

CENTRAL WASHINGTON UNIVERSITY  
Mathematics 411A, Introduction to Probability  
Fall, 2018

Professor Yvonne Chueh      Telephone: 963-2124      Office: SAMU 218 I  
e-mail: [chueh@cwu.edu](mailto:chueh@cwu.edu)      Office Hours: M-F 1:00-1:50, and by appointment  
Webpage <http://www.cwu.edu/faculty/chueh>

## OVERVIEW OF COURSE

### OVERALL COURSE OBJECTIVES:

The major objectives of this course are to help students:

1. Gain the knowledge and ability to work with probability reasoning, conditional Probability concepts, density and distribution functions, expectation and volatility of random variables within study scope.
2. Learn to formulate and solve probability related problems from the real world, including but not restricted to more challenging applications in insurance and actuarial fields.

### Student Outcomes:

At the conclusion of this course, the student will be able to:

1. Solve basic “counting” problems.
2. Understand and apply the axiomatic approach to probability theory.
3. Understand independence, find conditional and unconditional probabilities and apply Bayes’ Theorem.
4. Apply all the standard discrete and continuous probability distributions.
5. Understand and calculate mathematical expectations for random variables and functions of random variables.

### COURSE MATERIALS REQUIRED:

Probability and Statistical Inference. 9<sup>th</sup> Edition. Hogg|Tanis|Zimmerman. Published by Pearson.

### SELF-STUDY MATERIALS HIGHLY RECOMMENDED:

One of the following study manuals or online quiz subscription is highly recommended.

Actex study manual; ASM study manual for SOA Exam P; Adapt In Classroom Exam P.

**Advance reading** of the problems and text material is essential to good performance in this course. This textbook is particularly easy to read, and that is the main reason for its choice. There are a number of difficult topics, however, and I will supplement the material with handouts, discussions, and examples. The course is demanding and fast paced---far more so than Math 311, for example. Advice from previous students is: "If you want to do well, *go to class every day, study your notes, and do not fall behind.*"

### COURSE POINTS:

<b>Attendance and Class Participation</b>	20 points
<b>Worksheets/Homework</b>	50 points
<b>Ten Quizzes</b>	50 points
<b>Three Chapter Tests</b>	300 points
<b>Final Exam</b>	100 points
<b>Total</b>	520 points

The final exam is cumulative.

### LEVEL OF AWARENESS ISSUES INCORPORATED IN THIS COURSE:

AWARENESS ISSUE	-----ACTIVITY LEVEL-----			
	NONE	LOW	MODERATE	HIGH
Graphical Data Display		*		
Data/Information Sources		*		
Interpret Information				*
Mathematical Proof		*		
Probability Principles				*
Solving Problems				*

Final grades will be assigned according to the following scale:

<b>A</b> 100-93%	<b>A-</b> 92.9-90%	
<b>B+</b> 89.9-87%	<b>B</b> 86.9-83%	<b>B-</b> 82.9-80%
<b>C+</b> 79.9-77%	<b>C</b> 76.9-73%	<b>C-</b> 72.9-70%
<b>D+</b> 69.9-67%	<b>D</b> 66.9-63%	<b>D-</b> 62.9-60%
<b>F</b> 59.9% and below		

### Class Expectations

- **Think critically.** This course will require critical thinking. People that analyze, infer, evaluate, and make reasoned judgments do better in college and career, make better daily decisions, and have greater professional success. Developing critical thinking and reasoning should be a key goal of every student.
- **Apply yourself.** This course will take a lot of time and energy. You should have high learning expectations and challenge yourself. Success in this course will require significant effort (several hours of study time for each hour of class). Depending on your mathematical background, you may need to spend more or less study time. Attend class regularly, be on time, and budget your time to accommodate the workload.
- **Ask questions.** Loss Modeling is fascinating, but it can be confusing sometimes, too. Ask questions. If you aren't clear on something, there are likely others who are equally unclear on the specific detail or area. Asking questions also help your peers and the instructor deliver/facilitate effective lessons.
- **Be informed.** People sometimes use information to manipulate others' behaviors and decision-making in ways not always to your benefit. If you don't understand the mathematical basis of a claim about data, you can't make an informed decision about it. Be curious; try and find out all you can about a topic before you make a decision that may profoundly affect your life and career.
- **Communicate clearly.** Effective written and oral communication of difficult concepts and techniques indicates an intelligent mind and true understanding. Clarity, proper format, spelling, and grammar are expected of every student.
- **Use common sense.** Cheating on assignments or exams, plagiarizing others' work, and turning in late assignments is unacceptable. Any infractions may result in a zero for the assignment, a failing course grade, and the possibility of disciplinary action by the university. I won't accept *anything* late unless you have written documentation from an appropriate source or have made prior arrangements with me. If you have a problem that prohibits you from turning something in on time, let me know ahead of time. In all instances, communicate with me so we can prevent future problems.

## TEST POLICY

Because of the timely nature of the tests, no make-ups will be given. A grade of zero will be assigned unless you contact me **before** the scheduled time and provide an acceptable excuse. A weighted average of your score on the remaining tests will be used for the missing score. Final examination policy is as established by the Dean of Students.

## HOMEWORK POLICY

Homework will be assigned and collected. Working on exercises and homework is the only way most of us learn to critically analyze and "solve" problems.

Some class time will be devoted to questions on the exercises and homework. Office hours are also scheduled to provide opportunities for more in-depth discussion of homework problems.

Your homework must be well **stapled** and written/printed on **flat papers**. Failing to do any one of the above will result in losing homework points.

No late homework will be accepted once it's graded and returned to the class.

## SCHEDULE OF CLASS TOPICS AND ASSIGNMENTS

A tentative list of timing of topic coverage and chapter tests is presented below. Due to the intensive nature of the course, and possible variability in student backgrounds and learning process, we may deviate from this schedule. Please pay attention to the announcements.

<u>Week</u>	<u>Section Reading Assignment</u>	<u>Topic</u>
1 Sept 19-21	1.1~1.2	<b>(Probability)</b> <ul style="list-style-type: none"> <li>• Properties of Probability</li> <li>• Methods of Enumeration</li> </ul>
	<b>Quiz 1</b>	
2 Sept 24-28	1.3~1.5	<ul style="list-style-type: none"> <li>• Conditional Probability</li> <li>• Independent Events</li> <li>• Bayes' Theorem</li> </ul>
	<b>Quiz 2</b>	
3 Oct 1-5	<b>Quiz 3</b>	Review and Problem Solving

<b>Oct. 4</b>	<b>Chapter Test 1</b>
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4 Oct.8-12	2.1~2.3	<b>(Discrete Probability Distributions)</b> <ul style="list-style-type: none"> <li>• Random Variables of the Discrete Type</li> <li>• Mathematical Expectation</li> <li>• Special Mathematical Expectation</li> </ul>
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**Quiz 4**

5  
Oct. 15-19      2.4~2.6

- The Binomial Distribution
- The Negative Binomial Distribution
- The Poisson Distribution

**Quiz 5**

6  
Oct. 22-26      **Quiz 6**      Review and Problem Solving

**Oct. 25**

**Chapter Test 2**

7  
Oct. 29-Nov. 2      3.1~3.3

**(Continuous Distributions)**

- Random Variables of the Continuous Type
- The Exponential, Gamma, and Chi-Square Distributions
- The Normal Distribution

**Quiz 7**

8  
Nov. 5-9      4.1~4.3

- Bivariate Distributions of the Discrete Type
- The Correlation Coefficient
- Conditional Distributions

**Quiz 8**

9  
Nov. 12-16      Review and Problem Solving

**Quiz 9**

**Nov. 15**

**Chapter Test 3**

10  
Nov. 19-23      **Quiz 10**      **THANKSGIVING HOLIDAY!**

11  
Nov.26-30

**Winter Break Project**

Review and Problem Solving

12

**Dec.3-7**

***FINAL EXAM!!***