**Instructor:** Kevin Donges
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**Office Hours:** MWF 12:30 to 1:30 or by appointment

**Recitation Instructors:** Bo Luan (8:00 am, 4:10 pm)      Amartya Gosh (3:00 pm, 5:20 pm)
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**TA Office Hours:** https://mslc.osu.edu/courses/stat/4201420253015302

**Course Description:** This course introduces basic concepts in mathematical statistics, including probability, discrete and continuous distributions and densities, mathematical expectation, functions of random variables, transformation techniques, sampling distributions, order statistics. After successfully completing the course, students can understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

**Textbook:** *John E. Freund's Mathematical Statistics with Applications,* 8th Edition, by I. Miller and M. Miller

**Topics:** We will be covering chapters 1 (Introduction), 2 (Probability), 3 (Probability Distributions and Densities), 4 (Mathematical Expectation), most of chapter 5 (Special Probability Distributions), most of chapter 6 (Special Probability Densities), 7 (Functions of Random Variables), 8 (Sampling Distributions).

**Prerequisite:** C- or better in MATH 2153 (254), 2162.xx (263), 2182H (263.01H), or 4128H (264H), or permission of the instructor. Not open to students with credit for 6201 (520), 6301 (610), 6801 (620), 420, or MATH 4530 (530).

**Website**: The course website is carmen.osu.edu; please check it regularly.  On the site you will find announcements, the syllabus, homework assignments, solutions, and grades (NOTE: The gradebook on Carmen is just that – a gradebook. It is used solely as a place to record your grade and the default Carmen overall grade will not be correct; as such, it should be ignored.)

**Important Dates:** The last day to drop a course is Friday, September 14th. The last day to withdraw from a course without petitioning is Friday, October 26th. There will be no class Monday, September 3rd (Labor Day), Friday, October 12th (Autumn Break), Monday, November 12th (Veterans Day – Observed), Wednesday, November 21st and Friday, November 23rd (Thanksgiving Break).

**Extra Help:** The Mathematics and Statistics Learning Center provides group tutoring in Cockins Hall 134 beginning August 27th. More information can be found at https://mslc.osu.edu/mslc-free-tutoring.

**Email Correspondence:** In order to protect your privacy all email correspondence must be done through a valid OSU name.# account; any email from a non-osu.edu account will be ignored. Please make sure to include "STAT 4201" in the subject line. Note that the faculty and student (buckeyemail) email systems are completely separate. As an alum, I am in both and the latter will autocomplete my buckeyemail address; if you send an email to this address I will not receive it. Your best bet is to contact me through Carmen. In addition, I will not respond to questions which can be answered by looking at the syllabus or Carmen, by a quick search on osu.edu or Google, and/or were announced in class. Please allow up to 48 hours for responses to other inquiries made via email.

**Evaluation:**

| | |
|---|---|
| Homework | 20% |
| Quizzes | 20% |
| Exam 1 (Friday, September 28th) | 20% |
| Exam 2 (Wednesday, October 31st) | 20% |
| Final Exam (Monday, Dec. 10th 8:00 – 9:45) | 20% |

Homework due dates will be announced in class and on Carmen. There will be approximately 5 homework assignments; each will have some problems graded for accuracy and some graded for completion. Homework is due at the beginning of recitation; late homework will not be accepted. Homework must be turned in during your recitation time and you must take quizzes with your recitation section.

The dates for the exams are tentative and I reserve the right to change the dates of any and all assessments; at least one week of notice will be provided in case of a change. All homework assignments and in-class assessments must be competed in pencil. No makeup quizzes or exams will be given. Please note that solutions, not answers, will be graded; a correct answer alone will not get full credit if the steps leading to it are not clear and/or correct. If you find a discrepancy in the grading of an assessment (e.g., incorrect addition/subtraction, correct answer marked incorrect, etc.) then you must bring it to my attention no later than one week from the day it is returned. After that no grade will be changed for any reason whatsoever.

 The grading scale will be no harsher than the following scale:

| A | A- | B+ | B | B- | C+ |
|---|---|---|---|---|---|
| [93,100] | [90,93) | [87,90) | [83,87) | [80,83) | [77,80) |
| C | C- | D+ | D | E | |
| [73,77) | [70,73) | [67,70) | [60,67) | [0,60) | |

**Calculators:** Please note that at no time will you be permitted to share a calculator with another student, use a calculator with a CAS, or use any internet enabled device (e.g., a cell phone) as a calculator.

**Attendance:** While I will not be taking attendance, you are expected to attend every class session. If you miss class then it is your responsibility to get any and all material covered from a classmate. Arriving late or leaving early is distracting to your classmates, and me and will not be tolerated.

**Electronic devices:** Use of communication devices and technology for activities other than class work disrupt the learning process for you and others in the class and will not be tolerated.  Cell phones and other electronic devices should be turned off or silenced during class.

**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 dissemination of all course content onto public, commercial, or social media sites is strictly prohibited.

**Accommodation:** 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.  You are also welcome to register with Student Life Disability Services to establish reasonable accommodations.  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.)

**Academic Misconduct:** Please help us to maintain an academic environment of mutual respect, fair treatment, and personal growth. You are expected to produce original and independent work for exams and homework. Although students are often encouraged to work together on homework assignments, all students must submit their own written work in their own words. 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 at http://studentlife.osu.edu/csc/.

**Final Comment:** It is crucial that we have a mutual respect for one another as members of the OSU community and that we conduct ourselves accordingly. My responsibilities include coming to class prepared to teach you statistics, giving clear lectures, assigning carefully chosen homework problems that are relevant to our course, and carefully preparing quiz and exam questions that accurately measure your progress in the course. Additionally, I am responsible to be available to you outside of class for consultation in office hours and by appointment. Likewise, I expect you to come to class motivated to learn the material. This involves reading the material ahead of time, promptly starting the homework assignments, and seeking additional help before it is too late**.** Ultimately, you are responsible for your university education and what you take from it.

**I reserve the right to change any and all items on this syllabus – any changes as well as official due dates and exam dates will be announced in class.**

**Tentative Schedule:** (Items marked with "*" may be omitted)

| Date | Lecture Topic | Textbook Reading |
|------|---------------|------------------|
| 8/22 | Intro to Probability; Review of Combinations/Permutations | 1.1 – 1.3; 2.1 – 2.4 |
| 8/24 | Probability Rules; Conditional Probability | 2.4, 2.5 |
| 8/27 | Conditional Probability; Independent Events | 2.6, 2.7 |
| 8/29 | Bayes' Theorem | 2.8 |
| 8/31 | Random Variables and Probability Distributions | 3.1, 3.2 |
| 9/3 | No Class; Labor Day | |
| 9/5 | Continuous Random Variables and Probability Density Functions | 3.3, 3.4 |
| 9/7 | Multivariate Distributions | 3.5 |
| 9/10 | Marginal and Conditional Distributions | 3.6, 3.7 |
| 9/12 | Expected Value | 4.1, 4.2 |
| 9/14 | Moments and Moment Generating Functions | 4.3, 4.5 |
| 9/17 | Moment Generating Functions; Product Moments | 4.5, 4.6 |
| 9/19 | Product Moments | 4.6 |
| 9/21 | Moments of Linear Combinations of Random Variables | 4.7 |
| 9/24 | Conditional Expectation | 4.8 |
| 9/26 | Review for Exam 1* | |
| 9/28 | Exam 1 (1.1 – 4.8) | |
| 10/1 | Discrete Uniform Distribution; Bernoulli Distribution | 5.1 – 5.3 |
| 10/3 | Binomial Distribution | 5.4 |
| 10/5 | Negative Binomial Distribution; Geometric Distribution | 5.5 |
| 10/8 | Hypergeometric Distribution | 5.6 |
| 10/10 | Poisson Distribution | 5.7 |
| 10/12 | No Class; Autumn Break | |
| 10/15 | Multinomial Distribution | 5.8 |
| 10/17 | Continuous Density Functions; Uniform Distribution | 6.1, 6.2 |
| 10/19 | Gamma Distribution; Exponential Distribution; Chi-Square Distribution | 6.3 |
| 10/22 | Beta Distribution; Weibull Distribution; Pareto Distribution | 6.4 |
| 10/24 | Normal Distribution | 6.5 |
| 10/26 | Normal Approximation to the Binomial | 6.6 |
| 10/29 | Review for Exam 2* | |
| 10/31 | Exam 2 (5.1 – 6.6) | |
| 11/2 | Functions of Random Variables; Distribution Function Technique | 7.1, 7.2 |
| 11/5 | Transformation Techniques: One Variable | 7.3 |
| 11/7 | Transformation Techniques: One and Two Variables | 7.3, 7.4 |
| 11/9 | Transformation Techniques: Two Variables | 7.4 |
| 11/12 | No Class; Veterans Day – Observed | |
| 11/14 | Moment Generating Function Technique | 7.5 |
| 11/16 | Sampling Distributions; Sampling Distribution of the Mean | 8.1, 8.2 |
| 11/19 | Sampling Distribution of the Mean; Central Limit Theorem | 8.2 |
| 11/21 | No Class; Thanksgiving Break | |
| 11/23 | No Class; Thanksgiving Break | |
| 11/26 | Chi-Square Distribution | 8.4 |
| 11/28 | t Distribution | 8.5, 8.6 |
| 11/30 | F Distribution | 8.5, 8.6 |
| 12/3 | Order Statistics | 8.7 |
| 12/5 | Review for Final Exam* | |
| 12/10 | Comprehensive Final Exam 8:00AM – 9:45AM | |