

**MTH 464: Probability II** 3 credits Sections 001, Winter 2017

**Web Address:** <http://www.math.oregonstate.edu/~ossiand/4-564-2017.html>

**Catalog Description:** Transformations of random variables; sums of independent random variables, generating functions, characteristic functions, the central limit theorem and other weak limit theorems.

**Prerequisites:** MTH 463 and MTH 341 required.

**Meets:** Three 50 minute meetings weekly at 3:00 pm MWF.

**Instructor:** Professor Ossiander, Kidder 298B, [ossiand@math.oregonstate.edu](mailto:ossiand@math.oregonstate.edu)

**Office Hours:** Monday 1:00-2:30pm; Friday 10:30am-noon; additional hours by appointment.

**Course Description:** Math 464 is the second term of Oregon State's senior level course in probability theory. The main goal of this class is to build on students' understanding of basic probability models to study joint distributions of random variables, transformations of random variables, and limit theorems for sums of random variables. Mathematical tools to be developed include generating functions and characteristic functions (Fourier transforms). It is assumed that students in the class have completed a course equivalent to OSU's MTH 463. Students are also expected to have had an introduction to real analysis such as OSU's advanced calculus sequence.

**Course Content:** The content of this course includes the following.

- Jointly distributed random variables
- Transformations of random variables
- Conditional distributions, densities, and expectations
- Generating functions and characteristic functions
- Limit theorems of sums of random variables

**Learning Resources:** The required course text is 'Probability and Random Processes', by Geoffrey Grimmett and David Stirzaker, third edition, published by Oxford University Press 2001.

**Learning Outcomes:** Upon completing MTH 464 a successful student is expected to be able to do the following.

1. Use multivariable probability densities and distributions to calculate the probability of given events.
2. Use multivariable probability densities and distributions to calculate the distribution of transformations of random variables.
3. Use multivariable probability densities and distributions to calculate conditional densities, distributions, and expectations.
4. Use generating functions and characteristic functions to deduce distributional characteristics of random variables.

5. Use probability distributions, generating functions, and characteristic functions to infer convergence of random variables.

**Course Plan:** Class meetings will be split between lectures on course topics and problem presentations by students. We will move systemically through Chapters 4 and 5 of the text book; this term we should cover most of these two chapters.

Homework will be assigned weekly, with students presenting solutions to some problems in class. Late homework is strongly discouraged.

There will be one in-class midterm examination and a take-home final examination.

**Evaluation of Student Learning:** (Approximate percentages given.)

- Homework problems 30 %
- Midterm 35 %
- Final Exam: 35 %

**Students with Disabilities:** Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at <http://ds.oregonstate.edu>. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

**Student Conduct:** All students are expected to obey OSU's student conduct regulations. Here is the link to OSU's Statement of Expectations for Student Conduct: <http://studentlife.oregonstate.edu/studentconduct/offenses-0>