Analysis II (Math 131B), Fall 2023, San José State University
MacQuarrie Hall 235, MW noon–1:15pm (Sec. 01, code 44629)

Instructor: Dr. Tim Hsu (pronounced "shoe").

Office and phone: MacQuarrie Hall 316, (408)924-5071.

Office hours: MW 9:30–10:20am and 1:30–2:30pm.

E-mail: `tim.hsu@sjsu.edu`. I can be reached by e-mail at many times of the day, and will try to respond within 24 hours.

Course web page: `http://www.timhsu.net/courses/131b/`

Required texts: *Fourier Series, Fourier Transforms, and Function Spaces: A Second Course in Analysis*, Hsu, MAA Press.

Optional texts: *Writing Proofs*, Hsu, downloadable from course web page.

Background references: Ross, *Elementary Analysis: The Theory of Calculus*

Semester grade: Homework 20%; Exam 1 14%; Exams 2 and 3 18% each; final exam 30%.

Goals of the course. In your first course in analysis, you learned the theory behind calculus. In this course, we build on that foundation to study *Fourier series*, i.e., infinite series of trigonometric functions. Central questions include: How do we define the "best" approximation to a given function? How do we find that best approximation?

In particular, those questions naturally lead to the idea of a *function space*, and specifically, a certain space of functions called a *Hilbert space*. We study the foundations of function spaces and approximations, establish the fundamental theory of Fourier series, and then go on to look at a continuous analogue known as the *Fourier transform*.

Prerequisites. A first course in analysis (Math 131A) or equivalent. As background, we assume: Supremums and infimums, completeness, sequences and limits, the Bolzano-Weierstrass theorem, series and convergence, continuity and limits, and the Extreme Value Theorem. It will also be helpful, but not as necessary, to have seen differentiation, the Mean Value Theorem, integration, the Fundamental Theorems of Calculus, and series of functions. If you're worried about remebering any of the above, we will spend the first month of class reviewing all of the above in a new setting, doing series of functions essentially from scratch.

This class will be run in a flipped format. That means you'll watch the lectures for a particular day's topic before class and then spend class time discussing concepts and working on problems, both with my help/personal attention and working with others in the class. Perhaps most importantly, class will be spent working on our quite considerable homework assignments. See the handout on "Daily workflow" for more details.

Problem sessions. We will also hold a weekly Zoom problem session where you can work together and get help, each **Fri noon–2:00pm** (time subject to change).

Homework. Homework will be due roughly once a week, with problem set 01 due **Wed Aug 30**. For more details on homework content and the process of doing homework (including outlines and revisions), see the handout on homework.

Specific homework assignments will be determined as the term progresses. For a complete list of all homework assigned to date, and downloadable versions of almost all handouts from class, you can always check the course web page.

Exams. The material on exams will mostly resemble the material from the homework. All exams are closed-book.

Calculators. You will *not* be allowed to use calculators for *any* in-class exams. The numerical work on exams will be simple enough that a calculator shouldn't be necessary, and even if you make numerical mistakes, you won't lose a lot of points on them.

Exam dates. The dates of our three in-class exams and final exam are found on the syllabus below. In particular, the final exam will be held on **Thu Dec 14**, from **9:45am–noon**. Please make sure that you are still on campus at that time (e.g., don't buy a plane ticket that leaves town on Dec 13).

How to add this course. If you are not registered for this course, and you would like to add it, you must first put a full effort into completing all of the work in the course. Second, if you are a graduating senior, you need to produce documentation to verify that.

I'll make a waiting list, which you get on by filling out and turning in the information form for the course. I'll give out add codes starting one week before **Fri Sep 15**, mainly based on completeness of homework, and as long as there is room, I will continue to give out add codes until add/drop date (**Fri Sep 15**). Note, however, that graduating seniors have the highest priority, and that Open University students have the lowest priority.

How to drop this course. Until **Fri Sep 15**, you can drop at `my.sjsu.edu`. Nothing will appear on your transcript, but please let me know if you drop.

To drop after Fri Sep 15, you must go to the student services center and submit a Course Drop form to the Director of Academic Services. Dropping under these circumstances is only allowed for "serious and compelling reasons" (course catalog). A low grade is not a serious and compelling reason.

Academic integrity. Your commitment to learning (as shown by your enrollment at SJSU) and SJSU's Academic Integrity Policy require you to be honest in all of your academic course work. Faculty are required to report all infractions to the Office of Student Conduct and Ethical Development. See: `www.sjsu.edu/studentconduct`

Disabilities. If you need course adaptations or accommodations due to a disability, or if you need special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities register with the Accessible Education Center (formerly the Disability Resources Center) to establish a record of their disability.

Date	Reading	Date	Reading
		Mon Oct 16	7.2–7.3
		Wed Oct 18	**Exam 2**
Mon Aug 21	1.1–1.2, 2.1	Mon Oct 23	7.1–7.2
Wed Aug 23	2.2–2.4	Wed Oct 25	7.3–7.4
Mon Aug 28	2.4–2.5, 3.1	Mon Oct 30	7.4–7.5
Wed Aug 30	3.1–3.2	Wed Nov 01	7.5–7.6
Mon Sep 04	**Labor Day**	Mon Nov 06	8.1–8.2
Wed Sep 06	3.3	Wed Nov 08	8.3
Mon Sep 11	3.4	Mon Nov 13	8.4
Wed Sep 13	3.5	Wed Nov 15	12.1
Mon Sep 18	Review	Mon Nov 20	**Exam 3**
Wed Sep 20	**Exam 1**	Wed Nov 22	**Thanksgiving Break**
Mon Sep 25	4.1–4.2	Mon Nov 27	12.2
Wed Sep 27	4.3–4.4	Wed Nov 29	12.3
Mon Oct 02	4.5–4.6	Mon Dec 04	12.4
Wed Oct 04	4.6, 5.1–5.2	Wed Dec 06	Semester review
Mon Oct 09	5.3, 6.1–6.2	**Thu Dec 14**	**FINAL EXAM**
Wed Oct 11	6.4, 7.1		**9:45am–noon**