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Department of Mathematics

Sets and Logic (MHF3202)

Welcome to Sets and Logic!

This is a 100% online course with Zoom class meetings as scheduled, which will be used for interactive learning and feedback. I would like to meet everyone “in person” during the first week (details follow). If you experience any technical difficulties interfering with your ability to follow and participate in the class, contact me as soon as possible so that we find a solution. I am happy to receive any questions or suggestions at any time. The sooner you share them the sooner I will be able to address them. It is essential to me to continuously improve your online learning experience.

Disclaimer: This syllabus is a subject to change and it is your responsibility to keep updated. Nevertheless, any modifications will appear in announcements.

Basic Information

Instructor: Dana Bartošová **Office:** LIT 436 **Email:** dbartosova@ufl.edu

Class meetings: MWF 1:55-2:45pm via Zoom (see Canvas).

Office hours: M 3-3:50pm, W 10:40-11:30, F 12:50-1:40pm, or by appointment via Zoom (see Canvas).

Required textbook: Daniel J. Velleman, How To Prove It: A Structures Approach, Second Edition, Cambridge University Press, New York, NY 10013.

Recommended reading: Apostolos Doxiadīs a Christos Papadimitriou , Logicomix: An Epic Search for Truth, Bloomsbury USA, 2009.

Communication: I have set up 5-minute time slots on Zoom for Tuesday 9/1 and Wednesday 9/2. You will get an email with a link to choose your slot; if none is convenient, please email me your availability.

You can email me directly through Canvas, you can open up a Discussion to communicate with your peers and myself, or use the Chat function here on Canvas. Class Zoom meetings and office hours are also a great time to ask, clarify, comment, and connect. All questions are welcome and I strongly encourage everyone to actively participate to keep up with the pace of the class and to create a community.

Announcements on Canvas: There will be frequent announcements to update you on any new additions to class Modules, information on group presentation and project, practice exams, changes and reminders of any due dates.

Modules on Canvas: Modules will be updated as the course progresses with videos, activities, recommended problems, and further materials.

Technology: No advanced technology is required. You will need a device with internet that can support video sessions for class meetings, office hours, and exams. Honorlock requires a camera. Should you experience any technical difficulties or lack necessary equipment, please contact me immediately to find a solution and keep you up beat with the course. Privacy and accessibility policies of software we will be using can be found here Privacy and accessibility policies.

Course description

This course is the first introduction to rigorous mathematical proofs. We will use familiar notions of a set, relation and function, and playing games to learn how mathematical statements come to be, how to guess a conjecture, how to prove a conjecture to make it a theorem, or how to find a counterexample to show that our conjecture needs to be corrected.

By the end of this course, you should be able to:

1. Analyze and formulate (mathematical) statements.
2. Correctly use simple deduction and detect incorrect deduction.
3. Apply a variety of strategies to find, write, and check a mathematical proof.
4. Play a few games and analyze logic in them.

This will be achieved by:

1. Completing reading and watching a video before class. (This will give you content to work with.)
2. Active participation in class meetings, where we will review the material, take polls about its general understanding, use jamboard to share ideas, and discuss in breakout rooms about assigned problems. (Here you can clarify and deepen your understanding of the material, as well as practice its application with direct feedback.)
3. Completing assignments that are chosen for each section of the book and learning from feedback to them. (Get a thorough practice of the very basics with personal feedback.)
4. Connecting with your peers through discussions, peer-to-peer review of your practice work, and attending office hours to clarify any confusions and to obtain additional feedback.(Find peers to work with, brainstorm, ask questions, and check one another's work.)
5. Deep research on a topic of your presentation and discussion with your teammates, and

presentations of your classmates. (Get profound understanding of a part of the material by reading what interests you and peak into what math research is like. There is no better way to check your understanding than to try to explain to your colleagues.)

6. Group project on mathematics in a game through playing and analysis with your teammates. (Brings joy into class, makes formal logic tangible, enhances curiosity about the essential question in math: What if….?)

Course delivery

1. Assigned reading with short accompanying videos.
2. Synchronous meetingson Zoom through Canvas for an overview of the assign material, answering questions, polls, discussions in small groups in breakout rooms, homework solutions on jammboard.

Course requirements and evaluations

Requirements

Requirement	#Pt/each	Details
Assignments	7 20	10 for correctness + 10 for completeness; lowest grade dropped; once 3 days late ok, submitted on Canvas and due by 11:59pm on dates indicated.
Midterms	350	During the usual class meeting time via Honorlock at Canvas.
Final exam	1100	TBD
Group presentation	150	Group research on a topic (below) with slide presentation; 5 mins/person.
Group project	150	Essay that analysis rules of a game, suggests modifications, explains logical structure of the game, and playing strategies.
Discussion	15	Activity in one of the Discussions on Canvas.

Assignments: There will be 7 assignments due on Friday by 11:59pm on dates as indicated in the Course schedule on Canvas in Assignments. Your work will be corrected directly there for you to see comments and your points will be recorded in Grades. The lowest score will be dropped and you can submit 3 days late once (that is, by following Monday 11:59pm) without any reason. Otherwise, late submission will not be accepted unless there is a well documented reason to do so. Each problem set will have 4-6 questions, 1-2 will be randomly chosen and corrected in detail (out of 10 points), the rest will be checked for completeness (out of 10 points), meaning true effort to complete all the problems. The problems are listed in the course schedule and numbered as in the textbook; A1: 1.1.7. reads work our problem 1.1.7. for Assignment 1.

Exams: There will be 3 midterms on dates as indicated in the Course schedule (subject to change) during the usual class meeting time via Honorlock on Canvas. The date of the final will be determined in due course, but will follow the same format. The exam will be submitted in Quizzes on Canvas as a single pdf and will be graded there, so that you can view comments. The points will be recorded in Grades. You will have 10 minutes prior the exam to set up Honorlock and 15 minutes after to submit your exam after. The exams will be closed book and notes on paper. Make up exams need to substantiated and will be

considered on case by case basis.

Group presentation on one of the following topic during our lecture time. Email me your preference by **September 9**. When the teams are formed, I will create groups on Canvas for everyone to connect. The content is completely up to your team, but I am happy to provide guidance should you prefer that. We will schedule a joint meeting on Zoom a week before your due date to discuss your progress. The expectation is to narrate your slides for 5 minutes each, however other means of delivery, such as, drawing on a tablet, are welcome. Presentations will be delivered during the usual class time on days as indicated. A date can be changed upon mutual agreement.

1. Why do we need formal proofs. (September 16)
2. Proof systems and automated proving. (October 5)
3. Model theory. (October 9)
4. Relations and functions. (October 23)
5. Recurrence and mathematical induction. (November 9)
6. Infinite sets. (November 23)

Group project: Groups project will be for 2-6 people, according to the number of players of a particular game. The games will be chosen after you share your preferences in the Discussion on Games, email, or lecture. We will then form teams according to your interests. The outcome will be an essay about rules of the game, your suggested modifications and their impacts on the outcomes of the game, strategies to play, and analyzing mathematics involved in the game. The due date is **November 16**, but early submissions are encouraged and the essays will be shared with the rest of the class.

Discussions: I have set up two discussions: Games and The hard and the confusing. Activity in at least one of these two discussions is required in order to obtain 5pt. You are encouraged to start other Discussions for your own benefit.

Grades: The total number of points is 475. The grades will be distributed as follows: A above 93%, A- 90-92%, B+ 87-89%, B- 83-86%, C+ 77-79%, C 73-76%, C- 70-72%, D+ 67-69%, D 63-66%, D- 60-62 %, E, I, NG, WF 59% and below. For university grading policies see https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies.

Class schedule

Date	Reading	Assignments	Other
8/31			Meet and greet and play with technology
9/2	1.1.	A1: 1.1.7.	
9/4	1.2.	A1: 1.2.3.; 1.2.10.(b)	
9/7			Holiday
9/9	1.3.	A1: 1.3.2.; 1.3.6.	
9/11	1.4.	A2: 1.4.7.; 1.4.14.(a)	Assignment 1 is due
9/14	1.5.	A2: 1.5.3.; 1.5.5.(a)	

9/16	2.1.	A2: 2.1.3.; 2.1.5.(a)	Presentation 1
9/18	2.2.	A3: 2.2.2.	Assignment 2 is due
9/21	2.3.	A3: 2.3.2.	
9/23			Review session
9/25			Exam 1
9/28	3.1.	A3: 3.1.16.	
9/30	3.2.	A3: 3.2.2.	
10/2	3.2/3.3		
10/5	3.3.	A3: 3.3.19.	Presentation 2
10/7	3.4.	A3: 3.4.13.	
10/9	3.5.	A4: 3.5.14	Presentation 3; Assignment 3 is due
10/12	3.6.	A4: 3.6.8.	
10/14			Review Session
10/16			Exam 2
10/19	4.1.	A4: 4.1.2.	
10/21	4.2./5.1.	A4: 4.2.2.; 5.1.15.	
10/23	4.3./5.2.	A5: 4.3.19.; 5.2.9.	Presentation 4; Assignment 4 is due
10/26	4.4.	A5: 4.4.6.	
10/28	4.5.	A5: 4.5.17.	
10/30	4.6.	A5 4.6.4.	Assignment 5 is due
11/2	5.3.	A6: 5.3.13.	
11/4			Review Session
11/6			Exam 3
11/9	6.1.	A6: 6.1.17.	Presentation 5
11/11			Holiday
11/13	6.2.	A6: 6.2.12.	
11/16	6.3.	A6: 6.3.16.	Group project is due
11/18	6.4.	A6: 6.4.16.	
11/20	6.5.	A6: 6.5.2.	Assignment 6 is due
11/23	7.1.	A7: 7.1.21	Presentation 6
11/25			Thanksgiving
11/27			Thanksgiving
11/30	7.2.	A7: 7.2.6.; 7.2.10.	
12/2	7.2.		
12/4	7.3.	A7: 7.3.9.	Assignment 7 is due
12/7	7.3.		
12/9			Review

Recording

Part of our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or

utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who unmute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Diversity, equity, and inclusion statement

It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, religion, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In particular, I will gladly honor your request to address you by an alternate/ preferred name or gender pronoun. Please advise me of this preference early in the semester so I may make appropriate changes to our records.

Honor code

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 specifies a number of behaviors that are in violation of this code and the possible sanctions. Click here to read the Honor Code. 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 instructor in this class.

Class attendance

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies.

Accommodations for students with disabilities

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center. Click here to get started with the Disability Resource Center. It is important for students to share their accommodation letter with their

Disability Resource Center. 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.

Online evaluations

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Click here for guidance on how to give feedback in a professional and respectful manner. 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 ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students here.

Health and wellness

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit U Matter, We Care website to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.

University Police Department: Visit UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road,

Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website

Academic resources

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study

skills and tutoring.

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information.

On-Line Students Complaints: View the Distance Learning Student Complaint Process.