MGF1130
Section: LE06
Mathematical Thinking
Summer A 2025

I. General Information

Class Meetings

- This course meets in Leigh Hall (LEI) 104 MTWRF during Period 3 (11:00 AM – 12:15 PM)

Instructor(s)

- Name: Dylan Connell
- Office: 455 LIT
- Office Hours: MW Period 2 (9:30 PM – 10:45 PM, in-person only)
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Course Description

Through 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 vastly 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

- Mathematics

The General Education objectives for Mathematics are as follows:

Courses in mathematics provide instruction in computational strategies in fundamental mathematics including at least one of the following: solving equations and inequalities, logic, statistics, algebra, trigonometry, inductive and deductive reasoning. These courses include reasoning in abstract mathematical systems, formulating mathematical models and arguments, using mathematical models to solve problems and applying mathematical concepts effectively to real-world situations

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
3. 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.
4. Students will use mathematical models such as growth models or the normal distribution to solve problems.
5. 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_Students_2e_(Diaz).

- Notes for the relevant material from these additional textbooks will also be posted on Canvas. In terms of coverage, these notes will be sufficient, but students may use the textbooks for additional practice exercises.

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.

Materials and Supplies Fees: n/a.

II. Graded Work

Description of Graded Work

The following is a list of all graded assignments in the course, their point values, and their point values. All assignments are accessed and submitted through Canvas. Following this list is a table showing how final grades are assigned. **Any dispute about a grade must be made within one week of the grade being posted.**

Exams

- There are three proctored exams during the term which each cover two weeks of material. See the schedule in the next section for a more detailed breakdown.
- 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.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Value:** 3×150 points = 450 points.

Quizzes

- Every two weeks (non-exam weeks) there will be quiz on the week's material administered during class.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Value:** 3×80 points = 240 points

Homework

- Homework is assigned on a roughly weekly basis. Some questions may depend on lectures from later in the week.
- 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 "Late Pass", which allows a single homework deadline to be extended by a day. An additional one is given after each exam.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Value:** Total 260 points (250 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, participation is assessed through clicker-style questions during term.

- Participation points can also be lost by doing things that hinder the class running smoothly such as using unauthorized electronic devices or otherwise disrupting classroom discussion.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Value:** 50 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.

III. Annotated Weekly Schedule

Week	Topic	Summary	Required Readings/Works	Assigned Work Due
Week 1	Problem Solving Growth Rates	Percentages Rates, Error Dimensional Analysis Linear, Exponential, and Logistic Growth	Lippman pp. 1-18, 187-192	Week 1 HW Quiz 1
Week 2	Sets Logic	Set operations and counting. Logical forms, Truth Tables, and Euler Diagrams	Lippman pp. 319-328 pp. 407 - 422	Week 2 HW Exam 1
Week 3	Collecting Data Describing Data	Populations and Samples, Sampling Methods, Bias, Experimental Design. Charts, Mean, Median, Percentiles, Variance	Lippman pp. 227- 242 pp. 243 – 272	Week 3 HW Quiz 2
Week 4	Normal Data	Normal distributions, empirical rule, z-scores, central limit theorem.	Diaz 11.1-11.3	Week 4 HW Exam 2
Week 5*	Symmetry	Rigid Motions (Reflections, Rotations, Translations, and Glide Reflections) and Symmetry Groups	Inigo et al. pp. 336 - 345	Week 5 HW Quiz 3
Week 6*	Fractal Geometry	Fractals and fractal dimension. Geometric series. Measurements of Fractals. Complex Numbers.	Lippman pp. 373 - 381	Week 6 HW Exam 3

*Depending on student interest and the pace of the class, weeks 5 and 6 may be replaced by

- Week 5. Number Theory: GCD/LCM, Prime Numbers, Euclidean Algorithm, Modular Arithmetic.
- Week 6. Graph Theory: Graphs, Paths & Cycles, Hamiltonian & Eularian Paths & Cycles, Planar Graphs.

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.
- **Critical Thinking:** Reason in abstract mathematical systems and use mathematical models to solve problems. Apply mathematical concepts effectively to real-world situations.
- **Communication:** Formulate mathematical models and arguments. Communicate mathematical solutions clearly and effectively.

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

- Students will determine efficient means of solving a problem through investigation of multiple mathematical models **(Gen Ed Area M Critical Thinking)**.
    - Assessed through lecture quizzes, homework, quizzes, and exams.
- Students will apply logic in contextual situations to formulate and determine the validity of logical statements using a variety of methods **(Gen Ed Area M Content)**.
    - Assessed through lecture quizzes, homework, quizzes, and exams.
- Students will apply mathematical concepts visually and contextually to represent, interpret and reason about geometric figures **(Gen Ed Area M Communication)**.
    - Assessed through lecture quizzes, homework, quizzes, exams, and contributions to Canvas discussions.
- Students will recognize the characteristics of numbers and utilize numbers along with their operations appropriately in context **(Gen Ed Area M Content)**.
    - Assessed through lecture quizzes, homework, quizzes, and exams.
- Students will analyze and interpret representations of data to draw reasonable conclusions. **(Gen Ed Area M Critical Thinking)**.
    - Assessed through lecture quizzes, homework, quizzes, and exams.

VI. Policies

Attendance Policy

Attendance is mandatory and will be assessed with many short in-class assignments. 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

Students Requiring Accommodation

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email, they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructors in this class.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/ , 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Free Help-The Little Hall Math Lab

In addition to attending your discussion section regularly 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/

In-Class Recordings

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.