

## Math 454/554 - Fourier Series and Boundary Value Problems, Section 001, Fall 2016

INSTRUCTOR: Dr. Yulia Hristova

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WEB: <https://umdearborn.edu/canvas>



OFFICE HOURS: (subject to change) M: 11:00 - 12:00, TR: 11:30-12:30 and 3:00-3:30 CASL 2079

COURSE MEETING TIMES: TR 3:30 pm - 4:45 pm, CASL 2070

COURSE DESCRIPTION: In the first part of this course we will study Fourier series. The second part will be devoted to boundary value problems for partial differential equations and their solutions using Fourier series. Students cannot receive credit for both MATH 454 and MATH 554. 3 credit hours.

COURSE OBJECTIVES: : After finishing the course students should be able to

1. Compute Fourier series of functions.
2. Understand and use the basic vocabulary, concepts, rules, definitions, and mathematical notation of boundary value problems.
3. Use separation of variables to solve the heat, Laplaces and wave equations in 1D and 2D.
4. Use Fourier series to solve boundary value problems.

MATHEMATICS PROGRAM GOALS:

1. Increase students command of problem-solving tools and facility in using problem-solving strategies, through classroom exposure and through experience with problems within and outside mathematics.
2. Increase students ability to communicate and work cooperatively.
3. Increase students ability to use technology and to learn from the use of technology, including improving their ability to make calculations and appropriate decisions about the type of calculations to make.
4. Increase students knowledge of the history and nature of mathematics. Provide students with an understanding of how mathematics is done and learned so that students become self-reliant learners and effective users of mathematics.

TEXT: "Fourier Series, Transforms, and Boundary Value Problems", second edition by Ray Hanna and John Rowland.

GRADING POLICY: Grades will be based on attendance, quizzes, two midterm exams, and a comprehensive final exam. Requests for regrading mid-term exams and quizzes must be made within one week after the items in question have been returned to the class. Your final percentage grade is computed to the nearest tenth and the letter grade is determined by the grading scale given below.

**Your grade is based solely on performance, not effort or special circumstances.**

ASSIGNMENT AND GRADING DISTRIBUTION MATH 454 (Undergraduate):

Attendance	Quizzes	2 MT Exams	Final Exam
2 %	20%	48% (24% each)	30%

ASSIGNMENT AND GRADING DISTRIBUTION MATH 554 (Graduate):

Attendance	Quizzes	2 MT Exams	Final Exam	Project
2 %	20%	40% (20% each)	28%	10%

GRADING SCALE:

$100 \geq A \geq 94$	$84 > B- \geq 80$	$70 > D+ \geq 67$
$94 > A- \geq 90$	$80 > C+ \geq 77$	$67 > D \geq 64$
$90 > B+ \geq 87$	$77 > C \geq 74$	$64 > D- \geq 60$
$87 > B \geq 84$	$74 > C- \geq 70$	$60 > E$

HOMEWORK & QUIZZES: Ungraded homework from the textbook will be posted on Canvas. Quiz problems will be either out of the homework or very similar to homework problems. No make-up quizzes will be given, instead, the lowest quiz score will be dropped.

CALCULATORS: Calculators are not required for this course, but students are welcome to use them during lectures. Only scientific calculators are allowed on quizzes and exams.

MID-TERM EXAMS: Two exams will be given in class, according to the following schedule (subject to change): **Exam 1** Tuesday, October 11; **Exam 2** Tuesday, November 22.

FINAL EXAM: The comprehensive final exam will be on Thursday, December 15, starting at 11:30 am.

MISSED EXAMS POLICY: Missing an exam is permitted only for very serious and unavoidable extenuating circumstances, and only if you notify me in advance. In all cases of absence from exams a written excuse is required. Otherwise you will get a score of 0 on the exam. Except in truly exceptional situations, a student who misses the final exam will fail the course.

ACADEMIC INTEGRITY POLICY: The University of Michigan-Dearborn values academic honesty and integrity. Each student has a responsibility to understand, accept, and comply with the University's standards of academic conduct as set forth by the Code of Academic Conduct (<http://umdearborn.edu/697817>), as well as policies established by each college. Cheating, collusion, misconduct, fabrication, and plagiarism are considered serious offenses and violations can result in penalties up to and including expulsion from the University.

**In this course**, the penalty for a first violation will be a grade 0 on the related assignment. A second violation will result in a failing grade for the course. All violations will be reported to CASL and the student's home unit.

**INCOMPLETES:** These will be given only in extraordinary circumstances. More precisely, I will consider giving you an incomplete if you have successfully completed all but a small portion of the work of the course and some severe, unexpected event prevents you from completing the course. This means that you must have taken at least 2 midterms and must be doing work at the C level or better. You will have to sign a contract detailing what you have to do to complete the course. I will not give you an incomplete simply because you are behind in your work; in the latter case you should try to drop the course.

**ANNOUNCEMENTS AND UPDATES:** All announcements and updates will be either posted on Canvas, made in class or communicated through e-mail. It is the student's responsibility to monitor their e-mail and Canvas for new messages. It is advisable that students change the Notification Preferences in Canvas to allow immediate notifications of new announcements.

#### **EMAIL COMMUNICATION:**

##### **DO'S**

- Read <http://www.wikihow.com/Email-a-Professor>;
- Include the course number in the subject of your e-mail;
- If you need help solving a problem try to ask me during office hours. This will take less time for both of us. If coming to office hours is not feasible, you can send your question by e-mail and you should attach a picture of your work.

##### **DON'TS**

- Do not send me e-mails through Canvas.
- Do not send e-mails requesting a higher grade, unless you believe there has been a mistake. Asking for a higher grade than you earned is unethical and will never lead to a grade increase.

**UNIVERSITY ATTENDANCE POLICY:** A student is expected to attend every class and laboratory for which he or she has registered. Each instructor may make known to the student his or her policy with respect to absences in the course. It is the student's responsibility to be aware of this policy. The instructor makes the final decision to excuse or not to excuse an absence. An instructor is entitled to give a failing grade (E) for excessive absences or an Unofficial Drop (UE) for a student who stops attending class at some point during the semester.

**COMMUNICATION AND ELECTRONIC DEVICES USAGE IN CLASS:** The use of mobile communication devices and music players disrupts the class. Please be considerate of both your fellow students and your instructor and either turn-off or silence your cell phones, pagers, PDAs, or similar communication devices and turn-off and put away your music players during scheduled classes. Given the fact that these same communication devices are an integral part of the University's emergency notification system, an exception to this policy would occur when numerous devices activate simultaneously. When this occurs, students may consult their devices to determine if a university emergency exists. If that is not the case, the devices should be immediately returned to silent mode and put away.

**DISABILITY STATEMENT:** The University will make reasonable accommodations for persons with documented disabilities. Students need to register with Disability Resource Services (DRS) every semester they are enrolled. DRS is located in Counseling & Support Services, 2157 UC ([http://www.umd.umich.edu/cs\\_disability/](http://www.umd.umich.edu/cs_disability/)). To be assured of having services when they are needed, students should register no later than the end of the add/drop deadline of each term. If you have a disability that necessitates an accommodation or adjustment to the academic requirements stated in this syllabus, you must register with DRS as described above and notify your professor.

**NON-DISCRIMINATION POLICY:** The University of Michigan is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, national origin, age, marital status, sex, sexual orientation, gender identity, gender expression, disability, religion, height, weight, or veteran status in employment, educational programs and activities, and admissions. Inquiries or complaints may be addressed to the Senior Director for Institutional Equity, and Title IX/Section 504/ADA Coordinator, Office for Institutional Equity, 2072 Administrative Services Building, Ann Arbor, Michigan 48109-1432, 734-763-0235, TTY 734-647-1388, [institutional.equity@umich.edu](mailto:institutional.equity@umich.edu).

**CAMPUS SAFETY:**

- All students are encouraged to program 911 and UM-Dearborns University Police phone number (313) 593-5333 into personal cell phones. In case of emergency, first dial 911 and then if the situation allows call University Police.
- The Emergency Alert Notification (EAN) system is the official process for notifying the campus community for emergency events. All students are strongly encouraged to register in the campus EAN, for communications during an emergency. The following link includes information on registering as well as safety and emergency procedures information: <http://umdearborn.edu/emergencyalert/>.
- If you hear a fire alarm, class will be immediately suspended, and you must evacuate the building by using the nearest exit. Please proceed outdoors to the assembly area and away from the building. Do not use elevators. It is highly recommended that you do not head to your vehicle or leave campus since it is necessary to account for all persons and to ensure that first responders can access the campus.
- If the class is notified of a shelter-in-place requirement for a tornado warning or severe weather warning, your instructor will suspend class and shelter the class in the lowest level of this building away from windows and doors.
- If notified of an active threat (shooter) you will Run (get out), Hide (find a safe place to stay) or Fight (with anything available). Your response will be dictated by the specific circumstances of the encounter.

### TENTATIVE COURSE OUTLINE:

I will try to adapt the pace of the class to the needs of the students, hence the schedule below is subject to change.

Sept 8 – Sept 13	Review of ODE (1.1-1.4)
Sept 13 – Sept 20	Orthogonal Sets and Functions (parts of Chapter 2)
Sept 20 – Oct 6	Fourier Series (Chapter 3)
Oct 11	Exam 1
Oct 13 – Oct 25	Linear PDE (1.8, 1.9), Separation of Variables (1.12), Sturm-Liouville Problem (2.5)
Oct 27 – Dec 8	Heat, Wave and Laplace Equations (parts of chapters 8 and 9)
Nov 22	Exam 2
Dec 13	Review
Dec 15	Final Exam