

Phys 6070 Mathematical Methods of Physics

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www: <http://faculty.uml.edu/vpodolskiy/phys.6070>, blackboard
Textbook: Mathematical Methods for Physicists, 7-th edition
G.B. Arfken, H.J. Weber, F.E. Harris
ISBN: 978-0-12-384654-9

Meeting times: scheduled time: MWF 1:00pm ... 1:50pm

Office hours: MW 11:00...noon, other times by appointment

Class format: The best way to study mathematical methods is by doing the problems. Therefore, students are required to read and work through the relevant material before the class. The instructor will summarize the material during one class per chapter. Students will solve and discuss selected homework problems during the rest of the classes.

Prerequisites: All students should be fluent in undergraduate-level calculus

Student learning outcomes: Upon completion of this course students will demonstrate the ability to:

1. Perform vector transformations across coordinate systems and perform differential operations in curvilinear coordinates
2. Construct orthogonal functional spaces and utilize orthogonal bases to approximate arbitrary functions
3. Perform integrals in complex coordinate plane

Homework grading policy: Student's performance while solving the problem during the class will count towards 50% of homework score. The other 50% of homework score will be based on graded homeworks. Teamwork is permitted and encouraged during homework solutions. However, it must be acknowledged.

Quizzes: will be based on material covered in class. Quizzes are closed/books/notes, and will be assigned throughout the problem-solving classes;

Midterm exam: is closed books, closed notes, based on problems assigned for in-class and homeworks.

Final exam is closed books, closed notes, based on homework problems and on problems posted online. One single-sided formula sheet (prepared by the students) will be available during final exam.

Regrade policy: It is student's responsibility to prove that grading mistake has been made. When the issue of the regrade concerns the general method of solving the problem, partial credits, etc., the student will be asked to solve the problem on the blackboard in with closed books/closed notes. The instructor will then question the student on the related course material, and assign a new grade for the problem. The new grade can be higher or lower than the original grade.

Grading policy: The grade is determined according to the total score based on:

In-class performance/homeworks:	30%
Quizzes	20%
Midterm:	25%
Final exam:	25%

E-mail communication with instructor: The instructor will use blackboard to e-mail important course updates, class notes, etc. to the class. It is assumed that the students regularly check their UML e-mail.

Missed classes/exams/homeworks: as a rule, there are no makeup exams/homeworks/quizzes. In extraordinary circumstances (severe illness, jury duty, etc.) the homework may be postponed, the quiz/midterm grade may be prorated, or the makeup exam can be arranged. In these cases, the student must inform the instructor as early as possible and obtain a written approval.

Student Mental Health and Well-being: We are a campus that cares about the mental health and well-being of all individuals in our campus community, particularly during this uncertain time. If you or someone you know are experiencing mental health challenges at UMass Lowell, please contact [Counseling Services](#), who are offering remote counseling via telehealth for all enrolled, eligible UMass Lowell students who are currently residing in Massachusetts or New Hampshire. I am available to talk with you about stresses related to your work in my class

Students with disabilities: will be accommodated according to general policy of the University. Please contact Disability Services at Wellness Center (x4-6800)

Diversity, Inclusion, and Classroom Community Standards: UMass Lowell community values human diversity in all its forms, whether expressed through race and ethnicity, culture, political and social views, religious and spiritual beliefs, language and geographic characteristics, gender, gender identities and sexual orientations, learning and physical abilities, age, and social or economic classes. Enrich yourself by practicing respect in your interactions, and enrich one another by expressing your point of view, knowing that diversity and individual differences are respected, appreciated, and recognized as a source of strength

Academic integrity: any suspected cheating or other academic fraud cases will be reported and prosecuted according to UML policy: (<https://www.uml.edu/Catalog/Graduate/Policies/Academic-Integrity.aspx>). It is the students' responsibility to familiarize themselves with these policies. Students are responsible for the honest completion and representation of their work.

Tentative Course Schedule: (Updated versions will be posted online/e-mailed to the class.)

Week#	Dates	Chapter	In-class work	HW
1,2,3	Sep 1, 3 Sep 8, 10 Sep 13, 15, 17	3.10 curved coordinates 4 Tensor analysis	3.10.1, 3.10.4, 3.10.5, 3.10.10, 3.10.26 4.1.1, 4.1.5,4.1.7, 4.1.10, 4.2.2, 4.3.6	3.10.6, 3.10.8, 4.1.6,4.1.8, 4.3.2 (due Sep. 20)
4	Sep 20, 22, 24	5.1-5.2 Gram- Schmidt orthogonalization	5.1.2, 5.1.4, 5.2.2,	5.1.3, 5.2.1, 8.2.3,8.2.9,8.3.3 [due Oct.4]
5	Sep 27, 29, Oct 1	8.1-8.3 Sturm-Liouville Theory	8.2.1, 8.2.6, 8.2.8,8.3.1	
6,7	Oct 4, 6, 8 Oct 13, 15	14.1-14.7 Bessel Functions	14.1.1, 14.1.2, 14.1.4,14.1.7, 14.1.10, 14.2.2, 14.2.6, 14.2.7, 14.3.5, 14.5.1, 14.5.2(a), 14.7.2, 14.7.6	14.1.6,14.1.11, 14.2.8,14.3.2, 14.5.2(b) [due Oct 18]
8,9	Oct 18, 20, 22 ^s Oct 25, 27, 29	15.1-15.6 Legendre Functions	15.1.5, 15.1.9, 15.1.12, 15.1.14, 15.2.1, 15.2.3, 15.4.3,15.4.13,15.6.2(a)	15.1.6, 15.2.7, 15.3.5, 15.4.7, 15.6.2 (b) [due Nov 1]
10,11	Nov 1, 3, 5 Nov 8, 10, 12	11 Complex variable theory	11.2.7, 11.2.9(a,b,d), 11.3.3, 11.3.7, 11.4.4, 11.4.6, 11.5.3, 11.5.5, 11.6.2	11.2.9(c,e), 11.3.6, 11.4.3, 11.4.8,11.6.3 (due Nov 15)
12, 13, 14,15	Nov 15, 17, 19 Nov 22, Nov 29, Dec. 1, 3 Dec. 6, 8, 10	11 Complex variable theory	11.7.1(a,c,e, h),11.8.1, 11.8.2,11.8.8, 11.8.13, 11.8.15, 11.8.18b, 11.10.3, 11.10.4	11.7.1(b,g), 11.8.3, 11.8.9, 11.8.16, 11.10.5 Bonus:11.8.18a (due Dec.10)