Physics 301 - Intro to Mathematical Physics - Spring 2022

Instructor	Renate Wackerbauer, Office Location: REIC 106 phone: 474-6108 WELCOME !! and have a great semester e-mail: rawackerbauer@alaska.edu
Open Office hours	Due to Covid19 there are no walk-in office hours unless the situation improves; discussions after class work well; meeting via zoom works; email is effective for straight-forward questions. additional recitation classes can be scheduled on request.
Course Info	Phys301, 4 credits (4 hours of lecture!)
Prerequisites	Phys211, 212, 213; Math252; or permission of instructor.
Lectures	MWF 2:15 to 3:15 am, REIC 207; T 9:45-10:45 am, REIC 207 Lectures are face to face Due to the fluid situation with covid, the course modality can change throughout the semester. In the case of online course delivery, lectures would be offered synchronously (tablet with whiteboard), recorded, and uploaded into google classroom.
Noyes Lab	Access to the Noyes Computer Lab (Rm 101 NSCI) is provided to all students enrolled in a Physics course. Your polar express card lets you in.
Text	Required text: *Mathematical Methods in the Physical Sciences*, by M Boas, John Wiley and Sons (3rd edition, 2005); The publisher provides a listing of errata for this text. Mathematical handbooks will be very useful for this course; one recommendation is *Abramowitz and Stegun: Handbook of Mathematical Functions*; it can be downloaded for free. Supplementary readings: *Essential Mathematical Methods for Physicists*, by HJ Weber, F Harris, and GB Arfken, Elsevier Academic Press ---- this is an undergraduate level book, widely used - *Mathematical Methods for Physicists*, by GB Arfken and HJ Weber, Elsevier Academic Press, ---- this book is for advanced reading - usually at the graduate level - Various mathematics books in the library cover individual parts of the material presented in the lectures. Please explore them to see different approaches to our topics.
Course	Introduction to theoretical foundations of classical and modern physics. Includes calculus of vector fields, linear algebra and elementary tensor

Content [**Tentative course calendar**](#)	theory, complex analysis, ordinary linear differential equations, linear partial differential equations, Fourier analysis and probability. Physical applications include planetary motion, rotating bodies and inertia tensor, damped and driven harmonic oscillator, wave equation, Schroedinger's equation and diffusive systems.
Course Goals	This course provides an introduction into mathematical methods that are *essential* for the upper division Physics courses. Of course these mathematical tools have much broader applications in many technical fields other than physics, e.g., engineering, industrial research/development, and even economics/finances or mathematical biology. This course, and its companion course PHYS 220 "Introduction to Computational Physics", are crucial prerequisites for the rest of the undergraduate Physics curriculum.
Student Learning Outcomes	You learn, --how to solve standard mathematical text book problems analytically --how to apply mathematical concepts to physical problems and to the sciences in general --limitations of analytically solvable mathematical problems and the need for computational methods --the most essential mathematical tools required for the theoretical physics courses ahead of you
Homework [**homework**](#)	Richard Feynman (Nobel prize, 1965) "You don't understand anything until you have practiced" Homework (11 assignments, each counting 100pts) will be assigned weekly and will be due by **2pm** on the following Friday, unless explicitely altered at the time of assignment. Late homework will *not* be accepted. Finished homework should be uploaded to "google classroom" in a single pdf-file. You can earn 100 bonus points in the homework by giving a 10min presentation to class on a topic related to class, for example the life of a mathematician/physicist, an application of a mathematical concept - discussed in class - to a particular physics/science problem, etc in case of issues with the homework link use: ffden-2.phys.uaf.edu/wacker/CLASS/301.html
Examinations	Two one-hour in-term examinations and a two hour final examination will be held during the semester. In-term exams will be held in the classroom. The exams will be closed books and closed notes. No calculators, computers, or communication devices are allowed. <table><tr><td>Exam 1 (in class)</td><td>Friday, February 18</td><td>Boas: approx. chapt. 1-4</td></tr><tr><td>Exam 2 (in class)</td><td>Friday, April 1</td><td>Boas: approx. chapt. 4-8</td></tr><tr><td>Final Exam</td><td>Friday, April 29, 1-3pm</td><td>Boas: approx. chapt. 1-8, 12-13</td></tr></table>
Grading	The maximum score for each homework will be 100 points. A solution

(homework, exam) that presents nothing more than a restatement of the problem will receive zero credit. *illegible work will not be graded.* To pass the course with a grade higher than an "F", you need 40% of the total credits. Grades A - D are assigned equal weight (units of 15%) for total credits between 40% and 100%. +/- are assigned 2.5% from grade boundary. So A+ (>97.5), A(>87.5), A- (>85), B+(>82.5), B(>72.5), B- (>70), C+ (>67.5), C (>57.5), C- (>55), etc. For the final grade homework, exams, will be weighted as follows:

Homework	20%
Exam 1	25%
Exam 2	25%
Final Exam	30%

Course policies	Attendance at lectures is expected. Active class participation, questions are extremely welcome in the lectures. A missed exam will receive 0 credit unless the instructor is notified by email, phone, etc before the exam starts. Make-up exams will be individually scheduled with the student.
Student Obligations	As students of UAF, you are bound by the policies and regulations of the University of Alaska, UAF rules and procedures, and the Student Honor Code. You are obligated to make yourselves familiar with all conditions presented in the UAF Catalog. *Plagiarism on homework or on an exam will result in a failing grade.* *Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website: Further, students are expected to adhere to the university's policies, practices, and mandates and are subject to disciplinary actions if they do not comply.*

Student protection and services statement	Student protections statement: UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/.
	
	 Disability services statement: I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.
	
	 Student Academic Support:
	      Speaking Center (907-474-5470, uaf-speakingcenter@alaska.edu, Gruening 507)
	      Writing Center (907-474-5314, uaf-writing-center@alaska.edu, Gruening 8th floor)

UAF Math Services, uafmathstatlab@gmail.com, Chapman Building
Developmental Math Lab, Gruening 406
The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120,
    https://www.ctc.uaf.edu/student-services/student-success-center/)
For more information and resources, please see the Academic Advising Resource List
    (https://www.uaf.edu/advising/lr/SKM_364e19011717281.pdf)

Student Resources:
Disability Services (907-474-5655, uaf-disability-services@alaska.edu, Whitaker 208)
Student Health & Counseling [6 free counseling sessions]
    (907-474-7043, https://www.uaf.edu/chc/appointments.php, Whitaker 203)
Center for Student Rights and Responsibilities
    (907-474-7317, uaf-studentrights@alaska.edu, Eielson 110)
Associated Students of the University of Alaska Fairbanks (ASUAF) or
ASUAF Student Government (907-474-7355, asuaf.office@alaska.edu, Wood Center 119)

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