Statistics 3450
Basic Statistics for Engineers
Spring 2020 (Section 20215) Syllabus

Class Schedule: MW: 4:10 - 5:05 pm Baker System (BA) room 120

Instructor: Dr. Judit Bach **Office**: Cockins Hall (CH) 212C
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Office Hours: MWF: 10:30 am – 11:30 pm and by appointment

Course Description:
The course provides an introduction to probability and statistics targeted toward students studying mechanical 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. 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.**

College of Arts and Sciences GEC Statement:
Statistics 3450 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 ANOVA and factorial designs.

Assumed Background Knowledge and Prerequisites:
Calculus, differentiation as well as integration, exponential function, finite and infinite sums, basic set operations. Prerequisite courses are Math 1152 (153), 1161.xx, 1172 (254), or 1181H or equivalent.

Format of Instruction: Lecture, 2 contact hours per week.

Topics: We will be covering all or parts of chapters 1, 3, 4, 5, 6, 7, 9.

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).

Website: Canvas at http://www.carmen.osu.edu/. Check periodically for announcements about the class and other class material.

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 **two 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 in the Homework module on Carmen. Homework must be submitted in hardcopy (**not** e-mailed).

Exams:
The two exams during the semester and the final exam are all **closed book exams** with both multiple choice (ca.3-10) and essay style questions (ca. 3-7), **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 made by you with formulas** you find helpful (both sides of the paper may be used). The final exam is on Monday, April 27 4:00-5:45 pm. For the final exam, two sheets of 8.5" x 11" paper (same rules as above) may be used. 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).

Expectations:
You will be assessed on your learning of ideas, concepts, and achievement of skills presented during lecture, on the course website, and in assigned readings. You should expect that **some** ideas, concepts or skills in assigned reading may **not** be reiterated in the lecture.

Attendance:
We use **TopHat** for attendance. It is **required** to bring a **portable device** (e.g. tablet, cell phone, laptop, or clicker) to the classes to access the TopHat classroom participation system. TopHat home page: https://tophat.com/ login page: https://app.tophat.com/login or signup for an account page: https://app.tophat.com/register/. **Important**: **your TopHat account should include both your OSU username and your full name exactly as it is listed on Carmen.** TopHat is free for students at The Ohio State University. **Detailed information can be found at** https://resourcecenter.odee.osu.edu/top-hat/using-top-hat-students. It is **your responsibility to get any and all material covered from a classmate if you miss class**.

Join Code for our class (within TopHat): 844570.

Grading:
The final course grade will be based on:

Homework (best 6 out of 8, 3% each)	18%
Attendance	2%
Exam 1 (Wednesday, February 12)	25%
Exam 2 (Monday, March 30)	25%
Final Exam (Monday, April 27)	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

E-mail Correspondence:
In order to protect your privacy, **all course e-mail correspondence must be made from a valid OSU name.# account and must have a subject field starting with the phrase "Stat 3450 MW 4:10 pm".** If you have not activated your OSU email account, you can activate your account at https://my.osu.edu/.

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 122 starting the second week of classes. More details are on the MSLC webpage at http://mslc.osu.edu

Communication Devices:
Other than the above listed TopHat activities, please otherwise refrain from using portable devices 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.**

Recording of Class:
Audio, video, and photographic recording of class content (e.g., lectures) is strictly **prohibited** without written authorization from the instructor. The transmission or sharing of any course content onto public, commercial, or social media sites is strictly **prohibited**.

Drop Date:
The last day to drop the course without a 'W' appearing on your record is Friday, January 31, 2020.
The last day to drop the course without petitioning is Friday, March 20, 2019

Advice:
1. A **tentative** lecture schedule is given in this syllabus. Give a first reading to scheduled text sections **before** the lecture that covers that material. **Announcements made in class or on Carmen supersede information in this syllabus. It is your responsibility to be up to date about the announcements.**

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. **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(s) 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(s).

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.eduor 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. 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 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 and Hw due
1	M-Jan 6	Sampling, Summary measures, Graphical Plots	1.1-1.3
2	W-Jan 8	Probability Rules, Equally likely outcomes	3.1
3	M-Jan 13	Conditional Probability, independence	3.2
4	W-Jan 15	Discrete Random Variables, pmf, cmf	3.3
	M-Jan 20	**No class--- Martin Luther King Jr. Day**	
5	W-Jan 22	Expected Values & variances	3.3 **Hw 1 (1.1-3, 3.1-2)**
6	M-Jan 27	Continuous RVs, density & distribution functions	3.3
7	W-Jan 29	Means and variances of continuous RVs	3.3
8	M-Feb 3	Random sample, sample mean, propagation of error	3.4
9	W-Feb 5	Binomial distribution	4.1 **Hw 2 (3.3-4)**
10	M-Feb 10	Normal (Gaussian) distribution	4.3
11	**W-Feb 12**	**Exam I**	**Ch. 1-4.1**
12	M-Feb 17	Lin comb of normal RVs; normal prob. plots	4.3, 4.7
13	W-Feb 19	Central Limit Theorem; Normal approx. to binomial	4.8
14	M-Feb 24	Confidence int. for mean of normal pop, var. known	5.1-5.2 **Hw 3 (Ch 4)**
15	W-Feb 26	Sample size calc.	5.2
16	M-Mar 2	t intervals for means of normal pop	5.4
17	W-Mar 4	Hypothesis tests for pop means; large sample	6.1 **Hw 4 (Ch 5)**
	M-Mar 9	**No Class—Spring Break**	
	W-Mar 11	**No Class—Spring Break**	
18	M-Mar 16	Significance levels; p-values	6.2, 6.6
19	W-Mar 18	t-tests, Power	6.4 , 6.7 **Hw 5 (6.1-2, 6.6)**
20	M-Mar 23	Power	6.7
21	W-Mar 25	Two-sample t-tests and confidence intervals	7.3 **Hw 6 (6.4, 6.7)**
22	**M-Mar 30**	**Exam II**	**Ch. 4-6**
23	W-Apr 1	Two-sample t-tests and CIs; One-way ANOVA, F-test	7.3, 9.1
24	M-Apr 6	One factor experiments; Randomization, F-test; ANOVA	9.1
25	W-Apr 8	Two factor experiments two-way ANOVA, Blocking	9.3, 9.4 **Hw 7 (7.3, 9.1)**
26	M-Apr 13	Randomized complete block design; 2^p factorial expts.	9.4, 9.5
27	W-Apr 15	2^p factorial expts; Prob. plots; Main effects	9.5 **Hw 8 due (9.3-5)**
28	M-Apr 20	Fractional Factorial Design	Handouts
	M-Apr 27	**FINAL EXAM 4:00-5:45 pm**	**Cumulative**