

Math 4330-001, 5330-001 Fourier Analysis

2018/2019 Semester 2

Course Instructor: Dr. Judith Packer

Contact Info: Office: Math 227, Telephone: 2-6979; e-mail packer@colorado.edu.

Lecture hours and Venue: MWF 1 p.m - 1:50 p.m. ECCR 108.

Office Hours: Monday 4 -5 p.m., WF 3- 4 p.m. or by appointment.

Course Prerequisites: Math 2130 and Math 3001 or instructor consent.

Textbook: Eric Stade, *“Fourier Analysis”*, John Wiley and Sons, 2005.

Course Contents: This course introduces elementary Fourier analysis, first developed by Joseph Fourier in the 1800's. Fourier analysis is a way of studying functions by decomposing them into certain types of “building block” oscillatory trig. functions. The material to be covered includes the Appendix, most of Chapters 1 and 3, and parts of Chapters 2, 5, and 6 in the textbook. Topics include: A review of the definition and arithmetic of complex numbers, periodic functions on the real line \mathbb{R} , and functions on the circle \mathbb{T} , trigonometric functions with period 2π , Fourier coefficients of periodic functions, Fourier series, convergence of Fourier series, Gibb's phenomenon for Fourier series at points of discontinuity, study of uniform convergence, differentiation and integration of Fourier series, Fourier series with other periods, applications of Fourier series to solutions to boundary value problems in partial differential equations: the heat equation and the wave equation, vector spaces of functions, L^2 -spaces and inner products, the Hilbert space $L^2([-\pi, \pi])$, orthogonality and orthonormal bases for $L^2([-\pi, \pi])$, and, if time permits, functions defined on \mathbb{R} , the function space $L^1(\mathbb{R})$, convolution of functions defined on \mathbb{R} , the Fourier transform on $L^1(\mathbb{R})$, Fourier inversion in $L^1(\mathbb{R})$, the Hilbert space $L^2(\mathbb{R})$, the Fourier transform and Fourier inversion in $L^2(\mathbb{R})$. More information can be found on the web page for the course:

<http://math.colorado.edu/~packer/Fourier19.html>.

Assessment: Your grade will be computed from:

- Best 10 homeworks: 20% of final grade;
- In-class midterm, Wednesday, Feb. 13, 2019, 1 p.m. - 1:50 p.m., ECCR 108: 25% of final grade;
- Take-home midterm, given out Wednesday, April 3, 2019, 10 a.m., due Wednesday April 10, 2019, 5 p.m. (please note that takehome exams will be different for Math 4330 and Math 5330): 25% of final grade;
- In-class Final Exam, Monday, May 6, 2019, 1:30 p.m. - 4 p.m., ECCR 108: 30% of final grade.

Differences between Math 4330 and Math 5330:

Please note that students enrolled in the graduate version of this course, Math 5330, will have to do more problems on the homework and will be given a take-home exam (handed out on April 1) that will be more theoretical than the exam for Math 4330.

Important Dates:

- **January 30 (Wed.):** Last day to drop a course without Tuition/Fee charges and without a “W” appearing on your transcript.
- **March 22 (Fri.):** Last day to drop a course via MyCUInfo; Last day for students to make arrangements with their instructor if they have three or more final exams on the same day or two final exams scheduled to meet at the same time.
- **May 2 (Thurs.), 11:59 p.m.:** Last day for students to withdraw from the university for Spring semester. All withdrawals are assessed 100% of tuition and fees (\$0 refund) and “W” grades are posted to transcripts.

Accommodations for disabilities: If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner (for exam accommodations provide your letter at least one week prior to the exam) so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact Disability Services at 303-492-8671 or by e-mail at dsinfo@colorado.edu.

If you have a temporary medical condition or injury, see Temporary Injuries under Quick Links at Disability Services website (<http://disabilityservices.colorado.edu/>) and discuss your needs with your professor.

Religious observances: Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, assignments will either be rescheduled or dropped from grading calculations depending on the nature of the conflict. If you have a conflict, please advise me as soon as possible so that arrangements can be made. See full details at http://www.colorado.edu/policies/fac_relig.html

Miscellaneous University Rules & Regulations:

- **Honor Code:** All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Additional information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html> <http://www.colorado.edu/academics/honorcode/>
- **Classroom behavior policy:** Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student’s legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise

me of this preference early in the semester so that I may make appropriate changes to my records. See policies at

<http://www.colorado.edu/policies/classbehavior.html>

http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code

- **Statement on Discrimination and Harrassment:** The University of Colorado Boulder (CU-Boulder) is committed to maintaining a positive learning, working, and living environment. The University of Colorado does not discriminate on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation, veteran status, political affiliation or political philosophy in admission and access to, and treatment and employment in, its educational programs and activities. (Regent Law, Article 10, amended 11/8/2001). CU-Boulder will not tolerate acts of discrimination or harassment based upon Protected Classes or related retaliation against or by any employee or student. For purposes of this CU-Boulder policy, “Protected Classes” refers to race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Individuals who believe they have been discriminated against should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or the Office of Student Conduct and Conflict Resolution (OSCCR) at 303-492-5550. Information about the OIEC, the above referenced policies, and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://www.colorado.edu/odece/>