University of Alaska Fairbanks

PHYS 612 Mathematical Physics II
Spring 2021

Credits: 3.0

Lectures: MWF 11 am - 12 pm

Instructor: Dr. Martin Truffer
Office CNSM: REIC 116
Office GI: ELVE 401D
Phone GI: 474-5359
Email: mtruffer2@alaska.edu

Office Hours: TBD

Prerequisites: PHYS F611.

Course Type: Online, possibly switch to hybrid

Instructional Methods: Lecture

Course Goals:

1. Learn how to apply mathematical methods in solving physical problems
2. Prepare physics students for comprehensive exam
3. Prepare students for other graduate classes
4. Give students physics context in which to understand math problems

Course Content: The course is the second part of a two-semester sequence PHYS 611/612 that presents methods and ideas of modern mathematics important for science, engineering and, in particular for physics. The PHYS 612 course will cover Sturm-Liouville theory, partial differential equations, Green's functions, special functions, integral transforms and equations.

Text: "Mathematical Methods for Physicists", 7th ed., by Arfken, Weber, and Harris

Lecture notes: The instructor's notes will be made available on Google Classroom.

Grading: The course grade will consist of the following components:

Homework	Due on Wednesdays	50%
Mid-term	Friday February 26, 11 am – 12 pm	20%
Final exam	TBD 30%	

Homework: There will be approximately one homework assignment per week. The assignment will be posted on Google Classroom on Wednesday and will be due on the following Wednesday. You are allowed (and in fact encouraged) to work with others on the homework, but

make sure the paper you turn in is not simply copied from someone else. **All homework assignments must be turned in via Google Classroom**. Late assignments will be marked down as follows: minus 10% points per one day late up to 7 days, minus 100% after 7 days late.

Mid-Term Exam: The mid-term exam will be on Friday, February 26, during the regular lecture time. The exam will be open-book. The mid-term exam will cover material covered up to this point (details to be confirmed in class).

Final Exam: The final exam will be held at the time designated for finals by UAF. The final will be open-book. It will cover the entire course, with some emphasis on the more recent material.

Evaluation: Every student will be given a raw score out of 100%. A raw score above will be converted to a letter grade according to: > 97%: A+, 93-96% : A, 90-92%: A-, 87-89%: B+, etc. Good class participation will be rewarded by rounding up grades that are near a cut-off.

Student Learning Outcomes:

1 Know how to solve assigned mathematical problems in weekly homework assignments.
2 Be able to solve most PhD comprehensive exam questions in mathematical physics.
3 Obtain good understanding of relevant physical concepts, as well as theoretical and mathematical tools that can help students to conduct their own graduate research.

Course policies: Attendance of lectures is expected. Active class participation and questions are encouraged. A missed exam will receive zero credit unless the instructor is notified by email or phone before the exam starts. Make-up exams will be individually scheduled with the student.

Tentative Course Calendar:

Week 1: Chapter 9. Partial differential equations.
Week 2. Chapter 9. Partial differential equations.
Week 3: Chapter 9. Partial differential equations.
Week 4: Chapter 10. Green's functions.
Week 5. Chapter 11: Complex functions.
Week 6. Chapter 11: Complex functions.
Week 7. Chapter 14. Bessel functions.
Week 8. Chapter 15. Legendre functions.
Week 9. Chapter 15. Spherical harmonics.
Week 10. Chapter 20. Integral transforms.
Week 11. Chapter 20. Fourier convolution theorem.
Week 12. Chapter 20. Laplace transforms.
Week 13. Chapter 20. Laplace convolution theorem.
Week 14. Chapter 21. Integral equations.
Week 15. Chapter 21. Neumann series.

The precise schedule is subject to change. Chapter 11 will be taught by Dr. Connor.

Special Needs: The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (Room 203 WHIT, Phone 474-7043) to provide reasonable accommodation to students with disabilities.

Plagiarism: Plagiarism and cheating are matters of serious concern for students and academic institutions. This is true in this class as well. The UAF Honor Code (or Student Code of Conduct) defines academic standards expected at the University of Alaska Fairbanks which will be followed in this class. (Taken from the UAF plagiarism web site, which has many links with good information about this topic)

Complaints and Concerns: You are always welcome to talk to me about anything, however, if you have a non-subject matter question or concern that cannot be resolved by me, contact the Center for Student Rights and Responsibilities (https://uaf.edu/csrr/index.php).

Student Protections and Services: Every qualified student is welcome in my classroom. As needed, I am happy to work with you, disability services, veterans' services, rural student services, etc to find reasonable accommodations. Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. As required, if I notice or am informed of certain types of misconduct, then I am required to report it to the appropriate authorities. For more information on your rights as a student and the resources available to you to resolve problems, please go the following site: www.uaf.edu/handbook/.

UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: https://alaska.edu/nondiscrimination/.

Incomplete Grade: Your instructor follows the University of Alaska Fairbanks Incomplete Grade Policy: “The letter “I” (Incomplete) is a temporary grade used to indicate that the student has satisfactorily completed (C or better) the majority of work in a course but for personal reasons beyond the student’s control, such as sickness, has not been able to complete the course during the regular semester. Negligence or indifference are not acceptable reasons for an “I” grade.”

Technology requirements: To access instructor’s lecture notes on Google Classroom, students will need to have access to the internet and software to view pdf files.

Effective communication: Students who have difficulties with oral presentations and/or writing are strongly encouraged to get help from the UAF Department of Communication’s Speaking Center (907-474-5470, speak@uaf.edu) and the UAF English’s Department’s Writing Center (907-474-5314, Gruening 8th floor), and/or CTC’s Learning Center (604 Barnette Street, 907-455- 2860).