <http://wiki.uky.edu/blackboard/Wiki%20Pages/Browser%20Check.aspx> then click **BbGO!** If you do not have these installed, you can download them from this site.
5. To download **Windows Media Player**, click this link:
<http://www.microsoft.com/windows/windowsmedia/player/10/default.aspx>
6. Students and faculty can download **Microsoft Office Suite** (including Word and PowerPoint) from this site: <https://download.uky.edu/>.
7. **Students will need headphones, a microphone, and a webcam in order to access all material and to participate in Adobe Connect.**

If you experience technical difficulties contact the Customer Service Center at 859-218-HELP (4357) or by e-mail at helpdesk@uky.edu. Please also inform the course instructor when you are having technical difficulties.

Bb 101 for First-Time Online Students

This is a brief introduction for students using Blackboard for the first time.

- Go to <http://elearning.uky.edu> and log in with your **Link Blue ID**.
- Click on the Courses link near the top left of the page (to the right of My Bb and under the Library tab).
- In the Course Search line, type **Bb9-101** (exactly as you see it there, including the hyphen).
- Find the Course ID (first column) **Bb9-101-OnLine-Stu**, and click the down arrow next to the Course ID. Click **Enroll** then **Submit**.

Please understand that the online course demands that students must have daily access to a computer and administrator access on that machine so that they can install and upgrade software as all course material will be online. Students do not need to be tech experts, but they do need a willingness to learn new technologies and great patience with the still relatively experimental format of online education.

Students should be aware that in order to cover the content materials of a 4-credit hour course in only eight weeks, the course must move very quickly. Students should expect approximately double the workload of a 4-credit course (i.e., a course that includes lab work) taught during the regular semester. You are expected to spend a MINIMUM of 4.5 hours per day (5 days a week) working with the course material (including completing course modules, reading, completing problem sets, and working with the instructor and other students in the virtual laboratory sessions on Adobe Connect). It is YOUR responsibility to access material and complete assignments in a timely manner. To help keep you on track, I have provided a Course Schedule that you should follow. The schedule appears later in this syllabus and also in the UNITS tab on Blackboard.

Due dates for completing modules, due dates for submitting problem sets, and dates of the virtual labs appear in the schedule that follows the course outline. There will be an exam at the conclusion of each section of the course.

Course Outline

Section #1 - UNIVARIATE DESCRIPTIVE STATISTICS

In the first section of the course, we study characterizations of variables and procedures for summarizing and presenting data. In addition, we will consider the implications of the concepts we study for the interpretation of data. By the end of this section, you should be able to:

1. Define and identify the **dependent variable**: Understand scales of measurement and how they are relevant to the ways in which you can manipulate and interpret data.
2. Define and identify the **independent variable**: Understand the implications of manipulation vs. observation of variables.
3. Generate various **summary statistics** and understand what information each one communicates; understand when and why each summary statistic is useful.
4. Present information in a **table** and know when a table is a useful tool. Understand the conventions for tabling information and why conventions are important.
5. Present information in a **graph** and know when a graph is a useful tool. Understand the conventions for graphing information.
6. **Interpret** tables, graphs and summary statistics and use them as important sources of information to guide your reasoning about relevant topics.

Module Topic

1. **Dependent and Independent Variables**
2. **Scales of Measurement**
3. **Summary Statistics**
4. **Tables and Graphs**
5. **Measures of Central Tendency**
6. **Measures of Variability and Shape**

Reading Assignment

- Chapter 1
Chapter 2 (omit Real Limits)
Chapter 3 (omit Percentiles & Percentile Ranks)
Chapter 4

Section #2 – Probability, Sampling Distributions, and Statistical Inference I

The first goal of this section is on building a foundation for the statistical inferential procedures that will be the focus of much of the rest of the course. Statistics are used to make sense of situations dealing with variables; it addresses situations where outcomes are probabilistic in nature. All inferential statistics are based on being able to compute probabilities of outcomes under well-defined circumstances. Thus, to understand the logic of statistical procedures, you must have some appreciation of **probability theory** and how it underlies **statistical reasoning**. The second goal of this section is to begin to apply the knowledge of probability to derive a simple probability distribution called the “**binomial distribution**.” We will then use the binomial distribution as a “**sampling distribution**” that specifies the probability of any possible outcome for a particular class of experiments. We will show how the sampling distribution is useful in doing “**hypothesis testing**” and in computing the “**statistical power**” of a hypothesis test. These concepts are all essential tools in statistical reasoning that are used in a wide variety of contexts. By the end of this section, you should be able to:

1. Demonstrate understanding of the basic concepts of probability theory, including: **random sampling, marginal probabilities, conditional probabilities, independence**.
2. Demonstrate understanding of how simple events may be combined to form more complex events and how to compute the probabilities of complex events. Specifically, know what **joint**

- and compound events** are; know how to use the **multiplicative law** to compute the probabilities of joint events and the **additive law** to compute the probabilities of compound events.
3. Demonstrate understanding of how probability information is relevant to **reasoning** in various situations, including understanding common errors of reasoning about probabilities.
 4. Demonstrate understanding of how the binomial distribution is derived, how it is used as a **sampling distribution**, and how sampling distributions are central to **hypothesis testing** (i.e., understand the logic of hypothesis testing). Be able to extend the logic of hypothesis testing to the Chi-Square distribution.
 5. Define the distinction between **Type 1 and Type 2 errors** in hypothesis testing and show that you understand that the logic of hypothesis testing is based on the ability to compute and control the probability of a Type 1 error.
 6. Demonstrate understanding that it is desirable to minimize the probability of a Type 2 error and be able to estimate statistical **power** as a critical part of **designing experiments** that achieve this goal.

Module Topic

Reading Assignment

7. Populations and Samples	Chapter 8
8. Random Sampling and Research	
9. Basic Probability & Reasoning	
10. Complex Probability & Reasoning	
11. Deriving the Binomial Distribution	Chapter 9
12. Binomial as a Sampling Distribution	
13. Logic of Hypothesis Testing	Chapter 10
14. Types I & II Errors	
15. Statistical Power	Chapter 11
16. Chi-Square Sampling Distribution	Chapter 17, pp. 450-465
17. Chi-Square Goodness-of-Fit Test	
18. Chi-Square Test of Association	

Section #3 - Sampling Distributions (Normal, t) and Statistical Inference II

In this section of the course, we will study two new sampling distributions: the Normal distribution and the *t*-distribution. Whereas the binomial and Chi-square distributions served as sampling distributions of frequencies of events, the Normal and *t*-distributions serve as sampling distributions of means. We will study the use of each distribution for testing hypotheses about means. We will again study power in the context of the Normal distribution. Two important new procedures that we will learn are how to obtain **confidence intervals** on estimates of population means, and how to measure the magnitude of the effect of a variable (i.e., **effect size**). We will apply hypothesis-testing, confidence intervals, effect-size estimation and power estimation procedures in various contexts. By the end of this section, you should be able to:

1. Demonstrate understanding of the importance of the **Central Limit Theorem** and how it works.
2. Demonstrate understanding that **sampling error** is associated with all of our various statistical calculations and that the **sampling distributions** that underlie our calculations allow us to quantify that error. Thus, the probability of Type 1 errors, the power of a statistical test, and the margins of error expressed by a confidence interval are all based on knowing the relevant sampling distribution for our statistical computations.
3. Apply the concepts of sampling distribution and sampling error to the normal and *t*-distributions, and demonstrate understanding of the relations among the statistical procedures of **hypothesis-testing**, **confidence interval estimation**, **effect-size estimation**, and **power**.

Module Topic

Reading Assignment

19. Normal Distribution: Central Limit Theorem

20. Normal Distribution: Standard Scores	Chapter 5
21. Hypothesis Testing: Single Mean	Chapter 12
22. Hypothesis Testing: Diff. between Means	
23. Statistical Power Revisited	
24. Confidence Intervals	
25. t as a Sampling Distribution	Chapter 13 (omit pp. 336-339)
26. t, Single Mean Tests & Confidence Intervals	
27. t, Diff. between Independent Means	Chapter 14
28. t, Diff. between Dependent Means	
29. Relation of Hypothesis Testing, Confidence Intervals, Effect Size, Power	

Section #4 – Describing and Reasoning about Bivariate Distributions

In the first three sections of the course, we nearly always worked with one variable at a time (univariate distributions). In the final section of the course, our focus will be on ways that two variables can vary together (bivariate distributions). We first will study how to describe bivariate distributions, using scatterplots and the statistical techniques of linear regression and correlation. Then we will examine sampling distributions for measures of bivariate distributions, apply the logic of hypothesis testing to questions about the relation between two variables, and examine issues in interpreting correlation and regression. By the end of this section, you should be able to:

1. Describe the linear relation between two variables using scatterplots, the line derived from the best-fitting linear regression equation, and the correlation coefficient, and analyze how well these measures are capturing the relation between the two variables.
2. Apply the logic of hypothesis testing to several types of questions about the linear relation between two variables.
3. Interpret conclusions made based on linear regression and correlation, including identifying limits on conclusions and common errors in reasoning about correlation.

<u>Module Topic</u>	<u>Reading Assignment</u>
30. Describing Bivariate Distributions: Scatterplots	Ch. 6, pp. 113-120
31. Describing Bivariate Distributions: Linear Regression	Ch. 7, pp. 150-165
32. Describing Bivariate Distributions: Correlation	Ch. 6, pp. 121-130
33. Describing Bivariate Distributions: Error Measurement	
34. Inferences about Linear Relations	pp. 336-339
35. Interpretation Issues	Ch. 6, pp. 134-139

Summary of Assignments: (1) You will need to complete each set of **modules**, including answering questions as you proceed through the material, **by 11:59pm on the due date listed.** (2) You will need to complete and submit each **problem set by 11:59 on the due date listed.** The due dates for submission of problem sets are the same as for completion of the modules, but please plan to distribute your work across the available days. You will get into difficulties if you try to do all the modules and complete the problem set all at once. Due dates for completion of modules and problem sets generally are on Sundays and Wednesdays prior to the virtual labs. Work completed after 11:59 on those days will receive zero points. (3) You will need to **attend each virtual lab on the scheduled date (Mondays 6-8pm and Thursdays 6-8pm).** You should have a copy of your problem set with you, as well as other course materials that will allow you to work effectively with the instructor and other students.

NOTE SCHEDULE CHANGE during the last week – due date for modules and problem set moved to Monday, July 30; lab on Tuesday, July 31, from 6-8pm rather than Monday, July 30; Exam 4 will be given on Wednesday, Aug. 1. This will allow an extra day for any problems that may arise with the online system).

Submission of Assignments

All assignments must be submitted online. Assignments sent via e-mail will not be graded. If you have problems submitting an assignment, it is your responsibility to let your instructor know. Written assignments **MUST** be submitted as Microsoft Word files unless otherwise noted. All filenames should use only alpha-numeric characters (a-z, 0-9) before the file extension (example .doc or .docx). Example: SamAdamsEssay2.doc . Blackboard does not accept file names with characters like !@\$%.

Schedule for Module Completion, Problem Set Due Dates, Virtual Labs, and Exams (subject to change)

DUE DATE	ASSIGNMENT
Thurs, June 7	Introductory Virtual “Pre-Lab”: get acquainted, test connections, address questions
Sun, June 10	Modules 1-4 completed
Sun, June 10	Problem Set #1: Variables and Presenting Univariate Data
Mon, June 11	Virtual Lab #1
Wed, June 13	Modules 5-6 completed
Wed, June 13	Problem Set #2: Summarizing Data with Statistical Measures
Thurs, June 14	Virtual Lab #2
MON, JUNE 18	EXAM #1 (lab time: 6-8pm)
Wed, June 20	Modules 7-9 completed
Wed, June 20	Problem Set #3: Populations, Samples, Random Sampling, and Simple Probabilities
Thurs, June 21	Virtual Lab #3
Sun, June 24	Modules 10-12 completed
Sun, June 24	Problem Set #4: Complex Probabilities, Reasoning with Probabilities, Binomial Distribution
Mon, June 25	Virtual Lab #4
Wed, June 27	Modules 13-15 completed
Wed, June 27	Problem Set #5: Binomial Distribution as a Sampling Distribution, Hypothesis Testing and Power with the Binomial Distribution
Thurs, June 28	Virtual Lab #5
Sun, July 1	Modules 16-18 completed
Sun, July 1	Problem Set #6: Extending Logic of Hypothesis Testing to the Chi-Square Goodness-of-Fit Test and the Chi-Square Test of Association
Mon, July 2	Virtual Lab #6
THUR, JULY 5	EXAM #2 (lab time: 6-8pm)
Sun, July 8	Modules 19-20 completed
Sun, July 8	Problem Set #7: The Normal Distribution as a Sampling Distribution for Means; Standard Scores
Mon, July 9	Virtual Lab #7
Wed, July 11	Modules 21-24 completed
Wed, July 11	Problem Set #8: Hypothesis-Testing, Power, and Confidence Intervals with the Normal Distribution
Thurs, July 12	Virtual Lab #8

Sun, July 15	Modules 25-28 completed
Sun, July 15	Problem Set #9: Hypothesis Tests and Confidence Interval with the t Distribution
Mon, July 16	Virtual Lab #9
Wed, July 18	Modules 29 completed
Wed, July 18	Problem Set #10: Relation of Hypothesis Testing and Confidence Intervals; Effect Sizes
Thurs, July 19	Virtual Lab #10
MON, JULY 23	EXAM #3 (lab time: 6-8 pm)
Wed, July 25	Modules 30-33 completed
Wed, July 25	Problem Set #11: Describing Bivariate Distributions
Thurs, July 26	Virtual Lab #11
Mon, July 30*	Modules 34-35 completed
Mon, July 30*	Problem Set #12: Hypothesis Testing and Interpretation of Relations between Variables
Tues, July 31*	Virtual Lab #12
*note day	*EXAM #4 (WED 6-8pm)
Thurs, Aug 2	

Examination Information:

- 1) As indicated in the above outline, exams will be given during the regularly scheduled lab time on the dates indicated (all times are EDT). Students will be logged in with the instructor, who will proctor the exam and be available to answer questions. Students who are traveling and/or located in a time zone where this schedule presents a hardship may consult with the instructor before the course begins to make alternative arrangements. Students must do their own work on examinations; communication with anyone other than the instructor is not allowed during examinations.
- 2) Exams will be open book/open note exams. However, in order to be successful, you **MUST** be well prepared for the exam, as the time planned for the exam assumes you will need to consult materials only to do simple things, such as verifying formulas or the steps of a procedure. **RECOMMENDED:** prepare a "cheat sheet" for yourself. That is, using no more than 1-2 sheets of paper, organize the information you think will be most helpful to you while doing the exam (organizing the information is an important part of preparing for the exam). This might include formulas, a few example problems, some cues of what to think about when you are making interpretations, etc. Stick to using these sheets unless you get stuck on something. Then you may want to move on and come back to it if you have extra time to consult more material. If you have to search through a large amount of material throughout the exam, you will not be able to finish and will not do well.
- 3) Online exams will be submitted electronically through Blackboard and must be submitted by 15 minutes past the usual end of the lab period (8:15pm EDT). Each examination will require you to apply the material to solve problems, draw conclusions, and address interpretive issues. It is your responsibility to make sure that you access the material during the scheduled time period and that you submit it on time. If you go over the time, you will receive an automatic score of zero, so you must take responsibility to watch the time and submit the examination on time. Your exams will be manually graded, so scores will not be available immediately.
- 4) If you experience technical difficulties contact the Customer Service Center at 859-218-HELP (4357) or by e-mail at helpdesk@uky.edu. Please also inform the course instructor when you are having technical difficulties (you should be signed in with the instructor during the exam).

Excused Absences and Make-up opportunities

Late assignments will be accepted only in the event of documented excused inability/absences as defined by **University Senate Rules V, 2.4.2**. Problems associated with your computer, procrastination, and forgetfulness are not acceptable excuses for late submission of assignments. It is YOUR responsibility to make sure that you access and submit assignments on time. **Note:** Once the deadline for submission has passed, these assignments will no longer be accessible on Blackboard.

Make-up exams will only be given for **DOCUMENTED** excused absences (or inabilities) **as defined by the University (Senate Rule V.2.4.2)** and are scheduled as needed. A missed exam will result in a score of zero for that exam, unless an acceptable written excuse is presented within 36 hours of the missed exam.

Grading:

Problem Sets: Each problem set that you submit by the due date will be graded on a 0 to 3 scale. You will receive a 0 if you do not submit a problem set on time. (36 points possible)

Labs: Labs will be used for three purposes. They will be used to remedy comprehension difficulties revealed by your work on the problem sets; you will do exercises during the virtual lab meetings that elaborate the concepts covered in the modules and problem sets; and time will be spent working on the upcoming problem set. Labs generally will involve working on additional problems. You are always encouraged to ask questions, but labs are a particularly good time to ask about anything that is causing you problems. You can earn up to 3 points for each lab (not including meetings for exams): 1 point for attendance throughout a lab; 1 point for some degree of active participation; 1 additional point for good participation. You may lose credit at the instructor's discretion for late arrival or leaving the lab early; **attendance at a MINIMUM of 60% of the labs is required to pass the course**, regardless of other grades. (36 points possible)

Module Completion: You will receive one point for each module you complete; **completion of a MINIMUM of 60% of the modules is required to pass the course**, regardless of other grades. (35 points possible)

Exams: Each exam is worth a maximum of 100 points. (400 points possible)

Thus, it is possible to earn a maximum of 507 points. Grades will be computed on a base of 500 points, so regular, timely completion of ongoing work can result in extra points.

Exams (4 total @20% each)	80%
Module Completion, Problem Sets, and Labs	20% (107/100 points possible)

Final grades will be assigned as follows:

- A = 450-500 points (90-100%)
- B = 400-449 points (80-89%)
- C = 350-399 points (70-79%)
- D = 300-349 points (60-69%)
- E/Fail = 299 points and below (below 60%)

You can review your scores by going to **MY GRADES** in Blackboard (click on TOOLS first). Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar (<http://www.uky.edu/Registrar/AcademicCalendar.htm>)

Policy on Academic Accommodations:

If you have a documented disability that requires academic accommodations in this course, please make your request to the University Disability Resource Center <http://www.uky.edu/StudentAffairs/DisabilityResourceCenter/index.html>. The center will require current disability documentation. When accommodations are approved, the Center will provide you with a Letter of Accommodation which details the recommended accommodations. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754). Contact the DRC Director Jake Karnes 859.257.2754 or jkarnes@email.uky.edu.

Academic Offenses and Procedures

Students shall not plagiarize, cheat, or falsify or misuse academic records. [US: 3/7/88; 3/20/89]

PLAGIARISM and **CHEATING** are serious academic offenses. For additional guidelines about what constitutes plagiarism, see the Academic Ombudsman's statement on plagiarism. The full document can be found at <http://www.uky.edu/Ombud/Plagiarism.pdf>

Charges of an academic offense will be made against any student who cheats or commits plagiarism. Penalties for such an offense will be assessed according to University Regulations regarding Academic Offenses.

6.4.3 Initial Determination

A. By the Instructor and Chair

1. Penalties. If the student has previously received a penalty for an offense at least as severe as an E or F in a course, the chair shall inform the responsible dean, who shall determine an appropriate penalty pursuant to Section 6.4.3.B.1.b.

Otherwise, if the student has previously received a letter of warning, the instructor must assign a grade of E or F for the course. If the offense is particularly egregious, and if the chair approves, the instructor may also forward the case to the responsible dean with a recommendation for a penalty of XE or XF or a more severe penalty, pursuant to paragraph 6.4.3.B.1.a.

Otherwise, if there are no prior offenses or letters of warning in the student's record, the instructor must award a grade of zero for the assignment on which the offense occurred. The instructor may also choose to impose one of the following additional penalties after consulting with the chair:

- (a) require the student to perform extra academic work (failure to complete the extra work should result in a grade of E or F for the course);
- (b) reduce the final grade in the course by a specified number of levels;
- (c) assign a grade of E or F, as appropriate, for the course;
- (d) if the offense is particularly egregious, and if the chair approves, forward the case to the responsible dean with a recommendation for a penalty of a grade of XE or XF in the course or a more severe penalty, pursuant to paragraph 6.4.3.B.1.a.

If the instructor chooses to impose a penalty less than an E or F in the course, then the offense shall be considered a "minor offense." Generally, an offense that required significant premeditation should not be treated as a minor offense.

NOTE* In addition to the circumstances listed above, the following activities are considered evidence of cheating:

- 1) Any talking to another student during an examination.
- 2) Looking at another students' work during an examination, or allowing another student to look at your work.

3) Collaborating with another student on an examination and/or submitting an assignment that is similar in wording or sentence construction to the work of another student in the class, unless the assignment has been identified as a group assignment.

Appropriate Online Behavior:

Students are expected to maintain decorum that includes respect for other students and the instructor, to regularly log in to the course, and to display an attitude that seeks to take full advantage of the educational opportunity. All students are expected to be prepared to work and actively participate in class activities.

Virtual communication and discussion "in cyberspace" occur in a social environment where normal rules of social interaction apply. The remoteness of the recipients is no excuse to behave in an anti-social manner and post unacceptable messages.

Unacceptable messages include those that harass, intimidate, threaten, belittle, ridicule, expressed hatred for, or aggression toward others. Let us be mindful to avoid words that imply that some groups of people are less worthy than others (e.g., avoid racist, sexist, anti-Semitic, age-ist, and homophobic language).

Discussion board and other electronic communication for this course should relate only to the course subject matter, generally respond to the instructor threads, and always seek to further the aims of that particular session (e.g., stay on topic).

Contributions to virtual meetings are the intellectual property of the authors. Students who quote another person in class projects, publications or even in remarks made on the discussion board should always acknowledge the source of that quote (e.g., do not plagiarize your classmates). This should not be a major issue with the type of material that is the focus of this course, but it is important to remember to express your own thoughts and credit others (e.g., for thinking of a strategy to solve a problem).

Personal comments about other users and their views should not be placed in any of our Blackboard course areas that are viewable by other users.

Do not copy private messages to another person without the author's explicit permission. Consult the UK Student Rights and Responsibilities regarding the steps for addressing unresolved academic issues at <http://www.uky.edu/StudentAffairs/Code/part2.html>