

APMA SUMMER BRIDGE PROGRAM – SYLLABUS

Welcome to the APMA Summer Bridge Program, an exciting Analysis adventure awaits you! This is the survival manual for this course, where you can find all the administrative info you need to know. Feel free to e-mail me if you have any other questions.

1. AT A GLANCE

Course Name	APMA Summer Bridge Program
Term	Summer 2023
Class Times and Location	MTWThF 12–2 pm, 170 Hope St Rm 108
Recitation Times and Location	MTWThF 3–4 pm, 170 Hope St Rm 108
Course Website	Course Website
Instructor Name	Peyam (π -m) Tabrizian
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TA # 2 Name	Jake Mundo
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Date: Monday, August 21, 2023.

2. LOGISTICS

Course Description: This course is an Early Preparation Arrival Course in Analysis, where we will review key concepts from analysis that will be useful in your graduate school career. Specific topics to be covered will be Metric Spaces, Compactness, Arzelà-Ascoli Theorem, Banach's Fixed Point Theorem, Differentiability in \mathbb{R}^n , Implicit Function Theorem, Measure Theory and Lebesgue Integration.

Disclaimer: Think of this course as an Analysis refresher. I do not expect you to master everything I teach you in this course or to know how to solve all the practice problems. This course is more meant to that we are all on the same page with regards to the analysis concepts.

Textbook: None; I will post self-contained lecture notes.

Recommended:

- ▶ *Principles of Mathematical Analysis* (3rd edition) by Walter Rudin, McGraw Hill, ISBN 978-0070542358. Although it's very classical and a great reference book if you already know the material, it's a bit dry and difficult for beginners
- ▶ *Real Mathematical Analysis* by Charles Pugh (2nd edition), Springer, ISBN 978-3319330426. This is the book I used when I learned analysis, and I owe much of my analysis knowledge from that book. It covers more or less the same material as Rudin, but it is fun to read and has very interesting problems and pictures. We will roughly follow Chapters 2, 4, 5, 6 of this book.
- ▶ *Real Analysis: Measure Theory, Integration, and Hilbert Spaces* by Stein and Shakarchi, ISBN 978-0691113869. This book gives a very

intuitive development of measure theory and integration. We will roughly follow the first two chapters of this book

Online resources you can use:

- ▶ Course Website: This is the main course website, where you can find the lecture notes and practice problems
- ▶ Gradescope: Here is where you upload your homework
- ▶ Dr Peyam: My YouTube channel, where you'll find useful videos related to this course

3. ASSIGNMENTS

Attendance: Although attendance is optional, I highly encourage you to come to class. There will be a sign-up sheet at the beginning of class, and if you don't show up to class more than 3 times, I will send you a gentle reminder to attend class.

Practice Problem: There will be **optional** practice problems posted on the course website the night before each class. They are formally due at 11:59 pm on the day of the lecture, but that deadline is flexible. You only need to submit your solutions if you want to get feedback on them. You will upload your assignments on Gradescope.

Recitation Sessions: There will be recitation sessions led by the GTAs, where they will go over the practice problems.

4. MISCELLANEOUS INFORMATION

Statement on Inclusivity: I strive to foster an inclusive, collaborative, and supportive learning environment where everybody is welcome

and feels they belong. I also aim to create an atmosphere where everyone is comfortable to add their voices and opinions. Being a member of the LGBT community, I acknowledge that there are many disparities in representation in the mathematical sciences and that we, as a community, need to work much harder and more persistently to become more diverse.

Accessibility and Accommodations Statement: Brown University is committed to full inclusion of all students. Please inform me early in the term (by email, office hours, after class, or by appointment) if you may require accommodations or modification of any of course procedures. If you need accommodations around online learning or in-classroom accommodations, please reach out to Student Accessibility Services (SAS) for their assistance (sas@brown.edu, 401-863-9588). Undergraduate students in need of short-term academic advice or support can contact an academic dean in the College by emailing college@brown.edu. Graduate students may contact one of the deans in the Graduate School by emailing graduate_school@brown.edu.

Finally: Sit back, relax, and enjoy the show! On the next page, you can find *very tentative* schedule of the lectures.

#		Date	Lecture Title
1	M	Aug 21	Metric Spaces
2	Tu	Aug 22	Compactness
3	W	Aug 23	Arzelà-Ascoli Theorem
4	Th	Aug 24	Banach Fixed Point Theorem
5	F	Aug 25	Differentiation in \mathbb{R}^n
6	M	Aug 28	Implicit Function Theorem
7	Tu	Aug 29	Riemann Integration
8	W	Aug 30	Measure Theory
9	Th	Aug 31	Lebesgue Integral
10	F	Sep 1	Catch-up