Spring 2-1-2022

M 115.00: Probablility and Linear Mathematics

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Probability and Linear Mathematics (M115–00)

Syllabus – Spring 2022

Instructor Information

- ✓ **Lecturer:** Rick Darnell richard.darnell@umt.edu
  Office: Math 004C, 406-243-6812
  Office Hours: As posted and by appointment
- ✓ **Teaching Assistants**: Contact info, office hours schedule, office hours location.
  Anna Larson anna.larson@umontana.edu, 3-5 pm Thurs in the MLC.
  Sections: 11 am, 12 and 1pm
  Junwei Liao junwei.liao@umontana.edu, 1-3 pm Thurs in Corbin 364.
  Sections: 8, 9 and 10 am

Catalog Description:

M 115 - Probability and Linear Mathematics Credits: 3. Offered every term. Prereq. M 090 with a grade of B- or better, or M 095, or M01 placement ≥17, or ALEKS placement ≥ 3, or ACT score of 22, or SAT score of 550(with the new test). Systems of linear equations and matrix algebra. Introduction to probability with emphasis on models and probabilistic reasoning. Examples of applications of the material in many fields.

Learning Outcomes:

Upon completion of this course, students will be able to:

1. Find, understand and use linear equations to solve application problems.
2. Set up and solve systems of linear equations, and apply them appropriately.
3. Set up and solve linear programming problems (graphical method only).
4. Use linear regression and understand its uses as well as its limitations.
5. Use basic probability: sample spaces with equally likely outcomes, counting, conditional probability, Bayes' theorem, binomial probabilities, probability distributions, tree diagrams, Venn diagrams, two-way tables.
6. Use probability distributions: the binomial and normal distributions, and the normal approximation to the binomial distribution.
7. Use descriptive statistics: graphical displays, measures of center and spread.
8. Solve word problems involving the above concepts (this includes being able to precisely formulate a problem, and to interpret solutions).

General Education Learning Outcomes:

Upon completion of the mathematical literacy requirement, a student will be able to effectively apply mathematical or statistical reasoning to a variety of applied or theoretical problems.

Course Content:

1. Sets and Probabilities (Sets and their description, Basic Concepts of Probability, Conditional Probability; Independent Events, Bayes' Theorem)
2. Counting principles; Further Probability Topics (The Multiplication Principle, Permutations, Combinations, Probability Applications of Counting Principles, Binomial Probability, Probability Distributions; Expected Value)
3. Statistics (Controlling error in computation, Frequency Distributions; Measures of Central Tendency, Measures of Variation, The normal distribution, Normal Approximation to the Binomial Distribution)

4. Linear Functions (Slopes and Equations of Lines, Linear Functions and applications, linear vs. exponential functions)
5. Problem Solving Guidelines, Uses of Percentages, Orders of Magnitude
6. Linear Programming, The Graphical Method (Graphing Linear Inequalities, Solving Linear Programming Problems Graphically, Applications)

Required Materials

- **Texts:** *Applied Finite Mathematics* (Bloom), *Business Precalculus* (Lippman), *Introductory Statistics* (Illowsky, Dean, et.al), *Math in Society* (Lippman). These are *free* open educational resource (OER) textbooks and are available to download on Moodle. You can order a printed copy as well through Lulu.com for a small fee. Please note that each text section is linked to every section on the math site MyOpenMath.
- **Online Homework:** All online homework and testing is completed through MyOpenMath. Clicking on an assignment link in Moodle will create your account.
  Watch this YouTube video for an orientation on working with MyOpenMath.
- **Online Polling:** You will need a laptop, tablet, phone or other device to access online tools for responding to questions and discussions in class.
- **Calculator:** Most scientific calculators will work fine. Graphing calculators will be additionally useful for graphs and their interpretation. Demonstrations will be done with a TI-84 and Desmos.

Grading:

Your course grade is based on the following:

10%: Class participation, including weekly attendance reports, and polls
20%: Lab Activities, with lowest two dropped (*see below*)
20%: Online Homework
50%: 2 Unit Tests + 1 Cumulative Final, schedule TBA

To earn the grade…	receive this percentage in Moodle
A	≥ 90%
B	80% - 89%
C	65% - 79%
D	55% - 64%
CR	≥ 55%
F/NCR	< 55%

This class uses research-based methods in an active-learning format with frequent classroom discussions. Attendance and participation are essential for success. Attendance is taken through online polling software and attendance surveys.

All due dates (including quizzes) will be announced in class and posted on Moodle and MyOpenMath. All assignment due dates are announced well in advance, along with posting on Moodle and MyOpenMath. It is your responsibility to keep up to date on all such announcements.

Exam Extensions/Make-ups: Possible with advance notice and instructor permission (before the due date). Missed due dates without instructor contact are recorded as 0, with exceptions granted for extenuating circumstances (serious illness or hospitalization, death in the family).

Missed Homework/Late Work: You receive five late passes when you enroll in the MyOpenMath class. These passes reopen an assignment for up to 4 days after the deadline for an assignment. THERE

ARE NO MAKE-UPS for **lab activities**, regardless of the reason (e.g. sickness, sports, family emergency, etc.).

NOTE: If you are taking this course to fulfill a general education requirement or a requirement for your major or minor, you must take it for a traditional letter grade (not CR/NCR). If you decide to take this course with CR/NCR grading, a "D" is passing and will earn credit for the course. ***It will NOT*** fulfill your general education requirement NOR any requirement for your major or minor.

Incomplete (I) Grades:

You must meet these conditions for an incomplete:

1. Attendance greater than 80% and a passing grade (C or better) up to 3 weeks before the semester ends; and
2. Inability to complete the course due to extenuating circumstances, which usually means serious illness or death in the family; and
3. A written agreement on how the course requirements will be completed within 12 months. If the incomplete will automatically revert to the grade assigned at the time of the incomplete.

Incompletes are only given at the discretion of the instructor, per University of Montana policies and procedures. See the current catalog for further information.

Important Dates:

- Jan. 26: Last day to add/drop, or change grading option on CyberBear
- Feb. 7: Last day to drop on Cyberbear with refund. Last day to withdraw from all classes with a partial refund. Last day to buy or refuse UM student health coverage.
- Mar. 29: Last day to drop with instructor and advisor approval in CyberBear ($10 fee applies). Last day to change grading options using CyberBear.
- Mar. 30 2 - May 6: Drop using the Course Add/Change/Drop link with instructor and advisor permission ($10 fee applies). A "WP" or "WF" will appear on the transcript. Change grading options using Course Add/Change/Drop link.
- May 6: Last day of class
- May 20: Grades posted to CyberBear!

University Holidays (no school, campus closed):

- February 21: Presidents' Day
- March 21-25: Spring Break.

Misconduct:

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code.

Disability modifications:

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Office for Disability Equity. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with ODE, please contact them in Lommasson Center 154 or call 406.243.2243. I will work with you to provide an appropriate modification.

Schedule

The schedule is subject to modifications as announced in class. **It is your responsibility to keep up to date on all such announcements.**

Monday	Wednesday	Thursday - Lab	Friday
Jan 17 Intro	Jan 19 Intro/Lesson 1	Jan 20 Lab Intro	Jan 21 Lesson 1
Jan 24 Lesson 1	Jan 26 Lesson 1/2	Jan 27 Lab Activity 1	Jan 28 Lesson 2
Jan 31 Lesson 2/3	Feb 2 Lesson 3	Feb 3 Lab Activity 2	Feb 4 Lesson 3/4
Feb 7 Lesson 4	Feb 9 Lesson 4	Feb 10 Lab Activity 3	Feb 11 Lesson 5
Feb 14 Lesson 5	Feb 16 Lesson 5	Feb 17 Test Review 1-4	Feb 18 Lesson 6
Feb 21 Presidents' Day	Feb 23 Lesson 6	Feb 24 Lab Activity 4	Feb 25 Lesson 6
Feb 28 Lesson 6	Mar 6 Lesson 7	Mar 7 Lab Activity 4	Mar 8 Lesson 7
Mar 7 Lesson 7	Mar 9 Lesson 8	Mar 10 Lab Activity 5	Mar 11 Lesson 8
Mar 14 Lesson 8	Mar 20 Lesson 9	Mar 21 Lab Activity 6	Mar 22 Lesson 9
Mar 21 Spring Break	Mar 27 Spring Break	Mar 28 Spring Break	Mar 29 Spring Break
Mar 28 Lesson 10	Mar 30 Lesson 10	Mar 31 Lab Activity 7	Apr 1 Lesson 11
Apr 4 Lesson 11	Apr 6 Lesson 12	Apr 7 Test Review 1-11	Apr 8 Lesson 12
Apr 11 Lesson 13	Apr 13 Lesson 13	Apr 14 Lab Activity 8	Apr 15 Lesson 14
Apr 18 Lesson 14	Apr 20 Lesson 15	Apr 21 Lab Activity 9	Apr 22 Lesson 15
Apr 25 Lesson 15	Apr 27 Lesson 16	Apr 28 Lab Activity 10	Apr 29 Lesson 16
May 2 Lesson 16	May 4 Lesson 17	May 5 Lesson 17	May 6 Review
FINAL EXAM DUE MAY 12, 5:20 pm *Final Exam is online and due by the scheduled final exam date and time, no exceptions.*			