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M 105.01: Contemporary Mathematics

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M105 – 01: Contemporary Mathematics Spring 2022

Instructor Information

✓ **Lecturer:** Rick Darnell richard.darnell@umontana.edu

Office: Math 004C, 406-243-6812

Office Hours: [As posted](#) and by appointment

Catalog Description:

[M105 - Contemporary Mathematics](#) Credits: 3. Offered every term. Prereq. M 090 with a grade of C 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), or completion of the M105 [EdReady](#) module. An introduction to mathematical ideas and their impact on society. Intended for students wishing to satisfy the general education mathematics requirement.

Learning Outcomes:

This course illustrates several ways in which mathematics occurs in the “real world”. We will explore some topics of general interest not typically taught in a formal mathematics class. The goal is for you to see not only how much math is around you, but also some of its history, beauty, and influence on modern thinking.

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

1. Read mathematical material at an appropriate level, reason mathematically, and write using mathematical notation correctly.
2. Formulate a problem precisely, and interpret solutions.
3. Apply elementary probability theory to construct models of random phenomena, including the use of simulations.
4. Use elementary statistical tools such as measures of center and spread, graphical representations of data, and statistical estimation of population proportions.
5. Use tools from one or more areas of mathematics to evaluate claims based on mathematical evidence in popular media.
6. Explore other areas of culture and history through mathematics, including the influence of mathematical thought on religion and politics, mental math “tricks”, and mathematical games.

General Education:

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

Required Materials:

- **Required Texts:**

Math in Society (Lippman)

College Mathematics (Scottsdale Community College)

Other readings as provided and assigned.

Note: The textbooks are *free* open educational resource (OER) textbooks and are

available to download through a link on Moodle. You can order printed copies as well through Lulu.com for a small fee.

- **Recommended Texts:**

Blastland, M., and Dilnot, A. (2009). *The numbers game*. Gotham Books: New York.

Cohn, V., and Cope, L. (2012). *News & numbers: A writer's guide to statistics (3rd ed.)*. Wiley-Blackwell: Malden, MA

- **Online Homework:** MyOpenMath is accessed through individual assignments on Moodle – you will be automatically registered when you click on the link the first time. Watch this [YouTube video](#) for an orientation on working with MyOpenMath.
- **Yellowdig:** An online discussion community for our class accessed through the Moodle homepage. See below for more details.
- **Scientific calculator:** Most scientific calculators will work. If you have access to a TI-83 or TI-84 many computations will be shorter. Demonstrations will be done with a TI-84 and [Desmos](#).

Yellowdig

Math is a contact sport through doing and discussing with your peers. We will be utilizing Yellowdig – an online community – to facilitate and reward discourse and discussion among you. Approximately **25% of your overall grade** (through the “In-class activities and participation” portion – see below) will come from participating in Yellowdig conversations. Each week (*including spring break*), you can earn up to **1350** points, and you are expected to earn at least **1000** points per week. If you reach the weekly max by the end of each week, you are guaranteed to get at least a "C" in your participation grade. Additional activities will make up the other portion. Your goal is to reach a total of **16000 points** by the end of the term.

The grading period for Yellowdig will begin on **January 18** and end on **May 6**. Each weekly Yellowdig grading period ends on Monday at 11:59 pm.

You receive points for interacting and engaging with your peers in the following ways:

- Writing a Post of at least **40** words (**280** points)
- Writing a Comment of at least **20** words (**210** points)
- Receiving a Comment on your Post (**70** points)
- Receiving a reaction on your Post (**55** points)
- Receiving an Accolade on your Post or Comment: **50 - 150** points, for items such as teaching me something new, great question, deep insight and others.

You are encouraged to reward your peers for producing excellent content by commenting on and reacting to their Posts. In addition, I will acknowledge particularly exemplary Posts and Comments by giving Accolades. To earn as many points as possible, you are strongly encouraged to contribute to our Community early and often. Just keep in mind that, once you reach the weekly max, you cannot earn additional points until the weekly reset deadline after midnight on Monday.

Yellowdig passes back your grade to Moodle as a *proportion* that represents your current *pace* toward getting an "A" in Yellowdig. Therefore, the points you see in Yellowdig might not match the points you see in Moodle.

Grading:

Each of the components of this class are weighted accordingly, as reflected in Moodle:

30%	Assessments and projects
35%	MyOpenMath and other homework
35%	In-class activities and participation (including Yellowdig)
0%	Final exam

To earn the grade... receive this percentage in Moodle

A	$\geq 90\%$
B	80% - 89%
C	65% - 79%
D	55% - 64%
CR	$\geq 55\%$
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 at random intervals throughout the semester.

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

Extensions and make-ups are 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).

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 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 the Office of Disability Equity (ODE). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with ODE, please contact their office in Lommasson Center 154 or call 406.243.2243. We will work together to provide appropriate modifications.

Outline of topics:

The start and end dates will be determined and announced in class. Reordering, omissions and substitutions are possible, and will also be announced in class.

Introduction: Why math?

Topic 1: When are we ever going to have to use this?

Topic 2: Percentage refresher

Unit 1. Statistics and your life

Topic 1: Statistics and medicine

Topic 2: Cost-benefit analysis (Expected Value)

Topic 3: Popular statistics

Topic 4: Social statistics

Topic 5: Counting and probability

Topic 6: Probability, statistics, and the battle between determinism and free-will

Topic 7: Probability for fun and profit

Topic 8: Probability and modern science

Topic 9: From probability to certainty, and the arguments we make

Unit 2. Why religion begins with math

Topic 1: Plato: Appearance vs reality

Topic 2: Euclid's *Elements*

Topic 3: Logic and logical fallacies

Topic 4: Plato revisited: Learning, reasoning, and knowledge

Topic 5: Some proofs

Topic 6: Descartes and the importance of method

Topic 7: Spinoza, Jefferson, and "We hold these truths to be self-evident..."

Topic 8: Euclid again: Are there parallels?

Topic 9: Non-Euclidean geometries

Unit 3. Math and history

Topic 1: Culture and mathematics in the world

Topic 2: Everyone is a critic

Topic 3: Mathematics and the modern world