MGF1107
Sections: 5578
Math for Liberal Arts II
Spring 2024

I. General Information

Class Meetings

- Tuesday Periods 4 and 5 in MAT 2. Thursday period 5 in MAT 5.

Instructor(s)

- Name: Ross Ptacek
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- Office Hours: MWR period 4. Additional hours available by request.
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Teaching Assistant(s)

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Course Description

MGF1107, Math for Liberal Arts II is a general education Mathematics course which is not intended to prepare you for precalculus or calculus. This course will cover a variety of interesting topics from mathematics including graph theory, topology and geometry, and mathematical decision making (combinatorial and strategic games and probability). As we study these topics, we will focus not just on how to solve problems but how we reason about the truth of mathematical statements and how we communicate math to our peers.

Prerequisites

None.

General Education Credit

- Mathematics

This course accomplishes the General Education objectives of the subject area listed above. A minimum grade of C is required for General Education credit. Courses intended to satisfy General Education requirements cannot be taken S-U.

Required Materials

There is no required textbook for this class. Instead, notes which I have designed will be distributed on Formative (described below).

Required Technology:
- **Zoom:** We will use Zoom for some office hours, and optionally for course meetings. UF's website for Zoom is https://video.ufl.edu/conferencing/zoom/. As a student you will be clicking Zoom links from within Canvas and this should all work automatically.
- **Formative (https://www.formative.com/):** Formative is an online system for facilitating both classwork and homework. You will need to make a free account by going to https://app.formative.com/signup. The course code will be provided on Canvas at the beginning of the term. You must **use your ufl email address** when signing up.
- **Ziteboard (https://ziteboard.com/):** Ziteboard is an online whiteboard service that we will be using for collaboration this term. This is mainly for those who intend to attend the course virtually. Again, you will need to make a free account in order to use the whiteboards and participate in the group activities. Just click on the "Log In" link from the top right on https://ziteboard.com/ and you will be prompted for an email address and password. It's nice to use your ufl email when signing up for this but it is not required.

Materials and Supplies Fees: N/A

II. Graded Work

Description of Graded Work

Final Project

The final project is an investigation into a famous mathematical result or mathematician. Most topic choices are contemporary to show how math continues to progress. The project consists of two parts: a research paper and an accompanying visual aid. A full description of the project parameters, including a list of acceptable topics, can be found on the Final Project assignment page on Canvas.

- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Submit:** Canvas (paper and visual aid)
- **Value:** 200 points (100 paper, 100 visual aid)

In short, the final project paper is graded on the following criteria:

- The paper must explain its topic using accessible language.
- The paper must explain the person or theorem using the author's own language. In particular, plagiarism will earn a 0 on the paper part of the assignment.
- The paper must use mostly non-encyclopedia sources. All sources must be reputable.

The final project visual aid is judged on the following criteria:

- The visual aid should contribute to the understanding of the paper.
- This visual aid should be the student's own work, not a reproduction.
- The visual aid should represent complete, polished work, not a rough draft.

Level 1 Homework

- The level 1 homework is designed to either reinforce one of the core topics covered in class or to lay the groundwork for one of the optional topics.
- Each level 1 homework assignment is worth 10 points, but only your best ten assignments count toward your grade.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Submit:** Formative
- **Value:** 10 points x 10 assignments = 100 points

Level 2 Homework

- The level 2 homework goes slightly beyond the fundamentals in class and lays the groundwork for the level 3 assignment.
- Each level 2 homework assignment is worth 20 points, but only your best eight assignments count toward your grade.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Submit:** Formative
- **Value:** 20 points x 8 assignments = 160 points

Level 3 (Mastery) Homework

- The level 3 homework assignment does not require any new material. However, successful completion will require clever application of material from the level 1 and 2 homework and usually some element of mathematical argumentation.
- Level 3 homework assignments are graded based on **mastery**. Here are more details about mastery grading.
  - Only competent efforts will receive **any** points at all.
  - While mastery assignments will be submitted on Canvas or Formative, the grade will only be entered after a **conference with an instructor**. It is the student's

responsibility to schedule this conference within a week of the deadline. In the conference, the student must show complete understanding of their solution to get full marks.

- If a solution falls short of mastery but is on the right track, the student will be given partial credit and a chance to resubmit. In general, the resubmission window will be a week from the conference. Mastery assignments may go through many rounds of resubmission

- Each level 3 assignment is worth 60 points, but only your best four count toward your grade.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Submit:** Formative. Additional work from resubmissions may be submitted on Canvas on the assignment page.
- **Value:** 60 points x 4 assignments = 240 points

Quizzes

- There is one quiz for each full week of class. Of the 14, only 10 will count for credit.
- Quizzes are open notes.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Submit:** Formative (link varies per assignment.) during class
- **Value:** 10 points x 10 assignments = 100 points.

Pre-Classwork

This course functions like a "flipped" class. There will be an assignment due prior to class period which is a Formative assignment accompanied by a video lecture. Students must complete this assignment in order to be prepared for class.

- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Submit:** Formative (link varies per assignment.) prior to class.
- **Value:** 5 points x 20 assignments = 100 points

Classwork

Most class periods are devoted to class discussion or group activities. Students are assessed based on their participation in these activities.

- Participation in every class activity is worth 5 points. Participation is assessed by the results on the Formative assignment for the day. There are 22 such activities.
- It is very difficult to make up a missed class activity since interaction is a crucial part of them, but 4 of these assignments are dropped to account for unavoidable absences.
- A few classes do not have a particular Formative assignment attached to them. These classes all share a general 10 points.
- **General Education SLOs Met:** Communication, Content, Critical Thinking.
- **Submit:** Formative (link varies per assignment.) prior to class.

- **Value:** 5 points x 18 assignments + 10 general points = 100 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	1000-900		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.

Attendance and Participation

Attendance: Attendance is required in this class. As most class meetings will have a five point classwork assignment grade with them, failure to attend class will negatively impact a student's grade. The classwork activities are the primary way we practice communicating about mathematics, so it is important to be an active participant.

Excused absences are consistent with university policies in the undergraduate catalog and require appropriate documentation:

https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Participation: Participation in group activities is required to earn a full five points. Participation is primarily assessed by the classwork assignment on Formative. Students who are disruptive may have further points subtracted from the general participation heading described above.

III. Annotated Weekly Schedule

In the table below, pre-classwork assignments are given an abbreviation (e.g. Pre-GT1) which is also how they are referred to on Formative. Classwork assignments are not listed in the table, but it is assumed that they will be done in the same week as the corresponding pre-classwork. A feature of this class is that there are many options for which assignments are done. This table shows a list of assignments which accounts for full points, but there are many alternatives which are available depending on the student's interests.

Week	Topic	Summary	Required Readings/Works	Assigned Work Due
Week 1	Orientation Proof	Orientation to the course and technology. Mathematical Proof.	Syllabus	INT1, INT2 (CW) Quiz 1
Week 2	Graph Theory	Basic Properties of graphs. Chromatic number.	Pre-GT1, Pre-GT2	Graph Theory 1 Quiz 2
Week 3	Graph Theory	Complete and bipartite graphs. Trees.	Pre-GT3, Pre-GT4	Graph Theory 2 Chrom. Num. 1 Quiz 3
Week 4	Graph Theory, Proof	Preparation for mastery assignments. Mastery Conferences.	Story of Maths 1	Graph Theory 3 Chrom. Num. 2 Quiz 4
Week 5	Geometry/ Topology	Topological properties. Möbius Strips and orientability.	Pre-T1, Pre-T2	Möbius 1 Quiz 5
Week 6	Geometry/ Topology	Identification Diagrams. Euler Characteristic	Pre-T3, Pre-T4	ID Diagrams 1 Möbius 2 Quiz 6
Week 7	Geometry/ Topology	Fold and Cut. Map Projections. Mastery Conferences.	Story of Maths 2	Origami 1 Final Project 1 ID Diagrams 2 Quiz 7
Week 8	Combinatorial Games	Game Trees. Symmetry. (Tic-Tac-Toe)	Pre-CGT1, Pre-CGT2	Tic-Tac-Toe 1 Origami 2 Quiz 8
Week 9	Combinatorial Games	Transpositions. N and P postions. (Kayles. Chomp)	Pre-CGT3, Pre-CGT4	Tic-Tac-Toe 2 Symmetry 1 Origami 3 Quiz 9
Week 10	Combinatorial Games, Proof	Non-constructive Proof. NIM. Mastery Conferences.	Story of Maths 3	NIM 1 Symmetry 2 Final Project 2 Quiz 10
Week 11	Probability	Process Trees. Computing Probabilities.	Pre-PR1, Pre-PR2	Galton Board 1 NIM2 Quiz 11
Week 12	Probability	Expectation and Conditional Probability. The Monty Hall Problem	Pre-PR3, Pre-PR4	NIM3 Dice Battle 1 Quiz 12
Week 13	Strategic Games	Dominance. The Prisoner's Dilemma. Nash Equilibrium	Pre-SGT1, Pre-SGT2	Strat. Games 1 Final Project 3 Quiz 13
Week 14	Strategic Games	Iterated Games. Multi-step games.	Pre-SGT3, Pre-SGT3	Strat Games 2 Week 14 HW Quiz 14

Week 15	Strategic Games	Mixed Strategies. Tragedy of the Commons	A Mathematician's Lament	Week 15 HW Quiz 6 Exam 3
Week 16	Review			Final Project

IV. Student Learning Outcomes (SLOs)

At the end of this course, students will be expected to have achieved the General Education learning outcomes as follows:

- **Content:** Students demonstrate competence in the terminology, concepts, theories, and methodologies used within the discipline. After completing this course students will be able to employ strategies in solving problems in graph theory, topology, probability, and game theory. Students will use elements of mathematical reasoning to verify sound arguments and reject unsound arguments. (Critical Thinking for Gen Ed Math, assessed through pre-classwork, classwork, homework, quizzes mastery projects, and final project)

- **Communication**: Students communicate knowledge, ideas, and reasoning clearly and effectively in written and oral forms appropriate to the discipline. Throughout this course, students will use mathematical methods to solve problems. In their solutions, they will translate problems into mathematical language, use mathematics to produce a solution, and then translate that solution back to the original problem. Students will communicate mathematical solutions clearly and effectively. In the final project, students will write a short paper with an accompanying visual aid to explain a recent mathematical discovery or the work of a recent mathematician. (Communication for Gen Ed Math, assessed through pre-classwork, classwork, homework, quizzes mastery projects, and final project)

- **Critical Thinking**: Students analyze information carefully and logically from multiple perspectives, using discipline-specific methods, and develop reasoned solutions to problems. In this course, students will use mathematical methods to solve real-world problems. Students will use graph invariants to determine whether two graphs are different, use topological invariants to determine whether two shapes are different, determine which player (if any) has an advantage in a combinatorial game, find the expectation of simple random experiments, and determine pure and mixed equilibria for two player strategic games. (Critical Thinking for Gen Ed Math, assessed through pre-classwork, classwork, homework, quizzes mastery projects, and final project).

VI. Policies

Attendance Policy
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.

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.