

# MA 58500 Mathematical Logic I

Fall Semester 2020

updated November 21<sup>st</sup> 2020

**As a Boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do.  
Accountable together – we are Purdue.**

## Basic Information

Course Code	MA 58500
Course Title	Mathematical Logic I
CRN	22266
Course Credit	3 credit hours
Prerequisites	Some background in Abstract Algebra or Real Analysis would be highly beneficial (and it would make studying the material in this course much more meaningful).
Dates	Lectures and office hours held during August 24th - December 5th 2020 (except on US Thanksgiving, Thursday November 26th 2020); Final Exam period is December 7th - 12th 2020.
Lecture Times	Tuesdays and Thursdays 1:30pm-2:45pm EDT/EST (always in the current time zone of Purdue WL campus).
Office Hours	<del>Tuesdays 4-5:30pm and Thursdays 3-4:30pm EDT/EST (always in the current time zone of Purdue WL campus).</del> Tuesdays 3:45-4:30pm and 5:15-6:00pm and Thursdays 4-5:30pm EDT/EST (always in the current time zone of Purdue WL campus).

## Meeting Modality

This course is "Online on-site". The lectures and office hours will be synchronously live-streamed online using Zoom. Please see the "Zoom Ground Rules" at the end of this document for more information. The connection details can be found in [Brightspace](#). Lectures (not office hours) will be recorded and made available later in [Brightspace](#) for those who cannot join synchronously (but it is expected that students attend synchronously if they can).

Please note: it is currently planned that there will be two in-person midterms (see below for tentative schedule). It is of course possible that plans will be required to change because of changing circumstances (either university-wide, campus-wide, course-wide, or on a case-by-case basis). You should keep monitoring this site and [Brightspace](#) for updates.

## Webpages

Official Course Page:

<https://www.math.purdue.edu/academic/courses/coursepage?subject=MA&course=58500>

In addition, course information, materials and announcements will be posted as appropriate either on Brightspace (<https://purdue.brightspace.com/d2l/home/60092>) or on the instructor's course website as follows (please check both of these regularly):

<https://www.math.purdue.edu/~thoma922/teaching/ma58500/ma58500fs20.html>

## Instructor

Name Prof. Margaret E. M. Thomas  
Email Address memthomas at purdue.edu (please include MA58500 in the subject line)  
Office Location MATH 638

## Course Description

Propositional and predicate calculus; the Gödel completeness and compactness theorem, primitive recursive and recursive functions; the Gödel incompleteness theorem; Tarski's theorem; Church's theorem; recursive undecidability; special topics such as nonstandard analysis.

## Textbooks

Primary Textbook: E. Mendelson, [Introduction to Mathematical Logic \(6th Edition\)](#) (earlier editions, especially 4th and 5th, may also be viable).

Access to the primary textbook is **required** (see **Assessment Methods** below). We'll discuss in class various ways of accessing a copy of the book.

Secondary Textbooks: Since some of the course material may be dependent on how the coverage of material in class develops, secondary, optional reading materials may be recommended in due course.

## Assessment Methods

Assignments Eleven written assignments consisting of problems from the textbook (Mendelson). These will be due almost every week by Wednesday at 1:30pm (see planned schedule below; please note deadline of Assignment 11).

Assignments are to be submitted via **Gradescope**, which can be accessed via [Brightspace](#). You should submit your answers as a .pdf file, which can be a scan (using your phone or other suitable device) of your handwritten work.

Instructions on how to make a good quality scan your work and upload it to Gradescope can also be found on [Brightspace](#); please read these instructions before submitting.

As always, please make sure that your name is legible! If you work together with others, then you must write up your own version of the answers, and please also write at the top of your submitted work the names of the people with whom you worked.

Midterm Tests Two written closed-book tests **in person** (see tentative schedule below).

Final Exam One cumulative written, open-book exam, made available online at a pre-announced time with answers to be submitted via Gradescope (see Assignments) by a given deadline during Finals week.

## Course Evaluation and Grading Scale

Final grades will be calculated according to the following weighting of the above assessments:

Assignments	25%
Midterm Tests	50% (25% for each midterm)
Final Exam	25%

Students who get at least 97% of the total points in this course are guaranteed an A+, 93% guarantees an A, 90% an A-, 87% a B+, 83% a B, 80% a B-, 77% a C+, 73% a C, 70% a C-, 67% a D+, 63% a D, and 60% a D-; for each of these grades, it's possible that at the end of the semester a somewhat lower percentage will be enough to get that grade.

The instructor reserves the right to adjust either the course evaluation mechanism or the grading scheme at the end of the course; this adjustment will be applied uniformly and in a manner which only increases individual grades.

## Schedule

Planned schedule for assignment due dates, midterm tests and final examination:

Assignment 1	Wednesday September 2 2020, 1:30pm EDT
Assignment 2	Wednesday September 9 2020, 1:30pm EDT
Assignment 3	Wednesday September 16 2020, 1:30pm EDT
Assignment 4	Wednesday September 23 2020, 1:30pm EDT
Assignment 5	Wednesday September 30 2020, 1:30pm EDT
Midterm Test 1	Thursday October 8 2020, 1:30pm EDT (UNIV 201)
Assignment 6	Wednesday October 14 2020, 1:30pm EDT
Assignment 7	Wednesday October 21 2020, 1:30pm EDT
Assignment 8	<del>Wednesday October 28 2020, 1:30pm EDT</del> Friday October 30 2020, 6:30pm EDT
Assignment 9	<del>Wednesday November 4 2020, 1:30pm EST</del> Friday November 6 2020, 6:30pm EST
Midterm Test 2	Thursday November 12 2020, 1:30pm EST (UNIV 201)
Assignment 10	<del>Wednesday November 18 2020, 1:30pm EST</del> Friday November 20 2020, 6:30pm EST
Assignment 11	<del>Tuesday November 12 2020, 11:30pm EST</del> Tuesday December 1 2020, 6:30pm EST
Final Examination	Week of December 7 2020 <del>TBC:</del> <b>Tuesday December 8 9am EST - Thursday December 10 9am EST</b>

## **Attendance policy during COVID-19**

Students should stay home and contact the Protect Purdue Health Center (496-INFO) if they feel ill, have any symptoms associated with COVID-19, or suspect they have been exposed to the virus. In the current context of COVID-19, in-person attendance will not be a factor in the final grades, but the student still needs to inform the instructor of any conflict that can be anticipated and will affect the submission of an assignment or the ability to take an exam. Only the instructor can excuse a student from a course requirement or responsibility.

When conflicts can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency conflict, when advance notification to an instructor is not possible, the student should nevertheless contact the instructor as soon as possible. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, quarantine, or isolation, the student or the student's representative should contact the [Office of the Dean of Students](#) via email or phone at 765-494-1747.

## **Classroom Guidance Regarding Protect Purdue**

The [Protect Purdue Plan](#), which includes the [Protect Purdue Pledge](#), is campus policy and as such all members of the Purdue community must comply with the required health and safety guidelines. Required behaviors in this class include: staying home and contacting the Protect Purdue Health Center (496-INFO) if you feel ill or know you have been exposed to the virus, [wearing a mask in classrooms and campus buildings](#), at all times (e.g., no eating/drinking in the classroom), disinfecting desk/workspace prior to and after use, maintaining proper social distancing with peers and instructors (including when entering/exiting classrooms), refraining from moving furniture, avoiding shared use of personal items, maintaining robust hygiene (e.g., handwashing, disposal of tissues) prior to, during and after class, and following all safety directions from the instructor.

Students who are not engaging in these behaviors (e.g., wearing a mask) will be offered the opportunity to comply. If non-compliance continues, possible results include instructors asking the student to leave class and instructors dismissing the whole class. Students who do not comply with the required health behaviors are violating the University Code of Conduct and will be reported to the [Office of the Dean of Students](#) with sanctions ranging from educational requirements to dismissal from the university.

Any student who has substantial reason to believe that another person in a campus room (e.g., classroom) is threatening the safety of others by not complying (e.g., not wearing a mask) may leave the room without consequence. The student is encouraged to report the behavior to and discuss next steps with their instructor. Students also have the option of reporting the behavior to the [Office of the Student Rights and Responsibilities \(OSRR\)](#). See also [Purdue University Bill of Student Rights](#).

## Academic Integrity

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing [integrity@purdue.edu](mailto:integrity@purdue.edu), or by calling 765-494-8778, or by contacting the [Office of the Dean of Students](#). While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty" (Section B.2.a of the [Student Regulations concerning Conduct](#)).

Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of ghostwritten papers, the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest."

Incidents of academic misconduct in this course will be addressed by the course instructor and referred to the [Office of Student Rights and Responsibilities \(OSRR\)](#) for review at the university level. Any violation of course policies as it relates to academic integrity will result minimally in a failing or zero grade for that particular assignment or test, and at the instructor's discretion may result in a failing grade for the course. In addition, all incidents of academic misconduct will be forwarded to OSRR, where university penalties, including removal from the university, may be considered.

## Commercial Note Taking in Classes

Notes taken in class are generally considered to be "derivative works" of the instructor's presentations and materials, and they are thus subject to the instructor's copyright in such presentations and materials. *No individual is permitted to sell or otherwise barter notes, either to other students or to any commercial concern, for a course without the express written permission of the course instructor.*

See the [Regulations on Student Conduct: Miscellaneous Conduct Regulations](#).

## Nondiscrimination

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Purdue's nondiscrimination policy can be found at [https://www.purdue.edu/purdue/ea\\_eou\\_statement.php](https://www.purdue.edu/purdue/ea_eou_statement.php).

## **Academic Accommodation of Students with Disabilities**

Purdue University strives to make learning experiences accessible to all participants. If you anticipate or experience physical or academic barriers based on disability, you are encouraged to contact the Disability Resource Center (DRC) at: [drc@purdue.edu](mailto:drc@purdue.edu) or by phone: 765-494-1247.

In this mathematics course accommodations are managed between the instructor, student and DRC Testing Center. If you have been certified by the Disability Resource Center (DRC) as eligible for accommodations, you should contact your instructor to discuss your accommodations as soon as possible. Here are instructions for sending your Course Accessibility Letter to your instructor: <https://www.purdue.edu/drc/students/course-accessibility-letter.php>

## **Mental Health**

If you find yourself beginning to feel some stress, anxiety, and/or feeling slightly overwhelmed, try [WellTrack](#). Sign in and find information and tools at your fingertips, available to you at any time.

If you need support and information about options and resources, please see the [Office of the Dean of Students](#) for drop-in hours (M-F, 8 am-5 pm).

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc. sign up for free one-on-one virtual or in-person sessions with a [Purdue Wellness Coach at RecWell](#). Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is completely free and can be done on BoilerConnect. If you have any questions, please contact [Purdue Wellness](#).

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help and to speak with a clinician, contact [Counseling and Psychological Services \(CAPS\)](#) at 765-494-6995 during and after hours, on weekends and holidays, or by going to CAPS office on the second floor of the [Purdue University Student Health Center \(PUSH\)](#) during business hours.

## **Major Campus Emergency**

In the event of a major campus emergency, course requirements, deadlines, and grading are subject to change that may be necessitated by a revised calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted on course websites. You are expected to read your @purdue.edu email on a frequent basis.

# MA58500 Mathematical Logic I

## Ground Rules for using Zoom for live-streaming lectures and office hours

updated August 23<sup>rd</sup> 2020

### GETTING STARTED WITH ZOOM (FOR THOSE WHO HAVE NOT USED IT BEFORE)

You do not need an account with Zoom to participate by joining a “meeting.”

You do, however, need some equipment: a **computer** (either using the **Zoom app** or a **web browser**), along with a **microphone/webcam** if you wish to be heard/seen, or **smart phone** (with **Zoom Cloud Meetings app**), and of course a stable, **high-enough-speed internet connection**.

Please see **instructions** on how to get Zoom set up here:

<https://support.zoom.us/hc/en-us/articles/201362193-Joining-a-Meeting>

You can follow a given URL to initiate the process of joining the meeting, otherwise proceed directly within the Zoom app to join a meeting using a given Meeting ID. Then input a given password when prompted.

(Please be careful when typing in the password – if you do this incorrectly too many times, you will be locked out, and it may not say that this is what has happened, but just keep asking you for the password... you may need to reinstall the app to get things working again!)

### GENERAL ZOOM GROUND RULES FOR BOTH LECTURES AND OFFICE HOURS

**Connection details:** There will be the same connection details for all lectures, and the same connection details for all office hours, but these will be different from one another since the setups of the two types of meetings are different (for more details of the setup, please see below).

The **URLs**, **Meeting IDs** and **Passwords** for the lectures and office hours will be made available in Brightspace:

<https://purdue.brightspace.com/d2l/home/60092>

**Names:** Please use your **real name** when joining the “meeting.” (Sometimes the “name” field is automatically filled in with the name of your device or your email address, so you will need to be sure to change this.)

**Audio/Microphones:** Everyone’s microphone will automatically be **muted on entry**. This is simply to avoid unnecessary feedback loops or overwhelming background noise and so, I hope, will improve the quality of the live stream for everyone. But you should not be discouraged from asking questions just as you would in lectures or office hours; just please remember to unmute your microphone first, and mute it again afterwards.

**Video:** I would encourage you to have your **video camera on** the whole time, so that we can all see each other and feel as connected as possible. (Your camera will be off my default, so please enable it when you are ready.) However, if you feel that your bandwidth is struggling with the live stream, try turning off your camera.

**Technical Problems:** If you are trying to join a “meeting” either for lectures or office hours and you are having difficulties, please shoot me an email. Especially during the first few classes and office hours, I will try to monitor my email and troubleshoot problems in real time.

## **LECTURES**

**Time:** Lectures will take place **Tuesdays and Thursdays 1:30-2:45pm EDT/EST** (current time zone of the Purdue WL campus).

The lecture “meeting” will only start once I start it; you can “join” beforehand, but nothing will happen until I start things up. I will endeavour to get it started around 5-10 minutes before the start of lectures (15 minutes before the start of the first class).

You are then welcome (encouraged!) to chat to one another as you would in class before the lecture starts. Please start the login process early so that you will be ready for when the class starts on time.

**Chat:** There is a chat window within Zoom. You are welcome to use this to write questions there to “Everyone” while the class is going on, for example if you need to clarify something that was said. If that doesn’t resolve the issue then of course, unmute your microphone and interrupt me to ask instead.

**Recording:** Since there may be unexpected reasons why someone in the class cannot view the lecture live stream sometimes (e.g. technological problems, quarantining etc.), the lectures will also be recorded as they happen and posted after the lecture to Brightspace (<https://purdue.brightspace.com/d2l/home/60092>). (I will try to do this by the evening of the day of a given lecture.) Only those in the class will have access to them.

In order for me to prepare such a backup video from the Zoom live stream, you will be asked to provide your **consent** to the recording when you join the “meeting”, otherwise you will **not** be able to join.

If you do not wish your audio contribution to be a part of the posted video, then you should let me know in writing (e.g. by email) and I will do my best to edit out your audio feed.

**Display mode:** Probably you will be able to view the lecture best if you are in “Speaker View” rather than “Gallery View”. You can change this by clicking in the top right-hand corner on the relevant text. See here for more details of what this means:

<https://support.zoom.us/hc/en-us/articles/201362323-How-Do-I-Change-The-Video-Layout->

I will “spotlight” my video feed, which means that, for everyone in the class, the lecture will always be the main video visible, even if someone else is talking.

If, however this does not happen for you for some reason, and you wish to get your system only to display the video of the lecture, then you can “pin” my video feed. Further instructions for doing that are here:

<https://support.zoom.us/hc/en-us/articles/201362743>



## **OFFICE HOURS**

**Time:** At the start of the semester these are scheduled as Tuesdays 4-5:30pm and Thursdays 3-4:30pm EST/EDT (current time zone of Purdue WL campus). Please keep an eye on the course website for up-to-date information on the times of office hours.

**Waiting Room:** This feature will be enabled for office hours. This means that, after you have “joined” the meeting, you will still need to wait in the “Waiting Room” for me to admit you. As a general rule, you will be admitted right away. However, this will help ensure privacy. (Consider the waiting room as you would consider waiting in the hallway outside my office – usually the door will be open, but sometimes it will be closed.)

I will also try to make use of “breakout rooms” during office hours so that those waiting might be able to discuss amongst themselves while they are waiting.

If you in the waiting room and think you might have been waiting too long, try logging out and logging in again to the “meeting” – sometimes Zoom hangs after I have admitted someone and does not let them in after all, and they are not aware of this. If this still doesn’t work, shoot me an email.

**Video:** In addition to the general ground rules stated earlier, it may help if you can set up a tablet or even your phone to be able to show me what you are writing down. Several phone apps are available to do this; a pdf with some instructions can be found in Brightspace (<https://purdue.brightspace.com/d2l/home/60092>).

**Recording:** Office hours will NOT be recorded.