MGF1130 – Mathematical Thinking
Credit Hours: 3 Gen Ed Math (M)
Sections: 1330, 1331
Spring 2026

I. General Information

Class Meetings

- This course is an asynchronous online course. Course content is delivered through video lectures that can be viewed on Canvas.

Instructor

- Name: Ross Ptacek
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- Office Hours: MWF 10:40-11:30 PM (Zoom and in-person). Additional hours by request.
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- Preferred form of Contact: Email/Canvas messages. Grade inquiries must be sent from Canvas or from your ufl email address. For resolution of general technical issues, please contact the UF Helpdesk (https://it.ufl.edu/helpdesk/). Honorlock issues should be resolved with the Honorlock live chat or through https://honorlock.com/support/.

TA

- Name: Himanshu Yadav
- Office: 475 LIT
- Office Hours: M 9:35 – 10:25, T 12:50 – 1:40
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- Preferred form of Contact: Email/Canvas messages. Grade inquiries must be sent from Canvas or from your ufl email address.

Course Description

In this course, students will utilize multiple means of problem solving through student-centered mathematical exploration. The course is designed to teach students to think more effectively and increase their problem-solving ability through practical application and divergent thinking. This course is appropriate for students in a wide range of disciplines/programs.

Prerequisites

None.

General Education Credit

This course covers 3 credit hours of General Education Mathematics (M) requirements. The General Education objectives for Mathematics can be found at this link: https://curriculum.aa.ufl.edu/general-education/general-education-subject-area-objectives/.

This course will accomplish these objectives in the following ways.
1. Students will solve equations and inequalities in a variety of settings. These settings include percentages, proportions, rates, growth rates, and various numerical descriptions of data. Applications will be made to real world scenarios such as tax calculation and population growth.
2. Students will use formal logic to analyze the structure of plain English statements, assess the validity of arguments, and use deductive reasoning to identify logical fallacies. Applications will be made to real world examples of arguments such as those seen in advertisements or persuasive speeches.
3. Students will use mathematical models such as growth models or the normal distribution to solve problems.
4. Students will reason about the abstract mathematics of symmetry and fractal geometry and will make application back to objects seen in daily life.

Required Readings and Works

Our main text is *Math in Society* by David Lippman. The textbook is available as a PDF from https://www.opentextbookstore.com/mathinsociety/. The most recent edition (2.6) is also available as a paperback on Amazon, typically for under $30.

Additional Readings

- *College Mathematics For Everyday Life* by Maxie Inigo, Jennifer Jameson, Kathryn Kozak, Maya Lanzetta, and Kim Sonier. We will use this text only for the section on Rigid Motion and Symmetry. A link to this free book will be posted on Canvas.

- *Math for Liberal Arts Students (2e)* by Darlene Diaz. This textbook will only be used for the section on the normal distribution. This book is also free, and an electronic version can be found at the following link:

[https://math.libretexts.org/Bookshelves/Applied_Mathematics/Math_For_Liberal_Art_St udents_2e_(Diaz)](https://math.libretexts.org/Bookshelves/Applied_Mathematics/Math_For_Liberal_Art_Students_2e_(Diaz)).

- Notes for the relevant material from these additional textbooks will also be posted on Canvas. For many students, these notes will be sufficient. Material outside of my notes will not be tested.

Additional Materials

We will use the following free software in this course:
- Google Sheets (https://docs.google.com/spreadsheets/). Google Sheets is an incredibly powerful tool for calculations and for data visualization. I will create a number of useful spreadsheets and distribute them. All UF students can log into Google Sheets with their UF credentials.

Additional Course Fees: $21.99 (Distance Learning)

- The distance learning fee is **only** paid by residential students (Section 1330) and **not** UF Online students (Section 1331)

II. Graded Work

Description of Graded Work

The following is a list of all graded assignments in the course and their point values. All assignments are accessed and submitted through Canvas. Following this list is a table showing how final grades are assigned.

Exams

- There are three proctored exams during the term. We will use Honorlock for proctoring.
    - Exam 1 covers the first five weeks of the course (percentages, proportions, growth rates, sets, and logic)
    - Exam 2 covers material from the next five weeks (data visualization, statistics, experimental design, and normal data)
    - Exam 3 covers material from the final four weeks (rigid motions, symmetry, fractals, and complex numbers)
- You are allowed pencil and scratch paper on the exams but no other notes are allowed.
- Depending on the exam you will either be allowed a four-function or scientific calculator. The **only** allowed ones are the ones built into Honorlock or the one at Desmos (https://www.desmos.com/fourfunction, https://www.desmos.com/scientific). To reiterate, **handheld calculators are not allowed**.

- Each exam is a 60 minute exam, but an extra 15 minutes are added to account for any delays caused by Honorlock. Exam time accommodations are applied to the base 60 minutes, not the extra 15 minutes.
- There is an optional, comprehensive final exam which serves only to replace one of the during-term exams. The final exam will be open on Honorlock from Tuesday 4/28 at 8:00 AM through Thursday 4/30 at 11:59 PM.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Value:** 3×180 points = 540 points.

Exam Reviews

- Each exam has a corresponding review with questions similar to exam questions.
- Students get unlimited attempts, but the correct answers will only show after the due date.
- Exam reviews are always due at 11:59 PM the night before the exam window begins.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Value:** 5 points × 3 = 15 points

Quizzes

- There are two quizzes per unit for a total of six quizzes.
- Quizzes are timed (45 minutes) but not proctored. Notes are allowed during a quiz.
- Students are given two attempts per quiz and the best attempt counts for credit.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Value:** 6×30 points = 180 points

Lecture Quizzes

- Each module has a corresponding lecture quiz to test comprehension of the basic principles of the lecture. Questions on lecture quizzes come directly from the lecture.
- The quiz is not timed and is not proctored.
- Two attempts are given per question. If you are following along with the the lecture video, you should only need one!
- Lecture quizzes are due along with the corresponding homework.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Value:** 30 × 1 points = 30 points.

Homework

- Homework is assigned per module. The part of the module which each question comes from is clearly indicated on the assignment.
- Each question in a homework assignment can be reattempted in order to improve score. If you find yourself missing a question repeatedly, you should reach out for help on the discussions.
- There are some introductory orientation assignments valued at a total of 10 points.

- Students are all given one "LatePass", which allows a single homework deadline to be extended by a day. An additional LatePass is given after the first two exams.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Value:** Total 215 points (205 weekly + 10 intro)

Participation

Rationale. I believe that actively participating in mathematical discourse is an important part of the learning process. Being able to communicate your solution to a problem to others is possibly more important than having a correct solution to begin with. In this class, Canvas discussions will be created for each of the three exams. Each is worth 5 points.

- Participation points can be earned by contributing meaningfully to Canvas discussions. Some examples include.
  - Sharing partial work and asking for help: In order for the contribution to count, the student should explain what they have tried, not just ask for answers.
  - Assisting someone with a question: The student should attempt to explain their solution. The instructor or TA will also contribute and help clarify the answer.
- Participation points can be lost by doing things that hinder the class running smoothly. This includes making disruptive comments on the Canvas discussions but also includes repeatedly asking questions that have been answered in the syllabus or in course announcements.
- There is a general pool of 5 participation points used for handling issues that arise outside of the Canvas discussions. Students begin with all 5 points, but points are deducted for disruptive behavior. A warning will always be given prior to a deduction.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Value:** 20 points

Grading Scale

Your final grade is computed by summing up your total points and rounding to the nearest full point. A letter grade is then assigned using the chart below. For information on how UF assigns grade points, visit: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

Letter Grade	Point range		Letter Grade	Point range
A	900+		C	660-699
A-	860-899		C-	620-659
B+	820-859		D+	580-619
B	780-819		D	540-579
B-	740-779		D-	500-539
C+	700-739		E	0-499

A minimum grade of C is required for General Education credit. Courses intended to satisfy General Education requirements cannot be taken S-U.

Grade Disputes

Grade disputes must be brought to the instructor's attention before the date of the final exam and must be based upon actual errors with the grading of a particular assessment or with applying the grading scheme in the syllabus. If you have questions or concerns about your grade, a good rule of thumb is to contact the instructor within a week of getting your grade back. This ensures that there is plenty of time to resolve the issue before the final exam date.

III. Annotated Weekly Schedule

Below is a weekly schedule for the course. The video lectures and corresponding notes are sufficient for the class, but the textbook pages which the lectures and notes are based from is provided as a reference.

Week	Topic	Summary	Required Readings/Works	Assigned Work Due
Week 1 1/12-1/17	Orientation, Problem Solving Techniques	Orientation. Percentages and Rates. Proportions, Relative and Absolute Error,	Syllabus, Orientation Module of Canvas, Lippman pp. 1-10 136 min lectures	Intro assignments (F)
Week 2 1/20-1/24	Problem Solving Techniques Growth Rates	Dimensional Analysis. Estimation. Linear Growth.	Lippman pp 10-15 Lippman pp. 187 – 192. 100 min lectures	Problem Solving HW/Lecture Quiz (F) Quiz 1 (F)
Week 3 1/26-1/31	Growth Rates Sets	Exponential and Logistic Growth. Set operations and counting.	Lippman pp. 319-328 144 min lectures	Growth Rates HW/Lecture Quiz (W)
Week 4 2/2-2/7	Logic	Logical Connectives. Logical Equivalences. Quantifiers. Truth Tables.	Lippman pp. 407 - 422 pp. 413 – 440 122 min lectures	Sets HW/Lecture Quiz (W) Quiz 2 (F)
Week 5 2/9-2/14	Logic Statistics	Arguments, Euler Diagrams. Types of Data. Populations and Samples.	Lippman pp. 227- 232 60 min lectures	Logic HW/Lecture Quiz (W) Review 1 (R) Exam 1 (F)
Week 6 2/16-2/21	Statistics Describing Data	Sampling Methods. Sources of Bias. Experimental Design. Data Visualization.	Lippman pp. 233 – 250 70 min lectures	Collecting Data HW/Lecture Quiz (F)
Week 7 2/23-2/28	Describing Data	Median, Quartile, and Percentiles. Mean and Standard Deviation.	Lippman pp. 243 – 272 80 min lectures	Describing Data HW/Lecture Quiz (F) Quiz 3 (F)
Week 8 3/2-3/7	Normal Data	Properties of Normal Curves. The empirical	Diaz 11.1, 11.2 82 min lectures	Week 9 HW

				Rule.
Week 9 3/9-3/13	Normal Data	Central Limit Theorem.	Diaz 11.3 72 min lectures	Normal Data HW/Quiz (M) Quiz 4 (W)
Week 10 3/23-3/28	Symmetry	Rigid motions and symmetry. Reflections and rotations.	Inigo et al. pp. 336 – 348 107 min lectures	Review 2 (M) Exam 2 (T)
Week 11 3/30-4/4	Symmetry	Translations and glide reflections. Symmetry type of finite objects.	Inigo et al. pp. 349 – 356 104 min lectures	(*)
Week 12 4/6-4/11	Symmetry Fractal Geometry	Frieze Patterns. Fractals and fractal dimension.	Lippman pp. 367 – 373 74 min lectures	Symmetry HW/Lecture Quiz (M)
Week 13 4/13-4/18	Fractal Geometry	Geometric series. Measurements of Fractals. Complex Numbers.	Lippman pp. 373 – 381 105 min lectures	(*)
Week 14 4/20-4/22	Exam 3	Review		Fractals HW/Lecture Quiz (M) Quiz 6 (M) Exam 3 (W) Review (T)
Finals 4/27-5/1	Review			Final Exam (R)

(*) All module homework is due at the same time. For some longer modules, this means that there may be a week without a due date. It is expected that you are making progress on the module during this week.

IV. Student Learning Outcomes (SLOs)

This course satisfies the following General Education Area M SLOs.

- **Content:** Employ strategies in fundamental mathematics, including at least one of the following: solving equations and inequalities, logic, statistics, algebra, or trigonometry.

  - Assessed through lecture quizzes, homework, quizzes, and exams.

- **Critical Thinking:** Reason in abstract mathematical systems and use mathematical models to solve problems. Apply mathematical concepts effectively to real-world situations.

  - Assessed through lecture quizzes, homework, quizzes, and exams.

- **Communication:** Formulate mathematical models and arguments. Communicate mathematical solutions clearly and effectively.

  - Assessed through lecture quizzes, homework, quizzes, exams, and contributions to Canvas discussions.

These general education SLOs are accomplished through the course specific SLOs listed below.

- Determine efficient means of solving a problem through investigation of multiple mathematical models **(Gen Ed Area M Critical Thinking)**.

- Apply logic in contextual situations to formulate and determine the validity of logical statements using a variety of methods **(Gen Ed Area M Content)**.

- Apply mathematical concepts visually and contextually to represent, interpret and reason about geometric figures **(Gen Ed Area M Communication)**.

- Recognize the characteristics of numbers and utilize numbers along with their operations appropriately in context **(Gen Ed Area M Content)**.

- Analyze and interpret representations of data to draw reasonable conclusions. **(Gen Ed Area M Critical Thinking)**.

VI. Policies

UF Academic policies and resources can be found at this link: https://go.ufl.edu/syllabuspolicies. Additional policies in this section are all in compliance with those found in the above link.

Attendance Policy

As this is an asynchronous online class, there is no attendance policy. However, it is in the student's best interest to make contact with the course material multiple times a week, as though there were scheduled class meetings. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Free Help-The Little Hall Math Lab

In addition to the Canvas discussions and visiting the office hours of your instructor and teaching assistant, for help, the Little Hall Math Lab located in Little Hall 215 offers free drop-in assistance with math homework Monday through Friday from 9:30 to 4:00. It is staffed by mathematics graduate students and undergraduate tutors. Please note that this space is not designed for intense one-on-one tutoring, but rather as a resource for quick questions and explanations. You should not expect the staff to help you if you have not at least begun your homework and have specific questions. Moreover, they absolutely will not assist you with quizzes or any other such work. More details are available here: https://oas.aa.ufl.edu/students/tutoring/