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Fall 9-1-2021

M 473.01: Introduction to Real Analysis

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CLASS: MTuWF: 11:00 am – 11:50 am; MA 312; CRN: 74573

MOODLE: <https://moodle.umt.edu/course/view.php?id=47253>

This site will contain all information on this sheet plus more. Homework assignments and other information pertinent to this course (such as office hours) will be posted at this webpage, which will be updated frequently, so you should visit it regularly.

CATALOG DESCRIPTION: Theory of metric spaces and point set topology, Riemann-Stieltjes integral, sequences and series of functions. Stone-Weierstrass theorem, theorem of Arzela-Ascoli, introduction to Lebesgue integration.
Level: Undergraduate-Graduate

PREREQUISITES: M 273 and M 307 or equivalent.

PROFESSOR: Karel Stroetho
OFFICE: MA 307;
Phone: 243-4082 (or math office 243-5311 to leave a message);
E-mail: karel.stroethoff@umontana.edu;
OFFICE HOURS: To be announced (see moodle page)

TEXT: Lecture notes will be distributed in class and placed on the moodle page for the course.

TOPICS:

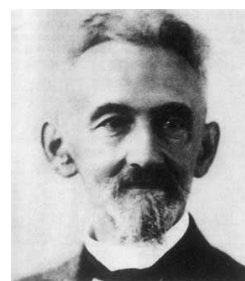
1. *The Real Number System*
2. *Metric Spaces*
3. *Sequences and Series of Functions*
4. *Lebesgue's Theory of Integration*



Maurice Fréchet
(1878–1973)

Founders of metric spaces

In his thesis of 1906 Maurice Fréchet first introduced the notion of a metric space. In 1914 Felix Hausdorff published his famous *Grundzüge der Mengenlehre* in which the theory of metric and topological spaces was further developed.



Felix Hausdorff
(1868–1942)

IMPORTANT DATES: Aug 30: Instruction begins
Sep 6: Labor Day Holiday, no class
Nov 24–26: Thanksgiving Vacation
Dec 13–17: Final Exam Week

FINAL EXAM: Thursday, December 16, 8:00 am – 10:00 am

GRADING:

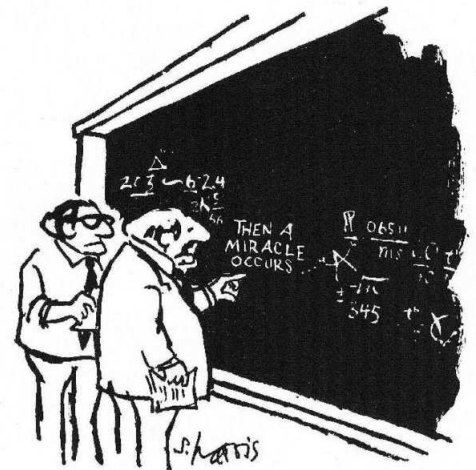
- (i) There will be weekly homework assignments, and the assigned homework will be collected for grading.
- (ii) There will be a Midterm in addition to a comprehensive final exam. The Midterm is tentatively scheduled for Wednesday, October 20.

Course Grade: Your numerical score for the course will be the sum of 50% of the Homework, 20% of the Midterm and 30% of the Final Exam.

HOMEWORK: Homework problems will be assigned frequently, and weekly assigned homework will be collected for grading. Late homework problems will *not* be accepted. To help you keep track of the assigned homework I will post a list of all assigned problems (with the dates they are due) on the website for this course. This website will furthermore contain other information regarding this course and it will be updated regularly.

Concerning the write-up of your homework I would like you to consider the following guidelines:

- 1) It should be concise and legible;
- 2) In the final write-up of your solution (i.e., the one that you hand in) you should give the reader an idea of direction, tell the reader what you are going to do and why. If you are to prove two inequalities, one of which is considerably easier than the other, indicate this — you could for example say that one direction is trivial (and in parentheses briefly indicate why) and announce that you intend to tackle the other (difficult) direction by using a certain theorem. The reader, presumably familiar with the theorem that you just mentioned, will then understand that the next chain of inequalities is to verify that the hypotheses of this theorem are satisfied and in fact give the desired result. Most of the homework problems will have one or several such “punch-lines,” which I want you to mention at the beginning of your solution, as an abstract of your proof. This will help you when you read your solution at a later time, and will help me in determining whether you really understood the problem.
- 3) Your solution should be correct! It will be your job to convince me of the correctness of your solution.



"I think you should be more explicit here in step two."

UM COVID-19 FACE COVERING POLICY: In order to help ensure the health and safety of the University of Montana (UM) community and the public, unless specifically exempted as outlined in the Procedures, all individuals on the UM campus are strongly encouraged to wear masks in indoor public settings. (<https://www.umt.edu/coronavirus/mask-policy.php>).

SAFETY FOR IN-PERSON INSTRUCTION:

- Mask use is required within the classroom.
- Class attendance will be recorded to support contact tracing efforts.
- No drinking of liquids or eating of food within the classroom.
- Class sessions are being recorded.
- Stay home if you feel sick and/or if exhibiting COVID-19 symptoms, and please contact the Curry Health Center at (406) 243-4330.
- Up-to-Date COVID-19 Information from the University of Montana:
 - UM Coronavirus Website: <https://www.umt.edu/coronavirus>
- Please remain vigilant outside the classroom in mitigating the spread of COVID-19.

SEATING: To assist COVID-19 contract-tracing we will record attendance. It will be useful if you sit in the same location throughout the term. Following is a seating chart to indicate where you sit in the class room. On the chart that will be passed through the class please indicate the location where you are seated by writing your initials.

