

Statistics 3470
Introduction to Probability and Statistics for Engineers
Autumn 2019 (Section 23995) Syllabus

Class Schedule: MWF: 10:20 – 11:15 am Knowlton Hall (KN) 0250

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

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Office Hours: MWF: 11:30 am – 12:30 pm and by appointment

Course Description:

The course provides an introduction to probability and statistics targeted toward students in several engineering disciplines. Topics covered include probability, Bayes Theorem, discrete and continuous random variables, probability distributions, expected values, sampling distributions, point estimation, confidence intervals, hypothesis testing and least squares regression models. A more detailed list of topics can be found in the tentative schedule below. **Students are responsible for all material covered in class, in the assigned readings and in homework problems, and expected to attend all classes.**

College of Arts and Sciences GEC Statement:

Statistics 3470 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, and statistical modeling using regression.

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 1181H or equivalent.

Format of Instruction:

Lecture, 3 contact hours per week.

Topics:

We will be covering all or parts of chapters 1 – 8, 12 – 14.

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

Textbook:

Probability and Statistics for Engineering and the Sciences (**9th edition**) by Jay Devore **with WebAssign** access. **Alternatively**, the **ebook and WebAssign access** can be purchased through the OSU WebAssign access. A paper copy of the book is also available on reserve in the Science and Engineering Library as well as at the Mathematics & Statistics Learning Center (MSLC).

WebAssign and Homework:

The **WebAssign electronic homework system (required)** includes access to the course textbook in ebook format. The login is located at <https://www.webassign.net/osu/login.html>. Use the “Log in @ Ohio State University” link.

Access is available in three formats (you only need to choose **one** of these formats):

- WebAssign only (which includes the textbook in eBook format)
- WebAssign and hard copy textbook
- Cengage Unlimited – which is a digital subscription provided by the course textbook publisher. The university bookstore lists a one-semester subscription for the course, but a 12-month subscription is also available.

Homework:

There are 11 **online homework assignments** tentatively scheduled throughout the semester. **They are specified and need to be turned in online through WebAssign.** There are turn-in (for grade) homework sets as well as suggested homework sets for additional practice. **The due dates are listed in the tentative daily schedule below and are also specified on WebAssign. Late homework will not be accepted.** In place of a one-time-forgiveness, instead of dropping the lowest homework score, the following better option will be given: An overall 80% performance on the homework assignments will count as 100% performance for the weight of the homework portion of the final grade. (accordingly, a 40% performance will count as a 50% for the homework portion etc.) **It is highly recommended that you reserve a notebook to record on paper how you solved the online homework problems!** It will be helpful when it is time to study for an exam. Solutions for homework assignments will be posted on Carmen after their due dates.

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 Tuesday, December 10 from 10:00-11:45am. 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 your 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): 820300.

Grading:

The final course grade will be based on:

Homework	18%
Attendance2%
Exam 1 (Monday, September 30)25%
Exam 2 (Wednesday, November 13)25%
Final Exam (Tuesday, December 10)	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 3470 10:20 am”.** 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.**

Drop Date:

The last day to drop the course without a ‘W’ appearing on your record is Friday, September 13, 2019. The last day to drop the course without petitioning is Friday, November 15, 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 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
1	W-Aug 21	Course Introduction; Sample Spaces and Events	2.1
2	F-Aug 23	Sample Spaces and Events; Axioms and Properties of	2.1, 2.2
3	M-Aug 26	Axioms and Properties of Probability; Counting Techniques	2.2, 2.3
4	W-Aug 28	Counting Techniques, Conditional Probability	2.3, 2.4
5	F-Aug 30	Conditional Probability, Bayes' Theorem and Independence	2.4, 2.5 Hw 1 due (2.1-3)
	M-Sep 2	No class – Labor Day	
6	W-Sep 4	Bayes' Theorem and Independence, Random Variables;	2.5, 3.1
7	F-Sep 6	Random Vars, Discrete Distributions; pmf, cdf, Expected Vals;	3.2, 3.3 Hw 2 due (2.4-5)
8	M-Sep 9	Expected Values; Binomial Distribution	3.3, 3.4
9	W-Sep 11	Binomial Distribution; Poisson Distribution	3.4, 3.6
10	F-Sep 13	Poisson Distribution, Probability Density Functions; cdf	3.6, 4.1, 4.2 Hw 3 due (3.1-
11	M-Sep 16	Prob. Density Functions; cdf, Expected Values & Variances	4.1, 4.2
12	W-Sep 18	Expected Values & Variances; Normal (Gaussian) distribution	4.1, 4.2
13	F-Sep 20	Normal (Gaussian) distribution	4.3 Hw 4 due (3.4,3.6,4.1)
14	M-Sep 23	Exponential and Gamma Distributions	4.4
15	W-Sep 25	Jointly Distributed Random Variables	5.1
16	F-Sep 27	Jointly Distributed Random Variables, Expected Values	5.1, 5.2 Hw 5 due (4.2-4)
17	M-Sep 30	EXAM 1	Ch 2-4
18	W-Oct 2	Exp. Values, Covariance & Correlation, Sample Mean Distr.	5.2, 5.3
19	F-Oct 4	Distribution of the Sample Mean; Central Limit Theorem	5.3, 5.4
20	M-Oct 7	Central Limit Theorem, Distribution of a Linear Combination	5.4, 5.5
21	W-Oct 9	General Concepts of Point Estimation	6.1
	F-Oct 11	No class – Autumn Break	
22	M-Oct 14	General Concepts and Methods of Point Estimation	6.1, 6.2 Hw 6 due (5.1-5)
23	W-Oct 16	Methods of Point Estimation	6.2
24	F-Oct 18	Basic Properties of Confidence Intervals	7.1
25	M-Oct 21	Confidence Intervals for a Population Mean	7.2 Hw 7 due (6.1-2)
26	W-Oct 23	Confidence Intervals for a Population Mean and Proportion	7.2
27	F-Oct 25	Intervals Based on a Normal Population Distribution	7.3 Hw 8 due (7.1-3)
28	M-Oct 28	Hypothesis and Test Procedures	8.1
29	W-Oct 30	Tests About a Population Mean	8.2
30	F-Nov 1	Tests About a Population Mean; The One Sample t Test	8.2, 8.3 Hw 9 due (8.1-2)
31	M-Nov 4	The One Sample t Test	8.3
32	W-Nov 6	Tests About a Population Proportion	8.4
33	F-Nov 8	Goodness-of-Fit Tests	14.1 Hw 10 due (8.3-4)
	M-Nov 11	No class — Veteran's Day	
34	W-Nov 13	EXAM 2	Ch 5 - 8
35	F-Nov 15	Simple Linear Regression Model	12.1
36	M-Nov 18	Simple Linear Regression; Estimating Model Parameters	12.1, 12.2
37	W-Nov 20	Estimating Model Parameters; Inferences About the Slope	12.2, 12.3
38	F-Nov 22	Inferences About the Slope; Inferences About Estimates	12.3, 12.4
39	M-Nov 25	Inferences About Estimates (Mean and Prediction)	12.4
	W-Nov 27	No class — Thanksgiving break	
	F-Nov 29	No class — Thanksgiving break	
40	M-Dec 2	Assessing Model Adequacy; Transformed Variables	13.1, 13.2
41	W-Dec 4	Multiple Regression	13.4 Hw 11 due (14.1,12.1-
	T-Dec 10	Tuesday 10:00-11:45 am FINAL EXAM	Cumulative