

MA54400 Fall 2020 Course Information

- MA544 Real Analysis and Measure Theory
- Professor [Antônio Sá Barreto](#)
- Schedule: MWF -- 3:30 -- 4:20, ME 2061.
- My contact information can be found on my home page. Please, do not leave phone messages. I will not get them.
- I will hold office hours on Webex on Tuesdays 1:00 to 2:00 and Thursdays from 4:00 to 5:00 (times subject to change). Students are welcome to ask me questions after the class.

Learning Resources, Technology & Texts

- The course material, homework assignments, lecture notes, etc., will be posted on the course [Brightspace](#) page.
- Students should use their boilerkey to access the course [Brightspace page](#).
- No textbooks are required. Additional readings: W. Rudin, Real and Complex Analysis or A. Torchinsky, Real Variables.
- I will post my lecture notes, both handwritten and typed, to [Brightspace](#). Students are free to download and print my notes and use them as they please. However, this is intellectual property and students may not post these notes anywhere online, give or sell hard or electronic copies to anyone.
- Attendance to lectures is important, students can ask questions and interact with me and other students. However, due to the covid-19 circumstances, it will not be required.
- Lectures will be boileercast and posted to [Brightspace](#). However, I am not responsible for the quality of the videos.
- Software-- Students will use gradescope to submit homework and exams. There is a link to it on the course Brightspace page.
- It is the responsibility of the student to become familiar with gradescope and to use it correctly. Students can find information about how to use gradescope [here](#).
- Students have to scan their documents, and the quality of the scan is important. The TA and I will not grade or regrade answers to questions that we are not able to read.
- You can use your phone to scan your documents, and you can find information about suitable apps [here](#).

Assignments

Assignments	Due	Points
Homework	Weekly throughout the semester	150
Midterm exam 1	To be scheduled	100
Midterm exam 2	To be scheduled	100
Final exam	To be scheduled	150
		Total: 500

Related considerations:

1. Homework will be assigned and collected once a week. The due dates will be announced in lecture and in Brightspace. Late homework will be accepted, but with a 20% penalty. The TA will grade homework. No scores will be dropped.
2. There will be two midterms and one final exam.
3. Exams will be posted on Brightspace at a previously announced date and time. Students will have one day to answer them and will submit their answers through gradescope.
4. Exams have firm deadlines. No late exams will be accepted, unless there is a very strong reason for it. In that case, I will reserve the right to give the student a different alternate exam.

Grading Scale

- A+: 95% to 100%
- A: 90% to 94%
- A-: 85% to 89%
- B+: 80% to 84%
- B: 75% to 79%
- B-: 70% to 74%
- C+: 65% to 69%
- C: 62% to 64%
- C-: 60% - 61%
- D+: 57% - 59%
- D: 55% to 56%
- F: 54% or below. Borderline cases will be considered on a case by case basis.

Academic Integrity

Students will abide by [Purdue's Honor Pledge](#): "As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue." This is no place for cheaters.

- Students are encouraged to discuss homework problems with other students, with me or their TA. They may also consult internet resources.
- However, students are not allowed to copy the solution to a homework problem from another student or from any other sources. If I or the TA discover a student copied someone else's work, we will give them a zero on the assignment.
- All exams are individual assignments. Students may not discuss exam problems with anyone else; they may not consult any textbook or use any internet resources to solve exam problems.
- Penalty for cheating on any exam will be an F in the course.
- *Students are encouraged to report issues of academic integrity that they observe to me; the more evidence they provide the better. They may do so anonymously, through the OSRR by calling 765-494-8778 or emailing integrity@purdue.edu.*

Course Schedule

The following topics will be covered in the course:

1. Introduction, the Riemann integral versus the Lebesgue integral
2. Topology of metric spaces (properties of open, closed, compact, and connected sets)
3. Continuity, semi-continuity, sequences of functions, pointwise and uniform convergence
4. The Riemann integral, sets of measure zero
5. Cantor sets
6. Construction of the Lebesgue measure and integral, abstract measure spaces and integral, properties of measurable functions
7. Convergence theorems, Fatou's Lemma
8. L^p - spaces, Hölder and Cauchy-Schwartz inequalities. Inner product spaces.
9. The Fubini-Tonelli Theorem, convolutions in \mathbb{R}^n
10. Applications: Approximations of the identity, the Fourier transform and its inverse
11. Completeness of L^p spaces and the Fourier transform of L^2 functions

12. Vitali Covering Theorem
13. Functions of bounded variation, differentiation of monotone functions, absolute continuity, the Helly Selection Theorem
14. The Lebesgue Differentiation Theorem

Here is the Purdue [Academic Calendar](#), and key University dates for the Fall 2020 semester are:

- Aug. 17 – Academic Year Faculty/Staff First Day
- Aug. 24 – Classes Begin
- Nov. 24 – Face-to-Face Instruction Ends
- Nov. 25-28 – Thanksgiving Break
- (no classes – 25, 26, 27; University Holidays – 26, 27)
- Dec. 5 – Classes End
- Dec. 7-12 – Final Exams
- Dec. 13 – Commencement
- Dec. 15 – Grades Due

Academic Guidance in the Event a Student is Quarantined/Isolated

If you become quarantined or isolated at any point in time during the semester, in addition to support from the Protect Purdue Health Center, you will also have access to an Academic Case Manager who can provide you academic support during this time. Your Academic Case Manager can be reached at acmq@purdue.edu and will provide you with general guidelines/resources around communicating with your instructors, be available for academic support, and offer suggestions for how to be successful when learning remotely. Importantly, if you find yourself too sick to progress in the course, notify your academic case manager and notify me via email. We will make arrangements based on your particular situation. The Office of the Dean of Students (odos@purdue.edu) is also available to support you should this situation occur.

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 contact the instructor as soon as possible by email, through Brightspace, or by phone. 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. Our course Brightspace includes a link on Attendance and Grief Absence policies under the University Policies menu.

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 building](#), 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 Dean of Students Office 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](#). See also [Purdue University Bill of Student Rights](#).

Nondiscrimination Statement

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. More details are available on our course Brightspace table of contents, under University Policies.

Accessibility

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247. More details are available on our course Brightspace under Accessibility Information.

Mental Health Statement

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 contact or see the [Office of the Dean of Students](#). Call 765-494-1747. Hours of operation are 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 at evans240@purdue.edu.

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, such individuals should contact [Counseling and Psychological Services \(CAPS\)](#) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

Emergency Preparation

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.