

The Mechanical Universe

Physics 205

Gustavus Adolphus College - Spring 2022

Instructor: Dr. Charles F. Niederriter

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Textbook: *Physics For Scientists and Engineers*, Serway and Jewett, 10th Edition,

Course Policy and Evaluation

- 1. Objectives:** As the second class in the sequence for science and engineering students at Gustavus, this course shares several objectives with the rest of the physics program. It is hoped that when students have completed *The Mechanical Universe* they will have learned some basic problem solving skills, some computer and calculation skills, some quantitative and empirical reasoning skills, and, of course, some physics, specifically mechanics, waves, thermodynamics, and oscillations.
- 2. Expectations:** Students in *The Mechanical Universe* are expected to have a solid background in differential and integral calculus (Calc I). They are also expected to be concurrently enrolled in Calculus II if they have not already successfully completed a college level course in it. The instructor will discuss the calculus involved in this course as necessary, but it is important that the students also see it in another course setting. In addition, all students are required to be concurrently enrolled in PHY206L, *The Mechanical Universe Laboratory*.
- 3. Classroom and Lab Environment/Ethos:** It is expected that all members of this classroom community will treat each other in a respectful and positive manner. This expectation is independent of your role associated with this course. Respectful treatment of others associated with this class is expected whether you are a student in the class, a TA for the class, a tutor for the class, or the professor for the class. Furthermore, should any problem / issue arise, it is expected that an attempt to resolve the situation will be made directly, calmly, respectfully, and professionally by the parties involved. If this fails to resolve the issue and the problematic behavior continues, or if the initial situation is deemed to be of a more serious nature, then the professor for the course should be contacted directly. Physics can, at times, be challenging for all of us. Please do your part in helping to create a positive environment where all members of this classroom community can do their best work.
- 4. Academic Honesty:** You are expected to live up to the high expectations that the college sets regarding academic honesty (see the college's honor code below). By writing your name or clicking submit on any graded assignment for this class, you are attesting to the fact that it has been completed in accord with the highest standards of academic honesty. I take this responsibility seriously and I expect that you will also. If you have any doubt about what constitutes appropriate use of someone else's work, please ask. Any student found in violation of these policies will be dealt with appropriately.

Honor Code: As a community of scholars, the faculty and students of Gustavus Adolphus College have formulated an academic honesty policy and honor code system, which is printed in the Academic Bulletin and the Gustavus Guide. As a student at Gustavus Adolphus College I agree to uphold the honor code. This means that I will abide by the academic honesty policy, and abide by decisions of the joint student/faculty Honor Board.

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Honor Pledge: On my honor, I pledge that I have not given, received, or tolerated others' use of unauthorized aid in completing this work.

The instructor is bound to abide by the College's Honesty Policy and therefore must report all incidents of academic dishonesty (cheating, copying, etc.) to the Dean's Office.

- 5. Requesting Accommodations:** Gustavus Adolphus College is committed to ensuring equitable and inclusive learning environments for all students. If you have a disability and anticipate or experience barriers to equal access, please speak with the accessibility resources staff about your needs. A disability may include mental health, attentional, learning, chronic health, sensory, physical, and/or short-term conditions. When appropriate, staff will guide students and professors in making accommodations to ensure equal access. Accommodations cannot be made retroactively; therefore, to maximize your academic success at Gustavus, please contact them as early as possible. Accessibility resources staff are located in the Academic Support Center (<https://gustavus.edu/asc/accessibility/>) (x7227). Accessibility Resources Coordinator, Corrie Odland (codland@gustavus.edu), can provide further information.
- 6. Multilingual Student Support:** Some Gusties may have grown up speaking a language (or languages) other than English at home. If so, we refer to you as "multilingual." Your multilingual background is an incredible resource for you, and for our campus, but it can come with some challenges. You can find support through the Center for International and Cultural Education's (<https://gustavus.edu/cice/>) Multilingual and Intercultural Program Coordinator (MIPC), Pamela Pearson (ppearson@gustavus.edu). Pamela can meet individually for tutoring in writing, consulting about specific assignments, and helping students connect with the College's support systems. If you want help with a specific task (for example, reading word problems on an exam quickly enough or revising grammar in essays), let your professor and Pamela know as soon as possible. In addition, the Writing Center (<https://gustavus.edu/writingcenter/>) offers tutoring from peers (some of whom are themselves multilingual) who can help you do your best writing
- 7. Mental Wellbeing:** The Gustavus community is committed to and cares about all students. Strained relationships, increased anxiety, alcohol or drug problems, feeling down, difficulty concentrating, and/or lack of motivation may affect a student's academic performance or reduce a student's ability to participate in daily activities. If you or someone you know expresses such mental health concerns or experiences a stressful event that can create barriers to learning, Gustavus services are available to assist you, and include online options. You can learn more about the broad range of confidential health services available on campus at <https://gustavus.edu/counseling/> and <https://gustavus.edu/deanofstudents/services/>.
- 8. Disability Services:** Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (1990) work together to ensure "reasonable accommodation" and non-discrimination for students with disabilities in higher education. A student who has a physical, psychiatric/emotional, medical, learning, or attentional disability that may have an effect on the student's ability to complete assigned course work should contact the Disability Services Coordinator in the Advising Center (x6286). No accommodations can be made without review by the Disability Services Coordinator.
- 9. Title IX: Sexual Misconduct Prevention and Resources:** Gustavus Adolphus College recognizes the dignity of all individuals and promotes respect for all people. As such, we are committed to providing

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an environment free of all forms of discrimination including sexual and gender-based discrimination, harassment, and violence like sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or is experiencing these types of behaviors, know that you are not alone. Resources and support are available; you can learn more online at <https://gustavus.edu/titleix/>.

Please know that if you choose to confide in me, I am required by the College to report to the Title IX Coordinator, because Gustavus and I want to be sure you are connected with all the support the College can offer. Although it is encouraged, you are not required to respond to outreach from the College if you do not want to. You may speak to someone confidentially by contacting the Sexual Assault Response Team (SART/CADA), Chaplains, Counseling Center, or Health Service staff; conversations with these individuals can be kept strictly confidential. SART/CADA can be reached 24 hours a day at 507-933-6868. You can also make a report yourself, including an anonymous report, through the form at <https://gustavus.edu/titleix/>.

- 10. Masking:** It is the policy of Gustavus Adolphus College that all students must abide by rules and standards designed to protect the community. For at least the foreseeable future, policies set by the Gustavus COVID-19 Response Plan and the ROAR Pledge require that fitted face coverings or face masks be worn in public spaces within buildings on campus at all times, this includes academic buildings and classrooms. Wearing an appropriate face covering protects oneself, other students and community members. For this reason, refusal to wear a fitted face covering is considered disruptive to normal classroom activities, and any student who refuses to wear or put on (“don”) a mask will be required to leave the classroom immediately.
- 11. Social Distancing:** Please remember that during class you should be seated at least 3 feet apart from others. When facing other students (e.g., for discussion) a distance greater than 3 feet is desirable. Therefore, we may spread out our seating for some activities (loud speaking/projecting). Some fixed seats and/or tables in your classroom have been blocked off with tape in order to promote social distancing and to avoid exceeding the new COVID-capacity of the room. Please try to minimize handling or moving furniture and do not remove tape from chairs and tables that have been blocked with it. When moving around the room, as well as entering and exiting, please try to remain three feet from others, and keep your mask on and correctly positioned (covering both your nose and your mouth).
- 12. Learning Styles:** Recognizing that students learn science in a variety of ways, the instructor will take advantage of many different techniques, including collaborative learning, to maximize the overall effectiveness of this course. Although collaborative efforts will be encouraged for solving in-class problems, assigned homework, labs, and some quizzes, they are **not allowed** for most quizzes and all exams. The instructor will make it clear which quizzes are to be group efforts and which are not to be.
- 13. Class Meetings and Reading Assignments:** The class will meet five days a week (M-F) for lecture, discussion, homework review, quizzes, and exams. Quizzes and exams are indicated on the following schedule. The student will be responsible for reading the text before coming to class and completing the reading quiz in Moodle.

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- 14. Homework:** Problems will be assigned on a weekly basis. Problems will be graded and returned to the student. Homework should be neat and orderly. Late homework will be accepted at the discretion of the instructor with some loss of points.
- 15. Group Activities:** A number of group activities, including problem solving and simulations, will be done throughout the semester. These activities will not be scheduled in advance and may be used to test students' knowledge of old material or to introduce new material.
- 16. Attendance:** Regular attendance at all lectures is expected and excessive absenteeism will result in some reduction of final grade.
- 17. Quizzes and Exams:** There will be three one-hour exams and a two-hour final exam as scheduled below. There will be ten to fifteen minute quiz almost every week that there is no exam.
- 18. Missed Exams:** Students are expected to arrange in advance to take an exam at other than the announced time. Permission to make up a missed exam after the fact will be at the discretion of the instructor
- 19. Incompletes:** A grade of incomplete will be given only for work not completed due to circumstances beyond the control of the student.
- 20. Physics Tutors:** Limited tutoring for this course will be available at times announced in the departmental tutoring schedule.
- 21. Office Hours, etc.:** My scheduled office hours are 2nd and 3rd hours every day. I will make every effort to be available during these times for individual assistance and advising. I will also be available at other times by appointment. Don't be afraid to ask for help.
- 22. Email:** You may contact me by electronic mail; chuck@gustavus.edu. I will respond as soon as I can to any questions that you might have.

23. Evaluation:

Hour Exams	30%	A	94 - 100	C+	74 - 78
Final Exam	25%	A-	90 - 94	C	70 - 74
Homework	20%	B+	86 - 90	C-	66 - 70
Quizzes	15%	B	82 - 86	D+	62 - 66
Group Problems		B-	78 - 82	D	58 - 62
& Participation	10%	F	< 58		

Assignment of final letter grades will also take into account the instructor's subjective evaluation of the student's attendance, initiative, class participation, preparation (particularly quantity and quality of homework), and evidence of improvement.

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Course Schedule

<u>Week Beginning</u>	<u>Chapter</u>	<u>Subject</u>	<u>Reading Assignment</u>
January 31	1-4	Review Kinematics	Chapters 1-4
February 7	1-5	Review Kinematics & Newton's Laws	Chapter 5
February 9	****	Quiz 1 on Chapters 2-4 ***	
February 14	5	Circular Motion and Applications of Newton's Laws	Chapter 6
February 15	****	Quiz 2 on Newton's Laws ***	
February 21	6	Circular Motion and Applications of Newton's Laws, Loops, Plotting & Introduction to Uncertainties	Chapter 7
February 25	****	Exam 1 on Chapters 1-6 ***	
February 28	7	Energy of a System, Euler's, and Uncertainty Propagation & T-Tests	Chapter 8
March 4	****	Quiz 3 on Chapter 7 ***	
March 7	8	Conservation of Energy And Averages, SD, SDOM	Chapter 9
March 11	****	Quiz 4 Chapter 8 ***	
March 14	9	Linear Momentum and Collisions Probability Distributions & Uncertainties	Chapter 10
March 18	****	Quiz 5 on Chapter 9 ***	
March 21	9 & 10	Collisions and Rotation Chi Squared	Chapter 11
March 24	***	Exam 2 on Chapters 7-9 ***	
March 28	10 & 11	Rotation & Angular Momentum	Chapters 12 & 13
April 1 – 9	*****	Spring Break *****	
April 11	12 & 13	Static Equilibrium & Gravitation	Chapter 15
April 18	15	Oscillatory Motion	Chapter 16 & 17
April 20	****	Exam 3 on Chapters 10 - 13 ***	

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<u>Week Beginning</u>	<u>Chapter</u>	<u>Subject</u>	<u>Reading Assignment</u>
April 25	16 & 17	Waves and Sound Waves	Chapter 17 & 18
April 28	**** Quiz 6 on Chapter 15 ***		
May 2	17 & 18	Superposition and Standing Waves	Chapter 20
May 4	**** Quiz 7 on Chapter 16 & 17 ***		
May 9	Review		
May 11	*** Quiz 8 on Chapters 17 & 18 ***		
May 12	Last Day – Pinewood Derby		
May 17 8:00 AM	*** Final Exam – Chapters 15 – 18 & Comprehensive ***		