PH202A: General Physics with Trigonometry I (3 SH)
Regis University, Regis College, Fall 2020
MWF 9:00-9:50am (RU01);
11:00-11:50am (RU02); 2:00-2:50pm (RU03)
Felix Pomponio Family Science Center, Rm. 130

"The most incomprehensible thing about the universe is that it is comprehensible." – Albert Einstein

Professor:	Evan Tilton (RU01)
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Office:	Carroll Hall 108C in the Math/Physics Suite
Office Hours:	W: 2-4pm, Th: 12-2pm, or by appointment – message me on Slack!

Professor:	Jenny Jarrell (RU02 & RU03)
Email:	jjarrell@regis.edu
Phone:	303-458-4974
Office:	Carroll Hall 108E in the Math/Physics Suite
Office Hours:	T: 11am-1pm, Th: 10am-12pm, or by appointment – message me on Slack!

Email and Slack are the most reliable ways to contact either of us. Questions of a scientific or mathematical nature should be asked publicly on Slack, so that everyone benefits from the answer, rather than privately via email.

COURSE CATALOG DESCRIPTION: PH202A discusses fundamental concepts of motion, including Newton's Laws and the conservation of energy, momentum, and angular momentum. Focuses on the development of quantitative and qualitative problem-solving skills. Co-requisite: PH 205A. Prerequisite(s): MT 260 or equivalent or permission of instructor. NOTE: This course has been approved to satisfy the core Category II natural science with laboratory requirement when taken with PH 205A.

The physics ideas mentioned above are foundational to all fields of science. During this semester, you will learn to solve complex problems from the ground up, translating questions from everyday language into mathematical models and applying fundamental principles to answer them. You will learn to reason qualitatively about physics problems, gaining an appreciation for how a result depends on its inputs.

STUDENT LEARNING OUTCOMES: At the end of this course, students should be able to

- State the fundamental and macroscopic interaction categories, the laws of conservation of energy, momentum, and angular momentum, and Newton's laws of motion.
- Define and explain the relations among momentum, force, impulse, energy, power, work, angular momentum, and torque, and among position, displacement, velocity, speed, and acceleration.
- Solve quantitative problems describing motion, starting from fundamental principles such as the laws of conservation of momentum, energy, and angular momentum, and applying mathematics including algebra, geometry, and trigonometry.
- Apply the methods of solution to standard problems involving static systems, linear motion on inclined surfaces, coupled objects, and energy conservation and transformation.
- Reason qualitatively about motion in physical systems, determining how changes in parameters of the system are likely to affect its behavior.
- Read and apply principles stated in a quantitative text in which mathematics is used in both descriptive and prescriptive ways.

DEPARTMENT PROGRAM LEARNING OUTCOMES (SLOs): Although these SLOs are the physics department learning outcomes for our physics majors and minors, some of these SLOs apply in PH202A (refer to the *italicized* text.)

1. *Knowledge of the fundamental principles* of analytical *mechanics*, special relativity, electricity and magnetism, quantum mechanics, and statistical mechanics.
2. *Ability to apply the principles of physics to solve qualitative and quantitative problems using both analytical* and computational methods.
3. Ability to design and conduct experiments.
4. *An understanding of* professional and *ethical responsibilities*
5. *Ability to communicate effectively, both orally and in writing*

COREQUISITE: A lab course, PH205A, is a corequisite of this course.

MATH REQUIREMENTS: You are expected to be comfortable with functions, algebra, geometry, trigonometry, and graphing, all of which will be used throughout this course. We will use symbolic, algebraic notation and manipulation liberally. You are not expected to have studied calculus. The math prerequisite is thus MT 260 or placement into MT 360A.

REQUIRED COURSE MATERIALS:

- **Pens or pencils** and **paper or notebooks** for working problems, both in class and as homework.
- **A scientific calculator**. Exams, homework, and in-class exercises will require numeric calculations. It is your responsibility to understand how to use your calculator prior to exams.
- **Required text**: *OpenStax College Physics* by Urone, Hinrichs, Dirks, Sharma, et al. (Print ISBN:978-1-938168-00-0; Digital ISBN:978-1-947172-01-2). It is **freely** available online at https://openstax.org/details/college-physics. If you dislike digital books, a printed edition can be purchased online for a modest fee. Be sure to look at the Student Resources section of the website (https://openstax.org/details/college-physics?Student%20resources), which has useful tools such as a Solution Manual for practice problems.
- Additional resources:
    - The Learning Commons: The Learning Commons' Writing Center, Tutoring, and Academic Success Workshops help with writing and studying in one-on-one and group sessions, in person and online.
        - Writing Center: all stages of writing, all degrees and disciplines. Graduate students, too!
        - Tutoring: available in a range of subjects at introductory and intermediate levels.
        - Smarthinking: another free online tutoring option. Writing, business, nursing, computer programming, mathematics, sciences, and Spanish support by highly trained tutors! 10 free hours annually.
        - Academic Success Workshops: led by Regis faculty and staff, free for Regis members, and cover a range of topics.
        - Visit regis.edu/tlc to schedule writing/tutoring appointments, log into Smarthinking, reserve study space in TLC, view workshop schedule, access online resources, and learn more about TLC. Contact tlc@regis.edu/ 303.964.6591 / Clarke Hall 241

DROP/WITHDRAWAL DEADLINES: The last day to drop the course is *Monday, August 24, 2020* and the last day to withdraw from the course is *Sunday, November 1, 2020.* Midterm grades will be turned in by *Thursday October 8, 2020*. These deadlines are not flexible.

GRADING:
Course grades will be broken down into the following four categories:

1. 30% - Midterm Exams (3 total)
2. 15% - Cumulative Final Exam
3. 15% - Class participation
4. 40% - Homework

You can expect your overall numerical grade to correspond to the letter grade below, but I reserve the right to assign a higher grade than would be given by this table according to my judgement of the difficulty of the assignments. However, no final grades will be adjusted downward relative the table below under any circumstance.

A	Outstanding scholarship	88–100
A-		85–87.99
B+		82–84.99
B	Superior work	78–81.99
B-		75–77.99
C+		72–74.99

C	Satisfactory/Unsatisfactory	68–71.99
C-		65–67.99
D+		62–64.99
D	Unsatisfactory	58–61.99
D-		55–57.99
F	Failure (no credit)	<55

CLASS ATTENDANCE AND ENGAGEMENT: I expect that you will attend and participate fully in every class. Because you are expected to consistently read the textbook, we will spend only a small amount of our limited class time in the traditional lecture format. We will instead use the class meetings for activities intended to deepen your understanding of the material that you have read about. For example, we will discuss challenging conceptual questions, analyze demonstrations of physical phenomena, or work through problem solutions. Many of these activities will involve working together in small groups. A portion of your grade is associated with satisfactory completion of these activities.

I have incorporated "drops" for various assignments to account for your unexcused absences. **If you miss more than 20% of the semester's classes due to unexcused absences, you forfeit ALL of your class participation points.** Regardless of the reason, you are responsible for getting notes, lecture handouts, and other items for missed classes.

DESCRIPTION OF COURSE COMPONENTS

1. **3 Midterm exams (10% each, 30% total):**
    - There will be three midterm exams. Tentative, approximate exam dates are given on the schedule in this syllabus. Firm exam dates will be announced 2-3 classes in advance. These exams will test your understanding of the content from assigned readings, class time, and homework problems. Exams could include a variety of types of questions, including but necessarily not limited to:
        - Qualitative, conceptual questions that may be either multiple choice, multiple choice with explanation, short answer, etc. These types of questions will be similar to the conceptual questions in the textbook, conceptual questions I ask you in class or on homework, and in-class activities.
        - Quantitative problems similar in scope to the in-class example and assigned homework problems.
    - The exams will not be tests of what you can memorize; they will require you to apply the principles that you have learned to **new situations that you have never seen before**. A key part of your studying should thus be solving problems that you have never seen before without looking at the solution until you have solved it yourself. All midterm exams are cumulative, but they will focus most heavily on material introduced since the previous midterm.
    - **Missed Exams**: Students are permitted to make-up a missed exam **only** if he or she can provide adequate documentation for an excused absence **BEFORE the exam day** (e.g., Regis sponsored activities, such as sports, travel to academic conferences, etc., illness that can be verified by a doctor's note, death in the family, etc.). I will follow-up on any documentation that you provide and then decide if your absence is excused, so that you can make-up the missed exam. The make-up exam could be different from the in-class exam.

2. **Final exam (15%)**
    - There will be a cumulative final exam which will have a more holistic focus on the course's material. The final will likely be a take home exam to completed in a scheduled 24 hour period during finals week.

3. **Participation (15%)**

    I expect that you will attend and participate fully in every class. Class participation will include several types of work:
    - In class "clicker" questions
        - Several times during each class I ask questions to get you to think carefully about your reading assignment for the day and some of the current concepts covered in class itself.
    - Worksheets, group questions, writing assignments, or other classwork will be incorporated into the lecture. These assignments will be turned in for grading. *There are NO make-ups for any aspect of the in-class activities.*
    - Reading surveys will be submitted via the Worldclass "Quiz" tool. These surveys will be brief, intended to take 5 to 15 minutes. They will consist of free-response questions graded for effort and multiple-choice questions graded for correctness. These surveys must be completed independently; collaboration during the survey is a violation of the Honor Code. Your responses to these questions will help me adjust the lecture for the day. **Note that any responses submitted via the surveys may be shown in class.** The deadline for responses is 8am on class day. Late responses will not be accepted.
    - Other in-class activities

4. **Homework (40%):**
    - Homework is the most important activity for learning physics. Physics is a skill rather than something that can be memorized, so you must practice it daily, just like a sport or musical instrument. Homework will be assigned nearly every week. All homework will be handwritten and must show how you arrived at your answer. Written homework is always due at the **beginning** of class on the due date. No late homework will be accepted.
    - You should solve problems habitually, as you encounter new concepts, rather than letting it pile up until the last minute. You should use a diversity of resources to help you with homework: visit me in office hours, schedule time with the free physics tutors, and collaborate with friends.
    - You should also treat homework as the bare minimum number of problems you need to solve; most people will need to solve more practice problems to sufficiently prepare for exams.
    - In addition to seeking help from me or tutors, you are encouraged to collaborate on homework within the guidelines for academic integrity. While everyone understands what the honor code means on quizzes and exams, there is often confusion on what it means for homework. Students are encouraged to work together on homework, but **your write-ups and submissions must be independent**. Copying, whether by hand or cut-and-paste on your computer, constitutes cheating, and will be handled accordingly. The best way to ensure you understand the assigned material (on which you will be tested later!) is to split off from the group when writing up or submitting your answers. A good approach is to try the problems on your own, collaborate with a group to figure out what approach will solve the harder ones, and then split off to implement and write-up that solution on your own. **Anyone that you collaborated with must be acknowledged in writing on the assignment.** ***When in doubt about plagiarism, quoting, or collaboration, consult with me – getting a homework problem done a few minutes quicker is not worth potentially irreparable damage to your college career because you got caught cheating!***
    - Problems will be graded for both correctness and clarity. It is not enough to arrive at a correct answer; you must show a logical process that starts from known, identified physics principles. Your solutions must be written clearly and include diagrams where appropriate. You **must** work the problems with algebraic symbols before substituting in numbers. If a number has units, you must write them together with the number (every time).
    - If your solution reflects a lack of careful attention in general, due to problems such as illegibility, it may simply be returned ungraded.

- More specifically, each graded problem will be graded for:
    - Completeness and Clarity (30%) – Is each part of the problem fully addressed in a good faith effort? Regardless of correctness, is your reasoning transparent enough, via the words or diagrams, for a peer to understand it?
    - Model (20%) – Is your solution using the correct physical principles and applying them correctly?
    - Good Notation (20%) – Is your algebra conducted fully with algebraic symbols? Are units included wherever necessary? Are vectors notated correctly?
    - Valid Math (20%) – Are all math steps shown, and are they correct?
    - Plausibility (10%) – Does your result have a plausible sign, magnitude, and/or units? If not, have you noted that you recognize it as implausible and why?
- Additionally, after the solutions have been posted, homework may be corrected with a color-contrasting pen or pencil up until the next homework due date. Up to 75% of lost credit in the Model and Valid Math categories may be earned back. This means, for example, that if your initial attempt is entirely incorrect but well explained, plausible, and correctly notated, you may receive a 60% for the problem due to no credit in Model and Valid Math but full credit in the other categories. This 60% can be raised back up to 90% if you correct your work in light of the solutions. However, you may not simply copy the solutions onto your paper; you must carefully show how you erred and how it should be fixed. For example, you might write something like "In this step, I assumed constant velocity. However, I should have included the acceleration due to the force of friction. Taking this into account, the equation becomes…."
- This grading system rewards good-faith efforts at engaging with the problems. Because you have multiple opportunities to engage with and revise the problem,
- This grading system rewards good-faith efforts at engaging with the problems. Because you have multiple opportunities to engage with and revise the problem, I will not comment extensively on the work when I grade it; you are expected to review the solutions online and revise appropriately. You are always welcome to seek help with these tasks in office hours.

PEER LEARNING & COLLABORATION: You are encouraged to discuss homework questions and in-class group assignments with your classmates (unless instructed otherwise!) *I value the peer instruction inherent in working together and I believe it is a valuable learning experience*. However, write-ups of your homework and other writing assignments are to be completed ***independently***. Copying constitutes cheating. The best way to ensure you understand the assigned material is to split off from the group to write up your answers independently of the group.

Any graded assignment that appears identical will receive zero points. On the other hand, to provide or receive any unauthorized assistance during an exam would lead to a grade of F in the course. Consistent with the College's Academic Integrity Policy, I will report all violations of this course's academic integrity policy to the Dean's office. Students who have committed multiple instances of academic dishonesty can be subject to institutional penalties like probation, suspension, or expulsion, in addition to the penalties for this course. Refer to the Academic Honor Code and Integrity sections for more information.

TENTATIVE COURSE CALENDAR Fall 2020: This syllabus represents my current plans and objectives, but these plans may need to change to enhance the class learning opportunity. Such changes are not unusual and should be expected. Regular updates on the reading assignments, homework sets and due dates, will be posted on the course management system at http://ph202af20.slack.com. Grades will be posted on http://worldclass.regis.edu.

This syllabus may be updated or revised by the instructor. The most recent syllabus can be downloaded from the course website.

Date	Topic	Reading	HW Assigned	HW Due
Monday, August 17	Expectations, How to Succeed, Intros		HW1	
Wednesday, August 19	Math, Models, Dimensional Analysis	1.1-1.2		
Friday, August 21	Position & Velocity Graphs	2.1-2.3	HW2	HW1
Monday, August 24	Acceleration			
Wednesday, August 26	Changing Direction	2.4		
Friday, August 28	Video Analysis & Modelling	2.4	HW3	HW2
Monday, August 31	Kinematics & Example Problems	2.5-2.7		
Wednesday, September 2	Gravity	2.5-2.8		
Friday, September 4	Projectile Motion	3.1-3.5	HW4	HW3
Monday, September 7	NO CLASS	3.1-3.5		
Wednesday, September 9	Vectors	3.1-3.5		
Friday, September 11	Force	4.1-4.2		
Monday, September 14	Exam 1			
Wednesday, September 16	Force & Acceleration	4.1-4.2		
Friday, September 18	Force, Acceleration, Mass, & N2	4.3, 4.5	HW5	HW4
Monday, September 21	Newton's 3rd Law	4.4-4.5		
Wednesday, September 23	Friction & Free Body Diagrams	4.6, 5.1		
Friday, September 25	Buffer		HW6	HW5
Monday, September 28	Momentum	8.1-8.3		
Wednesday, September 30	Exam 2			
Friday, October 2	NO CLASS			
Monday, October 5	Impulse		HW7	HW6
Wednesday, October 7	Work	8.1-8.3		
Friday, October 9	Kinetic Energy	7.1	HW8	HW7
Monday, October 12	Potential Energy	7.2		
Wednesday, October 14	Conservation of Energy	7.3-7.5		
Friday, October 16	Thermal Physics	7.6	HW9	HW8
Monday, October 19	Collisions	13,14,15		
Wednesday, October 21	2D Collisions	8.4-8.6		
Friday, October 23	Uniform Circular Motion	8.6	HW10	HW9
Monday, October 26	Rotational Kinematics	6.1-6.3,6.5		
Wednesday, October 28	Rotational Dynamics & Torque	10.1-10.2		
Friday, October 30	Rotational Energy	10.3	HW11	HW10
Monday, November 2	Angular Momentum	10.4		
Wednesday, November 4	Angular Momentum & Torque	10.5		
Friday, November 6	Statics	10.3-10.5	HW12	HW11
Monday, November 9	Exam 3	9.1-9.6		
Wednesday, November 11	Harmonic Motion			
Friday, November 13	Pendulum	16.1-16.6		
Monday, November 16	Relativity, Buffer	16.4		HW12
Wednesday, November 18	Relativity, Buffer			
Friday, November 20	Relativity, Buffer			
Monday, November 30	Final Exam 24-hour period			

ADDITIONAL COURSE AND UNIVERSITY INFORMATION

CLASSROOM BEHAVIOR: Students and faculty have a responsibility for maintaining an appropriate learning environment. Research has shown that computer and cell phone use during class reduces the grade for the user AND for the students around the user. **Our classroom is a "distraction-free zone".** Cell phone usage (e.g., texting, web browsing, etc.) is not permitted; you may be asked to leave the classroom and not return until the next class. Using your smart phones or other electronic devices to "check answers" during in-class activities can result in zero points for the activity for you (and your group members). Students are expected to remain in the class for the entire period. Please inform the instructor of any late arrivals or early departures from class. Repeated disruption of classroom instruction will be referred to the Office of the Academic Dean and may result in the student being withdrawn from the course.

POLICIES FOR COMMUNITY HEALTH AND SAFETY (COVID-19): Face masks or face coverings must be worn by faculty, staff, students and guests when in close proximity to others (less than 6 feet) and in public settings where other social distancing measures are difficult to maintain (e.g., common work spaces, meeting rooms, classrooms, etc.). All students must wear masks in order to attend class on campus. Appropriate use of face masks or coverings is critical in minimizing risks to others near you. You could spread COVID-19 to others even if you do not feel sick. Please see Face Covering/Mask Guidelines & FAQs for additional guidance. In addition: Classrooms are marked for social distancing, capacities have been calculated. Movement within classrooms should be minimized and eating during class is not allowed. Updated information can be found on the university webpage: https://www.regis.edu/coronavirus/index

INCOMPLETE POLICY: If unforeseen circumstances occur, and a student is unable to complete the required work for the course, an "Incomplete" grade may be submitted. A request must be made in writing and approved by the instructor. The request will include a timeline and plan for completing the work. The incomplete grade will reflect the grade earned in the course to this point (an "I" with whatever grade earned, including the missing work: an IF or ID or IC) and will only change when the plan is completed. Please see the University Catalog for more of the full policy: "A grade of an Incomplete or "I" denotes that the required work for the course is incomplete due to unforeseen circumstances" [emphasis added], which means "an accident, an illness, a death or major life transaction has occurred."

ACADEMIC HONOR CODE: All members of the Regis University community exhibit the qualities of honesty, loyalty and trustworthiness in all academic activities, holding themselves and each other accountable for the integrity of the learning community. Regis University students are committed to the highest standards of academic integrity and assume full and complete responsibility for maintaining those standards in the academic environment.

ACADEMIC INTEGRITY VIOLATIONS: Violations of academic integrity are taken very seriously and include cheating, plagiarism, fabrication, collusion and other forms of academic misconduct. All violations will be reported with appropriate sanctions applied. Sanctions can include, but are not limited to failure of an assignment, failure of a course, removal of academic honors, or review of the Academic Integrity Tutorial. For more serious violations, program suspension, College dismissal or University expulsion may be imposed. Refer to the Regis College Office of the Academic Dean for further information. This Academic Honor Code applies to any student enrolled in a course at Regis University or one of its university partners, regardless of the student's home college or program, and will be enforced according to the policies and procedures outlined in the University Academic Integrity Policy.

It is the responsibility of each student to review all aspects of the course syllabus and agree to adhere to the Academic Honor Code. In doing so, the student acknowledges that the work represented in all examinations and other assignments is his or her own and that he or she has neither given nor received unauthorized information. Furthermore, the student agrees not to divulge the contents of any examination or assignment to another student in this or ensuing semesters.

LEARNING SUPPORT: If you have a documented disability requiring academic adjustments, please contact Dr. Joie Williams, Director of Disability Services (303-964-3666, mbwillia@regis.edu, Clark Hall 225). She will review your documentation with you and help determine appropriate, reasonable accommodations. Following the meeting with Dr. Williams, please make an appointment with your instructor to discuss your accommodation request in light of the course requirements. You may self-disclose and request academic adjustments at any time during the semester. However, it is strongly recommended that you do so as soon as possible because accommodations are not provided retroactively and adequate lead-time is required.

ACCESSIBILITY: Regis is committed to creating a learning environment that is equitable, inclusive and welcoming. If you have a disability (or think you may have a disability) that may affect your work in this class and feel you need accommodations, contact Student Disability Services & University Testing (SDS/UT) to schedule an appointment and initiate a conversation about reasonable accommodations. To receive any academic accommodation, you must be registered with SDS/UT, which works with students and faculty to identify reasonable accommodations. SDS/ UT can be reached in Clarke Hall, suite 241, by phone at (303)458-4941, or by email at disability@regis.edu. For more information, please visit the SDS/UT's website at regis.edu/disability.

COUNSELING: During the semester, if you find that life stressors are interfering with your academic or personal success, consider contacting the Office of Counseling and Personal Development (OCPD). All full-time Regis College students are eligible for counseling services at no charge. OCPD is located in the Coors Life Direction Center, Room 114 and can be contacted by phone 24/7 at 303-458-3507. For more information, see www.regis.edu/ocpd.

DIVERSITY, EQUITY, AND INCLUSION: At Regis University the term "diversity" affirms our Jesuit commitment to build an inclusive community that values the dignity and contributions of all our members. We strive to shape a learning environment characterized by the Jesuit traditions of mutual respect and the pursuit of social justice, recognizing that our various identities and experiences, including but not limited to age, gender, race/ethnicity, class, disability, sexual orientation, religion and other forms of human difference, contribute to the richness and vitality of our Regis community, and those we are connected to locally, nationally, and globally. In accordance with our Jesuit Catholic mission, we commit ourselves to shaping an atmosphere, where the human rights of every individual are respected. We desire that same commitment to be instilled in each member of our community and demonstrated through our words and actions. Should an individual ever feel as though these values are not being upheld in the academic or residential environment, we encourage that person to bring it to the Office of Diversity, Equity and Inclusive Excellence in the Student Center, Suite 208; diverse@regis.edu or 303-964-5301.

REGIS'S NONDISCRIMINATION, SEXUAL MISCONDUCT, AND RETALIATION POLICY:
The Regis University Policy on Discrimination, Sexual Misconduct, and Retaliation prohibits University community members from discrimination and harassment on the basis of race, color, national origin, sex (including sexual harassment, sexual violence, sexual assault, sexual exploitation, intimate partner violence, or stalking) gender, disability, age, religion, veteran status, marital status, pregnancy, parental status, gender identity, gender expression, sexual orientation, genetic information or any other legally protected status ("protected class") in any of its policies, programs, admissions or activities.
Your instructors are Responsible Employees, which means if you disclose any information about incidents of discrimination, harassment, or sexual misconduct, they are required to report that information to the Equal Opportunity & Title IX Coordinator. The Equal Opportunity & Title IX Coordinator will then reach out to you in order to provide information on resources, your rights, and the policy and process at Regis University. The goal of the Office of Equal Opportunity and Title IX is to ensure that incidents of discrimination, harassment, and/or sexual misconduct are stopped, remedied, and prevented from reoccurring.
If you have any questions or concerns related to discrimination, harassment, or sexual misconduct, you can contact the Equal Opportunity & Title IX Coordinator directly:
Carole Goddard (she, her, hers) Equal Opportunity & Title IX Coordinator | EO & Title IX
3333 Regis Blvd., Denver, CO 80221 B-4
Main Hall Suite 204 P 303.964.6435 | E cgoddard001@regis.edu
https://www.regis.edu/life-at-regis/student-resources/campus-safety/equal-opportunity-and-title-ix-compliance
You can also make a report online at: https://cm.maxient.com/reportingform.php?RegisUniv&layout_id=4