

Instructor:	Olga Goulko	Lectures:	Tu&Th 2:00-3:15 pm, Y03-3380
Office:	ISC-1-1180	Office hours:	Tu&Th 3:30-4:30pm, or by appointment
Email:	olga.goulko@umb.edu	Homework due:	Fri 11:59pm

Mathematics is the language of physics. The goal of this course is to make you fluent in the most important aspects of this language. This course is taught by a physicist and the emphasis is on the application of mathematical methods to physics problems. We will focus on problem solving rather than on rigorous abstract proofs. This course is not meant to replace mathematics courses on the topics covered, but to supplement them by providing an opportunity to practice these methods.

### Expected learning outcomes

- Becoming confident in working with units, dimensions, and approximations
- Acquiring an overview over the most essential mathematical methods for physicists
- Solidifying prior knowledge of algebra, trigonometry, and calculus
- Being able to identify the mathematical tools needed to solve a particular physics problem
- Becoming fluent in the correct application of these methods
- Being aware of the main mathematical subtleties and exceptional cases

These skills are essential for all areas of physics and will be heavily drawn upon in other courses.

### Course topics

The topics and their schedule may change as the semester develops.

- Estimation, Units, Dimensions
- Proofs
- Integration and Differentiation
- Vectors and Matrices
- Complex numbers
- Differential equations
- Fourier series and transforms
- Probability and Statistics

The first exam is planned for Thursday, October 19th. The second exam will take place during the last lecture, Tuesday, December 12th.

### Book recommendations

There is no specific required textbook, but rather textbook recommendations. You are strongly encouraged to use a textbook in addition to the materials provided in class. All textbooks on mathematical methods in physics will cover most of the course topics, so you should choose a book whose style appeals to you. I recommend the following textbook:

- Alec J. Schramm, *“Mathematical Methods and Physical Insights”*

Other helpful textbooks are:

- A. Altland, J. von Delft, *“Mathematics for Physicists: Introductory Concepts and Methods”*
- Mary L. Boas, *“Mathematical Methods in the Physical Sciences”*

## Homework

There will be weekly homework assignments, which need to be submitted by the deadline via Gradescope (with link on Blackboard). Detailed instructions will be provided with the first assignment. Since this course is a methods course, the homework is particularly important to understand the concepts taught in class and to become skilled in applying them. In addition, there will be short weekly pre-class warm-up exercises, to be submitted on Blackboard at least two hours before each Tuesday lecture. These will be graded based on (serious and honest) participation only and will help you get prepared for the week's lectures.

You are expected to work out the solution of homework assignments independently. However, discussions among students are encouraged, as long as the final outcome comes from your original effort. **No late assignments will be accepted under any circumstances**, but the worst two assignments will be excluded from your final grade.

Weekly updates and additional course announcements will be posted on Blackboard and sent via email. Please make sure to check your email regularly.

## Grading

- warm-up exercises: 5%
- homework: 25%
- 2 exams: 70% (35% each)

Course grade percentages (may be adjusted):

A:	≥93%	A-:	92.99%-90%	B+:	89.99%-87%	B:	86.99%-83%
B-:	82.99%-80%	C+:	79.99%-77%	C:	76.99%-73%	C-:	72.99%-70%
D+:	69.99%-67%	D:	66.99%-63%	D-:	62.99%-60%	F:	<59.99%

The grade incomplete (INC) can be given only to students in otherwise good standing when a portion of the required class work, or the final examination, has not been completed because of serious illness, extreme personal circumstances, or scholarly reasons at the request of the instructor. Please see [www.umb.edu/registrar/policies](http://www.umb.edu/registrar/policies) for additional information, as well as for the pass/fail/withdrawal deadlines.

## Academic Integrity and Student Conduct

Students are required to adhere to the University Policy on Academic Standards and Cheating, to the University Statement on Plagiarism and the Documentation of Written Work, and to the Student Code of Conduct. The Student Code of Conduct and Instructional Setting Conduct Policy are available online and linked at [www.umb.edu/academics/academic\\_integrity](http://www.umb.edu/academics/academic_integrity).

In particular, **you may not post online or otherwise circulate outside the class any course materials without the written permission of the instructor.**

I generally have a zero-tolerance policy for cheating, and all violations will be reported to the University and result in an automatic F grade for the entire course. If you have any doubts or questions about what constitutes academic misconduct, please do not hesitate to contact me.

## Accommodations

UMass Boston is committed to providing reasonable academic accommodations for all students with disabilities. If you have a personal circumstance that will impact your learning and performance in this class, please let me know as soon as possible, so we can discuss the best ways to meet your needs and the requirements of the course. If you have a documented disability, or would like guidance about navigating support services, contact the Ross Center for Disability Services

by email ([ross.center@umb.edu](mailto:ross.center@umb.edu)), phone (617-287-7430), or in person (Campus Center, UL Room 211). To receive accommodations, students must be registered with the Ross Center and must request accommodations each semester that they are in attendance at UMass Boston. For more information visit: [www.rosscenter.umb.edu](http://www.rosscenter.umb.edu). Please note that the Ross Center will provide a letter for your instructor with information about your accommodation only and not about your specific disability.

### **Health, Wellbeing, and Success**

The university provides a variety of resources to support students' overall success. If you or someone you know experiences academic stress, difficult life events, or feelings of anxiety or depression, we encourage you to seek support. Helpful, effective resources are available via the University Health Services. The UHS Counseling Center can be reached 24/7 at 617-287-5690. Whether or not you are a current patient at the center, you will be able to access telehealth crisis support. More information is available online at [www.umb.edu/healthservices/counseling\\_center](http://www.umb.edu/healthservices/counseling_center) and [www.umb.edu/here4u/](http://www.umb.edu/here4u/).