

Statistics 3470
Introduction to Probability and Statistics for Engineers
Spring 2020 (Section 20226) Syllabus

Class Schedule: MWF: 8:00 – 8:55 am 209 W. 18th Avenue (EA) 160

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

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Office Hours: MWF: 10:30 am – 11:30 am 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, 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, 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.). I strongly advise to plan wisely in using your “freebie” points. **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.3-15) 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 Thursday April 23 8:00-9:45 am. 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 and TopHat account mandatory format:

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 <http://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): 589280

Grading:

The final course grade will be based on:

Homework (online: Webassign)	18%
Attendance2%
Exam 1 (Monday, February 17)	25%
Exam 2 (Wednesday, April 1)	25%
Final Exam (Thursday, April 23)30%
	<hr/>
	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 8:00 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.**

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 exams. 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 formula 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 work out the details of the homework questions on their own.

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 M-Jan 6	Course Introduction; Sample Spaces and Events	2.1
2 W-Jan 8	Sample Spaces and Events; Axioms and Properties of Prob.	2.1, 2.2
3 F-Jan 10	Axioms and Properties of Probability; Counting Techniques	2.2, 2,3
4 M-Jan 13	Counting Techniques; Conditional Probability	2.3, 2.4
5 W-Jan 15	Conditional Probability, Bayes' Theorem and Independence	2.4, 2.5 Hw 1 due (2.1-3)
6 F-Jan 17	Bayes' Theorem and Independence; Random Variables	2.5, 3.1
M-Jan 20	No class--- Martin Luther King Jr. Day	
7 W-Jan 22	Random Vars, Discrete Distributions; pmf, cdf, Expected Vals	3.2, 3.3 Hw 2 due (2.4-5)
8 F-Jan 24	Expected Values; Binomial Distribution	3.3, 3.4
9 M-Jan 27	Binomial Distribution; Poisson Distribution	3.4, 3.6
10 W-Jan 29	Poisson Distribution, Probability Density Functions; cdf	3.6, 4.1, 4.2 Hw 3 due (3.1-3)
11 F-Jan 31	Prob. Density Functions; cdf, Expected Values & Variances	4.1, 4.2
12 M-Feb 3	Expected Values & variances; Normal (Gaussian) distribution	4.1, 4.2
13 W-Feb 5	Normal (Gaussian) distribution	4.3 Hw 4 due (3.4,3.6,4.1)
14 F-Feb 7	Exponential and Gamma Distributions	4.4
15 M-Feb 10	Jointly Distributed Random Variables	5.1
16 W-Feb 12	Jointly Distributed Random Variables, Expected Values	5.1, 5.2 Hw 5 due (4.2-4)
17 F-Feb 14	Exp. Values, Covariance & Correlation, Sample Mean Distr.	5.2, 5.3
18 M-Feb 17	EXAM 1	Ch 2-4, 5.1
19 W-Feb 19	Distribution of the Sample Mean; Central Limit Theorem	5.3, 5.4
20 F-Feb 21	Central Limit Theorem; Distribution of a Linear Combination	5.4, 5.5
21 M-Feb 24	General Concepts of Point Estimation	6.1
22 W-Feb 26	General Concepts and Methods of Point Estimation	6.1 6.2 Hw 6 due (5.1-5)
23 F-Feb 28	Methods of Point Estimation	6.2
24 M-Mar 2	Basic Properties of Confidence Intervals	7.1
25 W-Mar 4	Confidence Intervals for a Population Mean	7.2 Hw 7 due (6.1-2)
26 F-Mar 6	Confidence Intervals for a Population Mean and Proportion	7.2
M-Mar 9	No Class—Spring Break	
W-Mar 11	No Class—Spring Break	
F-Mar 13	No Class—Spring Break	
27 M-Mar 16	Intervals Based on a Normal Population Distribution	7.3
28 W-Mar 18	Hypothesis and Test Procedures	8.1 Hw 8 due (7.1-3)
29 F-Mar 20	Tests About a Population Mean	8.2
30 M-Mar 23	Tests About a Population Mean; The One Sample t Test	8.2, 8.3
31 W-Mar 25	The One Sample t Test	8.3 Hw 9 due (8.1-2)
32 F-Mar 27	Tests About a Population Proportion	8.4
33 M-Mar 30	Goodness-of-Fit Tests	14.1 Hw 10 due (8.3-4) !
34 W-Apr 1	EXAM 2	Ch 5 - 8
35 F-Apr 3	Goodness-of-Fit Tests, Simple Linear Regression Model	14.1, 12.1
36 M-Apr 6	Simple Linear Regression; Estimating Model Parameters	12.1, 12.2
37 W-Apr 8	Estimating Model Parameters; Inferences About the Slope	12.2, 12.3
38 F-Apr 10	Inferences About the Slope; Inferences About Estimates	12.3, 12.4
39 M-Apr 13	Inferences About Estimates (Mean and Prediction)	12.4
40 W-Apr 15	Assessing Model Adequacy	13.1 Hw 11 due (14.1,12.1-4)
41 F-Apr 17	Transformed Variables; Multiple Regression	13.2, 13.4
42 M-Apr 20	Multiple Regression	13.4
Th-Apr 23	FINAL EXAM 8:00-9:45 am	Cumulative