EPsy 3264: Basic & Applied Statistics
118 STSS, M,W 12:45 PM - 2:00 PM
Fall 2011

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COURSE WEBSITE

http://www.tinyurl.com/epsy3264

COURSE DESCRIPTION

EPsy 3264 is designed to engage students using a modeling and simulation approach to inference. This course uses pedagogical principles that are founded in research, such as daily small group activities and discussion. Upon completion of this course, students should have an understanding of the foundational concepts of data, variation and inference, as well as an appreciation for the fundamental role that statistics plays in a host of disciplines, such as business, economics, law, and medicine.

AUDIENCE & COURSE PREREQUISITES

This course is intended for undergraduate students who have completed a high school algebra course, but *not previously* studied statistics.

There are no prerequisites for this course. However, students should have familiarity with computers and technology (e.g., internet browsing, Microsoft Word, opening/saving files, etc.).

PHILOSOPHY & FORMAT OF INSTRUCTION

This is *not* a class where you only come each day, listen, watch, and take notes! The primary method for learning new statistical concepts and methods will be by reading provided materials before class, participating in class activities and discussions, and working through homework assignments. **Class policies on participation, attendance, and late work will be decided on as a whole class.**

This course makes extensive use of *small group and large group activities and discussions* to introduce ideas and content, as well as to deepen your understanding of material encountered in the readings. Your learning experience is thus dependent–to some extent–on your classmates and vice versa. Because of this, *it is essential* that you not only attend class each day and participate in the activities and discussions, but that you show up prepared having completed the homework and reading assigned.

Statistics is more than just an application of mathematics or a methodology used in some other discipline. Statistics is a principled way of thinking about the world. In particular, it is a principled approach to data collection, prediction, and scientific inference.

Statistics is itself a unique discipline that has, like many others, undergone a tremendous amount of growth and change in the last two decades. In today's dynamic and interdisciplinary world, success in confronting new analytical issues requires both substantial knowledge of a scientific or technological area and highly flexible problem-solving strategies.

Internalizing a disciplines' way of thinking about and solving problems is a time consuming process, with the keyword being "process". It is not something that can be taught to students in a semester, or even year–long, course. Learning statistics takes much more than memorizing formulae or software commands. It requires active participation and questioning both in and out of the classroom. The instructors of this course will provide you with many opportunities to learn the material through class activities, readings, and homework assignments, but in the end, you will have to do all of the hard work of actually learning that material.

PROFESSIONALISM

Evidence of professional practice on both our parts includes (a) starting and ending on time, (b) being prepared, (c) being physically and mentally engaged, (d) performing at a high level, (e) making sure cell phones are off, and (f) refraining from sending and receiving e-mail, playing solitaire, shopping, texting, tweeting, and twittering during class. Thank you.

COURSE TEXTBOOK & READINGS

This is not a very traditional statistics course, as you will quickly come to understand. You do not have to purchase a textbook. To help you learn the course material as well as the software tools, we provide via the course website and email the following resources and readings:

- ***Readings:*** Excerpts from different sources–such as journal articles and online resources–that explain terms and concepts, or provide additional information not covered in class. These references will be especially useful when you review for exams. Some of the readings are journal and news articles that report about research studies or data analyses that are related to topics addressed in class activities or homework assignments. These have more detail than you need to know for the course, but they provide real-world examples of the statistical questions and methods you are learning about.
- ***Course Activities:*** These are handed out during class. They will help you learn course material and learn to use the technology tools.

We strongly suggest that you organize these materials into your own "textbook" for the course. This "textbook" can take on any form that you choose with the caveat that it becomes a useful resource for your learning of statistics. You are also invited to add to the materials we provide by including additional resources that you find useful in helping you learn and apply the course material. For example, you might want to create a glossary for the course by organizing and defining terms/concepts that are used in the classroom, assignments, and readings. We encourage you to share your ideas with other students in the learning community.

TECHNOLOGY

This course is taught in an active learning classroom and you are strongly encouraged to *bring a laptop to class on a daily basis*. You will use your laptop in class for a variety of things, including working with the *TinkerPlots™ 2* software, writing reports, and taking notes. The classroom is equipped with wireless Internet access, power outlets for each table, and projection capabilities for students as well as the instructor.

Couse Software: The course requires the use of the *TinkerPlots™ 2*. This software can be downloaded (for Mac or PC) from Key Press (http://www.keypress.com/x2842.xml) and a single-student home-use license can be purchased and downloaded for $19.95 from the publisher's website (https://keydrm.keypress.com/v3/orders/new?product=tp).

Course Website: The course website (http://www.tinyurl.com/epsy3264) is the storehouse for all the resources you will need during the class. On the website, you can access the course syllabus, homework assignments, course readings, web links, and datasets. The website works best with a recent version of *Mozilla Firefox*, *Google Chrome,* or *Safari*.

Mac Users: If you are using a Mac and seem to have problems downloading the *TinkerPlots™* files, *hold the option-key* while clicking on the link. This should download the file to your desktop. You then need to erase the .txt suffix that is appended to the end of the file. The suffix should be .tp, *and not* .tp.txt.

Email: Email is the primary source of communication among instructors, TAs and students for this course. As such, you will be expected to check your email frequently (i.e., at least once per day). As per the University policy, "students are responsible for all information sent to them via their University assigned email account. If a student chooses to forward their University email account, he or she is responsible for all information, including attachments, sent to any other email account."

Use of Personal Electronic Devices in the Classroom: Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference: http://policy.umn.edu/Policies/Education/Education/CLASSROOMPED.html.

Technology Policy: The course uses technology on a regular basis during both instruction and assessments (e.g., homework assignments, exams, etc.). *Student difficulty with obtaining or operating the various software programs and technologies–including printer trouble–will not be acceptable as an excuse for late work.* Due to the variation in computer types and systems, the instructor or TA may not be able to assist in trouble shooting all problems you may have.

Technology and Professionalism: Evidence of professional practice on both our parts includes (a) making sure cell phones are off, and (b) refraining from sending and receiving e-mail, facebooking, playing solitaire, shopping, texting, tweeting, and twittering during class.

STUDENT RESOURCES

Educational Psychology Computer Lab: The Peik Hall 325 Computer Lab will have some open times during the week. These times will be posted on the door of the lab. Only four computers in this lab have *TinkerPlots™ 2* installed on them.

Technology Support: The University Academic and Distributing Computing Services (ADCS) offers and supports a wide range of information technology-related services, functions, and processes through their website (http://www1.umn.edu/adcs/help). While most support is free to the University community, selected services or extensive consulting may be offered on a fee basis. For *TinkerPlots™* related questions/support, please contact the TA or instructor of the course.

Writing Support: The University Center for Writing provides free writing instruction for all University of Minnesota students at all stages of the writing process. For more information, or to set up an appointment, visit their website (http://writing.umn.edu).

Disability Accommodations: The University is committed to providing quality education to all students regardless of ability. Determining appropriate disability accommodations is a collaborative process. You as a student must register with Disability Services and provide documentation of your disability. The course instructor must provide information regarding a course's content, methods, and essential components. The combination of this information will be used by Disability Services to determine appropriate accommodations for a particular student in a particular course. For more information, please reference Disability Services: http://ds.umn.edu/Students/index.html.

Mental Health Services: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: http://www.mentalhealth.umn.edu.

COURSE REQUIREMENTS

Homework Assignments: There are daily homework assignments, which make up 40% of your grade. They include problems that will help you learn the course material and software through reflection and practice. These assignments will also help you prepare for the exams. As a student of statistics, working through all of the homework assignments is an important piece in building a complete understanding of the concepts, as well as allowing you to practice doing statistics.

While students are encouraged to work in groups in the course, *each individual student* needs to turn in a homework assignment with *his/her own independent work*. These assignments should be turned in at the beginning of the class session that they are due. Homework assignments that are submitted via e-mail or the instructor's or TA's mailbox without prior instructor approval will receive no credit. **Homework assignments must be typed and printed.** Handwritten assignments will receive no credit.

Without instructor consent, the penalty for late homework is a *5% deduction for that particular homework assignment for each day that it is late.*

If approval is granted to turn in an assignment via e-mail, the *only acceptable format is a PDF file*. Any other file format sent via e-mail will be deleted and you will receive a zero for that assignment. Please see the *How to Save as a PDF File* (on the course website) for more information.

***Exams*:** There are three in-class exams and three corresponding take-home exams, each worth 7.5% of your grade. The in-class exams will consist of several short answer questions designed to test your ability to apply the knowledge you gained by reading the assigned material, working on homework assignments and participating in class activities and discussions. For each in-class exam, if every member of your group receives a score of 90% or higher, each member of your group will be awarded a 5% bonus on that respective exam. You can use a 5"x8" notecard on each exam.

The take-home exams include problems that will assess your ability to work through open-ended, difficult statistical problems. These exams will be handed out the day of the in-class exams and will be due one week later. The work on these exams must be your own independent work. While you will be able to use *TinkerPlots*™, as well as your "textbook", on the take-home exams, the work you turn in must be your own independent work.

If you cannot be in class on the day an in-class exam is completed in class, or on the day a take-home exam is due, it is your responsibility to notify the instructor with as much advance warning as possible. *In general make-up exams will not be allowed. Case-by-case exceptions may be granted in only extreme cases at the discretion of the instructor.* You must provide documentation explaining your absence for the instructor to

determine whether an exception should be granted. If you fail to make-up the exam at the re-scheduled time, you will not be able to make it up at all.

Exam Bonus: If you strongly feel that a student in your group shouldn't be included for the in-class exam bonus points, either due to poor attendance or participation, a justification will need to be made to the instructors. *This will be reviewed by the instructors on a case-by-case basis*. If it is decided that a student shouldn't be included for the bonus points, that student will also not have the opportunity to obtain bonus points on that particular exam.

Final Exam: Each student in the course will complete a final exam that is worth 10% of the course grade. This exam will be cumulative in content. You may use the "textbook" you created for the course during the final exam.

Attendance/Participation: Class participation is an important part of learning, especially in courses like EPsy 3264. If you have a question, it is likely that others do as well. We encourage active participation and course grades will take into account students who make particularly strong contributions. Attendance and participation will be worth 5% of your course grade.

Attendance: Students can miss class twice (2 days) before they will be penalized for attendance. For each day missed thereafter, the students' overall grade will be reduced 1% (up to 5%). We will be asking each group to help monitor/record their group members' attendance.

Participation/Preparation: Participation will not be included as a part of your grade. You will, however, turn in a peer evaluation after each exam. You will be evaluating each member of your group (including yourself) on the level of preparation for class and participation in the course.

To encourage you to prepare and participate to your fullest, any student receiving superior ratings from the other group members (and after instructor consideration) will be awarded a 1% in her/his overall grade. (Since these evaluations will take place after each exam, it is possible to increase your grade by 3%.)

EVALUATION OF STUDENT PERFORMANCE

You will be evaluated on the basis of your performance on the homework assignments, the six exams, and the final exam and your course attendance/participation. Your course grade will be computed based on a weighted average using the weights mentioned in the above section. (For more information on computing a weighted average, see http://en.wikipedia.org/wiki/Weighted_average or http://mathforum.org/library/drmath/view/57605.html.

Grades will be assigned using the following criteria as a guideline:

Percentage Cutoff	Grade	Percentage Cutoff	Grade	Percentage Cutoff	Grade
92.5%	A	80.5%	B-	59.5%	D
89.5%	A-	76.5%	C+	Below 59.5%	F
86.5%	B+	72.5%	C		
82.5%	B	69.5%	C-		

Shortly after the course, you may access your final grade online at http://www.onestop.umn.edu. To access your grade via telephone, call the Gopher Student Line at 612–624–5200. Uncollected assignments will be retained for three weeks of the subsequent semester after the course, and then discarded.

CALENDAR

The calendar below lists the tentative dates of the course topics and readings, as well as the due dates for the assignments and exam dates. These dates are subject to change at the instructor's discretion.

Day	Date	Topic	Assignment Due
Day 1	Sept. 7	▪ Introduction	
Day 2	Sept. 12	▪ Exploring the Behavior of "Random"	**Homework 0** *iPod Shuffle Media Questions*
Day 3	Sept. 14	▪ Understanding Human Intuitions about Randomness and Modeling "Random" Behavior	**Homework 1** *iPod Shuffle Reflective Questions*
Day 4	Sept. 19	▪ Understanding Human Intuitions about Randomness and Modeling "Random" Behavior	**Homework 2** *Intuitions about Random Devices*
Day 5	Sept. 21	▪ Modeling Complex Phenomena	**Homework 3** *Can You "Beat" Randomness–Part II*
Day 6	Sept. 26	▪ Modeling "Blind Guessing"	**Homework 4** *Cereal Box Simulation*
Day 7	Sept. 28	▪ Modeling Variation for a Statistic Based on "Blind Guessing"	**Homework 5** *Matching Dogs to Owners–Extensions*
Day 8	Oct. 3	▪ Wrap-up for Unit 1	**Homework 6** *iPod Shuffle Revisited*
Day 9	Oct. 5	**Exam 1**	
Day 10	Oct. 10	▪ Comparing Two Airlines MEA	**Homework 7** *Comparing Two Airlines Media Questions*
Day 11	Oct. 12	▪ Characteristics of Distributions	**Take-Home Exam 1 Due** **Homework 8** *Comparing Two Airlines Reflective Questions*
Day 12	Oct. 17	▪ Randomization Tests (Quantitative Outcome)	**Homework 9** *Distribution Homework*

Day	Date	Topic	Assignment Due
Day 13	Oct. 19	▪ Randomization Tests (Categorical Outcome)	**Homework 10** *Cloud Seeding*
Day 14	Oct. 24	▪ Designing Experiments: Role of Random Assignment	**Homework 11** *Contagious Yawns*
Day 15	Oct. 26	▪ Role of Random Sampling: Bootstrap Test	**Homework 12** *Memorizing Letters*
Day 16	Oct. 31	Observational Studies: Bootstrap Test ▪	**Homework 13** *Latino Achievement*
Day 17	Nov. 2	▪ Types of Errors	**Homework 14** *Westvaco Study*
Day 18	Nov. 7	▪ Wrap-up for Unit 2	**Homework 15** *Comparing Two Airlines Revisited*
Day 19	Nov. 9	**Exam 2**	
Day 20	Nov. 14	▪ Sampling	**Homework 16**
Day 21	Nov. 16	▪ Summarizing Variation	**Take-Home Exam 2 Due** **Homework 17**
Day 22	Nov. 21	▪ Interval Estimates (+/- 2 Standard Errors)	**Homework 18**
Day 23	Nov. 23	**NO CLASS**	
Day 24	Nov. 28	▪ Interval Estimates (Mean Difference/Effect)	**Homework 19**
Day 25	Nov. 30	▪ Transition: Beyond This Course	**Homework 20**
Day 26	Dec. 5	▪ Transition: Beyond This Course	**Homework 21**
Day 27	Dec. 7	▪ Wrap-up	**Homework 22**
Day 28	Dec. 12	**Exam 3**	
Day 29	Dec. 14	▪ Course Wrap-Up	
	Dec. 19		**Take-Home Exam 3 Due**
Day 30	Dec. 21	**Final Exam** (1:30p.m.–3:30p.m. in STSS 118)	

MISSION STATEMENTS

Quantitative Methods in Education (QME)
The Quantitative Methods in Education (QME) track offers educational opportunities in both quantitative and qualitative methods with a broad array of introductory and advanced coursework. Students who choose QME as their track within educational psychology may specialize in any of four areas: *measurement, evaluation, statistics, and statistics education.* The goal of QME is to provide students with broad but rigorous methodological skills so that they may conduct research on methodologies, may help to train others in methodology, or will have the skills necessary to conduct research in related fields.

Psychological Foundations of Education Program Mission Statement
To apply and generate knowledge of psychological processes and methodological procedures involved in learning and teaching for the betterment and improvement of humans in a wide range of situations.

Department of Educational Psychology Mission Statement
Educational psychology involves the study of cognitive, emotional, and social learning processes that underlie education and human development across the lifespan. Research in educational psychology advances scientific knowledge of those processes and their application in diverse educational and community settings. The department provides training in the psychological foundations of education, research methods, and the practice and science of counseling psychology, school psychology, and special education. Faculty and students provide leadership and consultation to the state, the nation, and the international community in each area of educational psychology. The department's scholarship and teaching enhance professional practice in schools and universities, community mental health agencies, business and industrial organizations, early childhood programs, and government agencies. *Adopted by the Dept. of Educational Psychology faculty October 27, 2004.*

College of Education & Human Development Mission Statement
The new College of Education and Human Development is a world leader in discovering, creating, sharing, and applying principles and practices of multiculturalism and multidisciplinary scholarship to advance teaching and learning and to enhance the psychological, physical, and social development of children, youth, and adults across the lifespan in families, organizations, and communities.

POLICIES AND PROCEDURES

Academic Freedom and Responsibility: Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.*

* Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students"

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair (Susan Hupp; shupp@umn.edu), your adviser, the associate dean of the college (Kenneth R. Bartlett; bartlett@umn.edu), or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost (Arlene Carney; carne005@umn.edu).

Appropriate Student Use of Class Notes and Course Materials: Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/CLASSNOTESSTUDENTS.html.

Credits and Workload Expectations: Generally, when a one-credit course is taken, an average of three hours of learning effort per week (over a full semester) is necessary to achieve an average grade. A student taking a three-credit course that meets for three hours a week should expect to spend an additional six hours a week on coursework.

Equity, Diversity, Equal Opportunity, and Affirmative Action: The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: http://www1.umn.edu/regents/policies/administrative/Equity_Diversity_EO_AA.html.

Scholastic Dishonesty: You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code: http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: http://www1.umn.edu/oscai/integrity/student/index.html. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class–e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

Sexual Harassment: "Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy: http://www1.umn.edu/regents/policies/humanresources/SexHarassment.html.

Student Conduct Code: The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University you are expected adhere to Board of Regents Policy: Student Conduct Code. To review the Student Conduct Code, please see: http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html.

Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

University Grading Standards: The University of Minnesota's grading policy can be found at http://www.fpd.finop.umn.edu/groups/senate/documents/policy/gradingpolicy.html. For additional information, please refer to http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html.

The University utilizes plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following:

A	4.000	Represents achievement that is outstanding relative to the level necessary to meet course requirements
A–	3.667	
B+	3.333	
B	3.000	Represents achievement that is significantly above the level necessary to meet course requirements
B–	2.667	
C+	2.333	
C	2.000	Represents achievement that meets the course requirements in every respect
C–	1.667	
D+	1.333	
D	1.000	Represents achievement that is worthy of credit even though it fails to meet fully the course requirements

S		Represents achievement that is satisfactory, which is equivalent to a C– or better
F/N		Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (see also I).
I	Incomplete	Assigned at the discretion of the instructor when, due to extraordinary circumstances, e.g., hospitalization, a student is prevented from completing the work of the course on time. Requires a written agreement between instructor and student.

An incomplete for this course will be given on a case-by-case basis and require a written agreement between the student and instructor. The University's Senate Committee on Educational Policy states, the I (incomplete) shall be assigned "at the discretion of the instructor when, *due to extraordinary circumstances* (e.g., hospitalization), a student is prevented from completing the work of the course on time." Note the italicized phrase in the previous sentence. The most valid reason for an incomplete is an unforeseen event that gravely interferes with a student's ability to perform at an adequate level. Incompletes will not be given for avoidable problems such as unwise planning. The complete language covering the incomplete can be found online at
http://www.fpd.finop.umn.edu/groups/senate/documents/policy/gradingpolicy.html.

This publication/material is available in alternative formats upon request. Please contact the Educational Psychology Department, 250 Education Sciences Building, 612-624-6083.

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