

MEASURE AND INTEGRATION: MATH 776 GMU

Spring 2021

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| Instructor: Dr. Mahamadi Warma | Time: W: 4:30 PM–7:15 PM |
| Email: mwarma@gmu.edu | Place: Online |

Office Hours: W 1:30 PM–4:00 PM or by appointment.

Office: Exploratory Hall, room 4461.

Phone: 703-993-1488.

Textbook and material: We will cover portions of Chapters 1-3 in the following text book:

- Gerald B. Folland. Real analysis. Modern techniques and their applications. Second edition. Pure and Applied Mathematics. John Wiley & Sons, Inc., New York, 1999.

Justification: This is an important course in mathematics for all students interested to do research in pure, applied, computational mathematics, statistics, and probabilities. This course introduces students to general measure theory, measurable sets and functions, Lebesgue and Borel measures, differentiation, and integration.

Objectives: At the end of the course, the students should be familiar with the general theory of measurable sets and functions, Lebesgue measures, Borel measures on the real line, signed measures, complex measures and differentiation on the Euclidean space. They should also be familiar with the use of polar coordinates in integration, the Lebesgue integral, and the Lebesgue-Radon-Nikodym theorem.

Course Description: Measure theory: σ -algebras, measures, outer measures, and Borel measures on the real line. Integration: measurable functions, integration of non-negative functions, integration of complex functions, modes of convergence, product measures, the N -dimensional Lebesgue integral, and integration in polar coordinates. Signed measures and differentiation: signed measures, the Lebesgue-Radon-Nikodym theorem, complex measures, differentiation on Euclidean space, and functions of bounded variation.

Recommended Prerequisite: MATH 675.

Homework: Problems will be assigned regularly throughout the semester. Students are expected to solve all the assigned problems, and some of these problems will be handed in and graded. Students are allowed to discuss assigned problems with classmates, but solutions should be written individually.

Tests: There will a final exam. There will be one midterm and one final exam.

Grading Policy: The graded homework and class participation for 70%, and the final exam for 30%. Equivalence between scores and letters, recommended by GMU, is given in the table below:

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| A+ | A | A- | B+ | B | B- | C+ | C | C- | D | F |
| >97 | >93 | >90 | >87 | >83 | >80 | >77 | >73 | >70 | >60 | 60-0 |

Attendance and Course Policy: Students are expected to participate in all (synchronized) classes. In the event that you must miss a (synchronized) class, you are responsible to ask classmates concerning announcements made and the material discussed. Most lectures will be also recorded and uploaded in Blackboard.

Makeup exams are only possible with an acceptable excuse. Examples of such excuses are religious holy days, family emergencies, school sponsored events, job interviews, or sickness. All absences require

documentation. Notify me of any religious holy days within the first 2 weeks of the semester. Changing the date of the final exam for unusual circumstances, or because three or more finals are scheduled in one day, requires the approval from the professor at least a week prior to the last day of classes. If absence from the final exam is unexcused, the grade for the course is F.

Cellular Phones in the Classroom: Students must turn off all cellular Phones and other communication devices when in the classroom or in a synchronized class. In case the course will be in person on Campus, Emergency personnel should notify the professor at the beginning of the course and set phones to vibrate mode.

GMU Policies: The University Catalog, <http://catalog.gmu.edu>, is the central resource for university policies in university academic affairs. Further policies are available at <http://universitypolicy.gmu.edu/> All members of the university community are responsible for knowing and following established policies.

Honor code: Students are expected to follow the honor code <https://oai.gmu.edu/mason-honor-code/> Lack of knowledge of the honor code is not a reasonable excuse for its violation.

Disability Services: Reasonable accommodations are available for students who have a documented disability. Please contact Disability Services if you require accommodations: Office of Disability Services, Student Union Building I (SUB I), Room 4205, Phone: 703-993-2474.