

Statistics 3460
Principles of Statistics in Engineering
Spring 2018 Syllabus

Class Schedule: MWF: 8:00 - 8:55am Caldwell Lab (CL) room 120

Instructor: Dr. Judit Bach **Office:** Cockins Hall (CH) 212C

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Office Hours: MWF: 9:15 – 10:15 am and by appointment

Course Description:

The course provides an introduction to probability and statistics targeted toward students studying biomedical engineering. Topics covered include probability, random variables, the normal and binomial distributions, confidence intervals for means, hypothesis tests for means, multi-factor experiments, experiments with blocking, and regression. A more detailed list of topics can be found on the sample schedule below. **Students are responsible for all material covered in class, in the assigned readings and in homework problems.**

Assumed Background Knowledge and Prerequisites:

Calculus, integration, exponential function, finite and infinite sums, union and intersection of sets. Prerequisite courses are Math 1152 (153), 1161.xx, 1172 (254), or 1181.

Enrollment:

ADD and SECTION CHANGES will be processed (if space is available) starting at 7:30 AM on Tuesday, January 16th on a first-come, first-served basis in room 408A Cockins Hall. Cockins Hall opens by 6am. The instructor does not sign any add or section change forms; these must be taken to Jean Scott in 408A Cockins Hall for a signature.

Textbook:

Principles of Statistics for Engineers and Scientists by William Navidi 1st ed. ISBN 978-0-07-337634-9 MHID 0-07-337634-5. The book is available on reserve in the Science and Engineering Library as well as at the Mathematics & Statistics Learning Center (MSLC).

Format of Instruction:

Lecture, 3 contact hours per week.

College of Arts and Sciences GEC Statement:

Statistics 3460 satisfies the General Education (GE) requirement in Data Analysis.

Goals: Students develop skills in drawing conclusions and critically evaluating results based on data.

Expected Learning Outcomes: Students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

Methods: The focus of this course includes understanding of theoretical concepts, as well as problem solving applications of probability models and statistical inference. Examples include sampling, computing confidence intervals, hypothesis testing, statistical modeling using regression, ANOVA, and factorial designs.

Homework:

There are tentatively scheduled 8 graded homework assignments throughout the semester. You must show your work for all homework problems; do not just write the final answer. Policy regarding homework assignments is: late homework will not be accepted (no excuses). I understand that illness and other unplanned emergencies may pop up during the semester, and so I will drop your three lowest homework scores. I highly recommend that you save these “freebies” until you really need to use them! More details on homework assignments including required format are posted on Carmen. Solutions for homework assignments will be posted on Carmen after their due dates.

Exams:

There are two exams during the semester and a final exam. The exams are **closed book exams** with about 4-7 essay questions (6-12 for the final exam) **similar** in style and difficulty level to the suggested and turn-in homework problems and to the lecture examples. For each exam, you will be permitted one sheet of 8.5” x 11” **handwritten paper with formulas** you find helpful. (both sides of the paper may be used). The final exam is on Thursday, April 26 from 8:00-9:45am. For the final exam, two sheets of 8.5" x 11" paper (same rules as above) may be brought. The final exam will be cumulative, with a slight emphasis on those topics covered after the second midterm. A calculator should also be brought to all exams (no cell phone calculators or PDAs). Full credit for each exam problem can only be earned through showing your justification for or work on each problem. Answers without work will **not** receive full credit.

Attendance:

We use TopHat for attendance. Please, go to the **TopHat Home page** (<https://tophat.com/>) and either **login** (<https://app.tophat.com/login>) or **signup for an account** (<https://app.tophat.com/register/>), which is free for students at The Ohio State University. Please, use your **first and last name**, and add yourself to our class-list by using the following **Join Code** (within TopHat): **825361**.

Grading:

The final course grade will be based on:

Homework (best 5 out of 8, 4% each)	20%
Exam 1 (Friday, February 16 th)	25%
Exam 2 (Wednesday, March 28 th)	25%
Final Exam (Thursday, April 26 th)	30%
	100%

Percentage Grading Scale:

93% A 90% A- 87% B+ 83% B 80% B- 77% C+ 73% C 70% C- 67% D+ 60% D

Study Rooms and Help Hours - MSLC (Mathematics and Statistics Learning Center):

Our TAs hold office hours in the Mathematics and Statistics Learning Center in Cockins Hall room 134 starting the second week of classes. More details are on the MSLC webpage at <http://mslc.osu.edu>

Communication Devices:

Cell phones, PDAs and other communication devices must be either turned off or put on vibrate during class. Please refrain from texting during class as a courtesy to those sitting around you. All electronic devices other than a calculator must be shut off and put away during examinations.

E-mail Correspondence:

In order to protect your privacy, all course e-mail correspondence must be done through a valid OSU name.nn account. If you have not activated your OSU email account, you can activate your account at <https://my.osu.edu/>. **All e-mail correspondence regarding the class must have “Stat 3460” in the subject field.**

Drop Date:

The last day to drop the course without a 'W' appearing on your record is Friday, February 2, 2018.

The last day to drop the course without petitioning is Friday, March 23, 2018

Receiving an 'I' for the Course

You cannot receive an incomplete for the course unless 65% of the work in the course has been completed. Extenuating circumstances will be handled on a case-by-case basis.

Advice:

1. A tentative lecture schedule is given in this syllabus. Please, give a first reading to scheduled text sections **before** the lecture that covers that material.
2. The course moves rather quickly. If you are having difficulty, please **get help** as soon as possible. Homework assignments can be difficult if you wait until the last minute before trying any problems.
3. It is important that you provide sufficient details in writing up solutions to the problems for grading. It is also important that your solutions be **presented in a clear, easy to read** format. No credit will be given for work that is too sloppy or difficult to read.
4. The material becomes more complex as it moves along. The first exam material may feel easy compared to the second exam. **Keep working along** as the semester progresses.
5. Having the opportunity to use formula sheets on the exams also means that you are not given formulas and it is **your responsibility** to create your formula sheet and gather the necessary formulas you may need on an exam. Collecting important formulas along the way as we learn them is a good organized way to prepare your formulas sheet.
6. If you have a re-grade request on an exam, the request needs to be **written** on a sheet of paper attached to your original paper, within one week of the date the paper was first returned to class. If you are absent the day a graded paper is first returned to the class, it is your responsibility to come to me to get it in less than a week if you want to have a re-grade option available to you.

Academic Misconduct:

Please, help maintain an academic environment of mutual respect and fair treatment. You are expected to produce original and independent work on the exams. Although students are often encouraged to work together on homework assignments, all students must submit their own work in their own words.

Academic Misconduct Statement:

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term 'academic misconduct' includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Sexual Misconduct/Relationship Violence Statement:

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu.

Addressing Issues of Differing Abilities:

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Mental Health Statement:

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 or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling [614-292-5766](tel:614-292-5766). CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at [614-292-5766](tel:614-292-5766) and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org.

Diversity Statement:

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Note:

This syllabus and the calendar listed below **ARE SUBJECT TO CHANGE**.

Tentative Class Schedule and Reading assignments

Date	Topic	Section
M-Jan 8	Sampling, Summary measures, Graphical Plots	1.1-1.3
W-Jan 10	Probability Rules, Equally likely outcomes	3.1
F-Jan 12	Equally likely outcomes, Conditional Probability, independence	3.1-3.2
M-Jan 15	No Class Martin Luther King Jr. Day	
W-Jan 17	Independence, Discrete Random Variables, pmf, cmf	3.2-3.3
F-Jan 19	Expected Values & variances	3.3
M-Jan 22	Continuous RVs, density & distribution functions	3.3
W-Jan 24	Continuous RVs, density & distribution functions	3.3 Hw 1 due (1.1-3, 3.1-2)
F-Jan 26	Means and variances of continuous RVs	3.3
M-Jan 29	Functions of RVs, Linear combinations	3.4
W-Jan 31	Random sample, sample mean, propagation of error	3.4
F-Feb 2	Binomial distribution	4.1
M-Feb 5	Normal (Gaussian) distribution	4.3 Hw 2 due (3.3-4)
W-Feb 7	Lin Comb of normal RVs; normal prob plots	4.3, 4.7
F-Feb 9	Central Limit Theorem; Normal approx to binomial	4.8
M-Feb 12	Confidence int for mean of normal pop, var known; sample size calc	5.1-5.2
W-Feb 14	More Examples on CIs, Normal Approximation to Binomial	5.1.-5.2 Hw 3 due (Ch 4)
F-Feb 16	EXAM 1	Chs. 1-4
M-Feb 19	Large sample CIs for props	5.3
W-Feb 21	t intervals for means of normal pop	5.4
F-Feb 23	Prediction intervals, tolerance intervals	5.5
M-Feb 26	Hypothesis tests for pop means; large sample	6.1
W-Feb 28	Significance levels; p-values	6.2, 6.6 Hw 4 due (Ch 5)
F-Mar 2	t-tests	6.4
M-Mar 5	Power	6.7
W-Mar 7	Two-sample t-tests and confidence intervals	7.3
F-Mar 9	Paired t-tests and confidence intervals	7.4 Hw 5 due (Ch 6)
M-Mar 12	No Class Spring Break	
W-Mar 14	No Class Spring Break	
F-Mar 16	No Class Spring Break	
M-Mar 19	Practice: paired vs. two-sample	7.3-7.4
W-Mar 21	Scatter plots; Basics of Simple Linear Regression	2.1-2.3
F-Mar 23	Inference about slope and intercept	8.1
M-Mar 26	Inference for E[Y]; prediction intervals	8.1 Hw 6 due (Ch 7, Ch 2)
W-Mar 28	EXAM 2	Chs. 2, 5-7
F-Mar 30	Computer output; Assumption checking; Transformations	8.2
M-Apr 2	Multiple Regression; Computer output; Assumptions	8.3
W-Apr 4	Model selection; Forward, stepwise, subset selection	8.4
F-Apr 6	Experiments; Randomization, F-test; ANOVA	9.1
M-Apr 9	Experiments; Randomization, F-test; ANOVA	9.1
W-Apr 11	Two factor experiments	9.3 Hw 7 due (Ch 8)
F-Apr 13	Blocking	9.4
M-Apr 16	Saturated 2p factorial expts; Prob plots; Main effect	9.5
W-Apr 18	Saturated 2p factorial expts; Prob plots; Main effect	9.5
F-Apr 20	Fractional Factorial Design	handouts
M-Apr 23	Designs for response surfaces, Review	handouts Hw 8 due (Ch 9)
Th-Apr 26	Thursday 8:00-9:45am FINAL EXAM	Cumulative