

## MATH 7337 SYLLABUS

FALL 2021

Course Number: Math 6337 A

Course Name: Harmonic Analysis

Lecture Time: TuTh 5:00-6:15 p.m.

Lecture Room: Skiles 168

Instructor: Christopher Heil  
Office: Skiles 218D  
Email Address: [heil@math.gatech.edu](mailto:heil@math.gatech.edu)

Office Hours: Held virtually through BlueJeans, hours to be announced

Course Web Page: Canvas

Prerequisites: Math 6337 (Real Analysis I)

Recommended: Math 6338 (Real Analysis II)  
or Math 6580 (Introduction to Hilbert Spaces)

First class: Tuesday, August 24, 2020

### Covid.

- Lectures will be given in-person but will be broadcast live via BlueJeans, and the lectures will be recorded and made available on Canvas for later viewing.
- Please attempt to maintain social distancing in the classroom.
- Out of concern for your health and mine, I will wear a mask in the classroom and ask that you give me and your fellow classmates this same consideration. The Centers for Disease Control and Prevention recommends the use of face coverings inside public buildings even by fully vaccinated individuals. I understand that wearing a mask can be an inconvenience, but they have been shown to slow the spread of this virus. Wearing a mask is protection for yourself and a sign of care for the health of others. Your cooperation and understanding on this matter are much appreciated.
- If you have not done so, I encourage you to get vaccinated now. Doing so at Tech is easy and free. We know the vaccines are effective protection against Covid-19, including the new variants, and the best way to protect yourself and others. If you

are unvaccinated, you are at risk of contracting Covid-19 and infecting others, with potentially severe consequences for you or someone else. Please seek medical advice from your healthcare provider or a member of our Stamps Health Services team led by Dr. Ben Holton, if you have doubts or concerns about getting vaccinated.

**Lecture Notes:** C. Heil, *Introduction To Harmonic Analysis* (posted to Canvas).

Chapter 1: The Fourier Transform on  $L^1(\mathbb{R})$

Chapter 2: Fourier Series and the Abstract Fourier Transform

Chapter 3: The Fourier Transforms on  $L^2(\mathbb{R})$

Chapter 4: Distributions

Chapter 5: Measures

Chapter 6: Time-Frequency Analysis

Chapter 7: Discrete Time-Frequency Analysis

**Background Text:** C. Heil, *Introduction to Real Analysis*

Ebook available for free from SpringerLink:

<https://link.springer.com/book/10.1007/978-3-030-26903-6>

Additional material available at

<http://people.math.gatech.edu/~heil/real>

**Background Lecture Notes:** C. Heil, *Operator Theory and Functional Analysis* (posted to Canvas).

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Here are some other related books that may be useful as comparison texts.

- Katznelson, *An Introduction to Harmonic Analysis*
- Benedetto, *Harmonic Analysis and Applications*
- Dym and McKean, *Fourier Series and Integrals*
- Stein and Shakarchi, *Fourier Analysis: An Introduction*
- Gröchenig, *Foundations of Time-Frequency Analysis*

**Piazza.** Piazza is enabled for for class discussion. You can post questions to me or to the class here. Our class signup link is at: <http://piazza.com/gatech/fall2021/math7337a>

**Grading.** We will have 6 homework assignments and one take-home final exam.

6 Homeworks	25 points each
<u>Final Exam (take home)</u>	<u>50 points</u>
TOTAL	200 points

Letter grades will be based on your accumulated points at the end of the semester, according to standard 90%, 80%, 70%, 60% cutoffs (although I may adjust the cutoffs downward at the end of the semester, depending on class distribution):

180–200	A
160–179	B
140–159	C
120–139	D
0–119	F

At the end of the course, I'll evaluate the class distribution and decide if a curve is needed. I'll only curve *down* from the above cutoffs, not up.

**Homework.** All assessments will be electronic. Homework assignments will be posted on Canvas, and papers will be submitted electronically through Canvas. A subset of the problems on each assignment will be selected for grading. Late homeworks will not be accepted without advance permission.

Homeworks must be written in clear, complete sentences. You will not receive credit if the grader does not understand your writing.

I encourage you to type your homeworks using TeX or another mathematical typesetting system. I will provide sample TeX files that you can use as templates. Handwritten homeworks are acceptable, but be sure to write only on the *front side* of the page, otherwise bleed-through will be a problem. Use a good scanner to create a pdf file that you can submit through Canvas. Don't try to take pictures of the paper with a phone, it's just not readable.

You are allowed (and encouraged) to work together with other students on the homework, as long as you each *independently* write up your own solutions. You are also allowed (and encouraged) to ask me questions, although you should try to think about the problems before asking.

**Academic Dishonesty** All students are expected to comply with the Georgia Tech Honor Code. Any evidence of cheating or other violations of the Georgia Tech Honor Code will be submitted directly to the Dean of Students. The institute honor code is available at <http://www.honor.gatech.edu>

**Accommodations for Students with Disabilities.** If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/> as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.