

Syllabus for College Physics I (PHY 201 – Section 201 – CRN 4398) – Spring 2025

Lecture: Science Building, Room 277 – (MWF: 2-2:50 pm)

Course Description: This is a face-to-face, in person, 3-credit hour, lecture format, introductory physics course that requires the use of algebra, trigonometry, and vectors to solve real world problems and is required to be completed in one semester. From the most recent course catalog available: PHY 201 is the “First half of an introduction to physics for life-science students, using algebra and trigonometry, including kinematics and dynamics, force, energy, rotation, fluids, waves, and thermal phenomena.” Topics related to thermal phenomena have been eliminated beginning in fall 2019, the course catalog statement has been requested to be updated when given the opportunities to provide corrections annually. This course will mostly focus on Newtonian Mechanics, Work-Energy relationships, Oscillations, Waves, and Fluids if time permits. No extra credit will be available for this class and there will be no dropped grades, everything counts. It is expected that you have a high school level background in algebra and trigonometry and/or geometry. The Physics Program is currently housed in the Department of Mathematics and Physics within the College of Science.

Program Required Textbook: “College Physics: A Strategic Approach” by Knight, Jones, and Field, 4th Ed. Check the below link for available formats for the above textbook: e-Text, paperback, hardcover, loose-leaf versions, etc. <https://www.pearson.com/store/p/college-physics-a-strategic-approach/P100000279782>. The format of the textbook will **NOT** matter for this course, e-text is probably the cheapest. MasteringPhysics will **NOT** be used in any capacity for this course, do **NOT** purchase MasteringPhysics for this course. The above book contains all the necessary physics topics that will parallel the course lectures. A detailed schedule of the course lectures and topics is provided at the end of this syllabus with the corresponding chapters and sections **based on the above program required textbook**. That being said, any introductory algebra-based physics textbook will also likely have all the same exact topics, the physics does not change depending upon the book, so any algebra-based introductory physics textbook will likely suffice for this course. Lecture notes and homework are **NOT** specifically tied to a particular textbook. With that being said, it is best to use the notation learned from the lecture notes for all homework, quizzes, and exams. A suggested **FREE** online textbook is found at: <https://openstax.org/details/college-physics>. If a student chooses to use any textbook other than the program required textbook, the student is responsible for reading the correct sections of their chosen textbook that parallels the class lectures for the listed **required readings** found in the schedule at the end of this syllabus.

Pre-requisite Courses: (MTH 127 and MTH 122) or (MTH 130 and MTH 122) or MTH 132 or (MTH 140 and MTH 122) or MTH 229 or MTH 229H or MTH 140H.

Co-requisite Courses: PHY 202 - General Physics Laboratory.

Course Instructor Info: Dr. Sean P. McBride, Science Building 152/152A, (304)-696-2758/8852, mcbrides@marshall.edu “**HERD Hours**” and Office Hours: (F 11-2 pm & 3-5 pm, room 179/152 in the Science Building)
- Additionally, I have an ‘open-door’ policy for office hours as well as an ‘email me anytime with questions’ policy.

Teaching Homepage: <https://netapps.marshall.edu/mcbrides/teaching/>

Research Homepage: <https://netapps.marshall.edu/mcbrides/>

Academic Calendar: For drop/add dates, last day to withdraw from classes, and other important semester dates, see the [Marshall University Academic Calendar](http://www.marshall.edu/academic-calendar/) (<http://www.marshall.edu/academic-calendar/>).

Objectives: All material covered in this course is geared toward students pursuing a degree in life-science students. This course is aimed at showing you the basics of physical phenomena that you see in everyday life. More specifically, the objective of this course is designed to provide you with a basic understanding of: units, vectors, motion in one, two, & three dimensions, velocity, acceleration, conservative & non-conservative forces, work, kinetic energy, potential energy, conservation of energy, momentum, impulse, collisions, periodic motion, mechanical waves, sound & hearing, rotational motion, systems in mechanical equilibrium, and the basics of fluid mechanics if time permits; these are all key aspects of science that form some of the fundamental foundations of the physical world that surrounds us every day. Some pursuing careers in the health care fields will find the course material particularly useful when preparing/reviewing for the MCATs, which has physics questions.

This is a very organized class. This is a fast-paced course, ~ 14 chapters in 15 weeks; do not fall behind, if you do fall behind, seek help immediately, plenty of options for help exist, see page 2 of this syllabus or my Teaching Homepage for useful links. It is recommended that you get at least a 2-inch binder and a hole punch and keep all your materials organized to study from.

Learning Outcomes: In the process of learning the fundamentals of physics as described above, **the overarching goal of this class**, independent of your major, is to help hone your critical thinking, analysis, problem solving, and quantitative reasoning skills. To accomplish this goal successfully, you will be given **practice** via written homework problem sets that will be due weekly. Your individual success in achieving this goal will be **assessed** by your performance on weekly in class quizzes (11 of them - 5 group quizzes and 6 individual quizzes), 4 in class examinations, and a cumulative mandatory Common Final Exam.

Help for This Course: If you are starting to experience difficulties in this class, there exist many resources available for you to obtain additional help. *Resolve these difficulties quickly, before they snowball out of control (~14 chapters in 15 weeks). If you are lost in weeks three or four it may be very difficult to recover, ask for help sooner.* I am your number one resource for help in this class.

- **Six Office/“HERD Hours” per week** (F 11 am - 2 pm in S 152/179 and 3-5 pm in S 152/179): Get help in a group of friends or 1-on-1 individually, or we can make an appointment if these Office/“HERD Hours” times do not work for you. Or, you can simply drop by the Science Building to room 152 at any time and if my door is open and I have time to help you, I will. Feel free to email me questions at any time as well, I am usually quick to respond during the week and when it is within reasonable hours. It is very important that you ask questions as soon as you do not understand something. It is suggested to make friends with other students in the class and come to “HERD Hours” and study for Quizzes and Exams together.
- **There are free university tutors available for PHY 201.** See current tutoring options available at: <http://www.marshall.edu/uc/tutoring-services/>. I personally have not vetted or approved any of the Knack tutors, be cautious; first give “HERD Hours” a try or drop by my office. I also provide a list of “[Dr. SPM Approved Tutors](#)” on my Teaching Homepage that I will vouch for (they are private tutors, you pay by the hour). Additionally, the Physics Majors have been known to offer free tutoring in the Science Building each semester as much as possible; more information on times will be provided when information becomes available (please contact Administrative Associate, Teresa Wellman, for more information: wellmant@marshall.edu, this information when available will be posted on my teaching website).
- **“HERD Hours”:** You are all encouraged and welcome to come to what I call “HERD Hours” this is an environment where students can come individually, or especially in groups, and ask questions. This is in the **Science Building room 179 from 11 am - 2 pm on Fridays & 3-5 pm on Fridays**. Come and work on homework together in a non-classroom and/or non-typical-professor-office-hour setting. At “HERD Hours”, I will be around to help you at any time if you get stuck (my office/lab is right across the hall, S152), but what I really want to see is students helping fellow students, leading each other through peer instruction. Struggling, discussing, conquering the problems, and celebrating with your friends and peers is better than being frustrated by yourself and not making progress on the homework. I encourage you to work together. When working in groups there are more people around the table with different skill sets and different approaches and ideas to attack the problems. Working together in groups often results in getting the homework done faster with a better understanding and is overall a more memorable experience than spending long frustrated isolated hours struggling on your own. **Simply copying the homework from your peers during “HERD Hours” or other unauthorized resources will be of no benefit to you as 71.2 % of your grade will come from individual exams and quizzes.** Attendance will be taken during “HERD Hours” for recording keeping purposes only, **not for extra credit.**
- **PhET Simulations:** Remember, physics is some hard stuff when seeing it for the first time. I will try to introduce demos into the lecture to help assist in conveying the concepts; however, PhET Simulations are another good tool to ‘see’ concepts in action. PhET Simulations (<https://phet.colorado.edu/en/simulations/category/physics/index>) are interactive apps that highlight or demonstrate a physical concept. Outside of class, go online and play with the parameters in these simulations and see how changing the variables changes the results. You can even use the simulation to make tests and quiz problems for yourself. To run the PhET Simulations, use the latest version of Mozilla Firefox as your browser (<https://www.mozilla.org/en-US/firefox/new/>) combined with the latest version of Java found at <http://java.com/en/> (some still run on using Adobe Flash). Then select the simulations directly from the web site. Visit <https://phet.colorado.edu/en/troubleshooting>, if you experience problems or cannot open/run the PhET simulations.

Advice: As you can see above, there are many avenues and options for help. Do not be afraid to get help early. If you do any of the homework/quiz/exam problems incorrectly, it is your responsibility to learn how to do them correctly, learn from your mistakes, that is why you are here. Solutions to everything will be posted on Blackboard, and I am mostly always available if you need help. If you see something once in my class, chances are you will see it again for a higher point value on a later Quiz/Exam. It is beneficial to rework all problems you got wrong on Written Homework, Quizzes, and Exams. Similar problems could also be on the Final Common Exam. Physics is a subject where **memorization techniques will NOT work**; this is why it is often perceived as a difficult subject by many. To be successful in this class, understand the individual concepts and how they relate to say your favorite example; then be able to apply that concept to many other different problems and situations (the circumstances and required math for each problem may be different, but for each, the concept and approach leading to the answer is the same). The homework is time consuming and challenging, but that is rightfully why it makes up 15% of your grade. To do well in this class, you will have to spend ~ 9 quality hours per week dedicated to this class. Your understanding is proven by your individual quiz and exam performance, which make up a higher percentage of your overall grade. You must be able to demonstrate/understand the concepts from homework or else you will fail the quizzes. If you fail the homework and quizzes, you will fail the exams, including the final common exam, and thus the course. Homework, though the most valuable learning component, is one of the least point value assessments as it is your first encounter with the new material.

Attendance: I view all university level students as adults, who can or must do adult things, such as drive a car, vote, pay taxes, and who can also be sentenced to jail as an adult. Thus, as adults, I expect you to be responsible and be in class at all scheduled meeting times; however, you will not be docked points if you have an emergency and must miss a normal class when homework is not due or there are no quizzes/exams for that day. Simply get the missed lecture material from a willing classmate or Blackboard. Keep in mind there is a strong correlation between in class attendance and quiz/exam performance. All exams/quizzes/homework are mandatory and must be taken in class/(turned in) on the provided dates according to the schedule at the end of this document. If you are absent, you still must turn homework in early and make up any assignment, if allowed. **Notify me immediately when you realize a conflict exists when homework is due, there is an exam, or a quiz so we can come up with an alternative plan in advance (check the tentative exam schedule at the end of this document for exam times now).** If no effort is made in advance, the assignment/quiz/exam may count as a zero. All students are responsible for all lecture and demo material that occurs in class. **Within the first 2 weeks of class,** all students involved in any official Marshall University sports team or club (including accompanying Band/Dance/Cheer/Flag/etc members of any kind) must provide a schedule of when regular season events occur and be signed by a supervisor with contact info provided. **If you know well in advance when you will miss something, notify me immediately.** To help curb post covid19 spikes in frequent absenteeism without a University Excused Absence we will follow the below point deduction scheme. You must sign the physical attendance sheet that is passed around the room each class period. Just showing up for the quiz, or missing the majority of lecture, will still count as an absence.

0 - 4 missed normal classes for whatever reason = no point deduction.

5 missed normal classes with no University Excused Absence = 5% off overall grade.

Every normal class beyond 5 missed classes with no University Excused Absence will be an addition 1% off your overall grade.

10 missed normal classes with no University Excused Absence will result in an automatic failure of the course.

Lectures: Ideally, lectures will contain exciting demonstrations where possible that will illustrate the physical concepts being taught. Lectures will also provide you with the background to solve real world problems (mathematical machinery will be given through examples). Ideally, all the aforementioned topics will be covered. Some topics might have to be omitted due to unexpected and unforeseen circumstances that may arise throughout the semester (floods, tornadoes, power outages, snow storms, ice storms, global pandemics, etc). A very detailed tentative course schedule is found at the end of this syllabus with all the tentative exam, quiz, dues dates for written homework, an up-to-date list of topics covered, etc, etc. Dates may change on this printed tentative course schedule; thus, see the most up to date syllabus in Blackboard or my teaching website.

Required Reading and Purpose of Lectures: It is **required** that you read the sections of your textbook that are outlined in the tentative course schedule at the end of this syllabus. You should certainly read the corresponding sections prior to attempting the homework, quizzes, and exams. The lectures are geared toward the average student and primarily meant to (1) spark an interest in the subject, (2) highlight key and often difficult parts of the text, (3) show exciting demonstrations of the concepts discussed in the text where possible and if available, and (4) work through some examples to give you the mathematical machinery to solve problems. It is recommended that before or after class, you download any additional notes or videos from Blackboard and review them before the next class. **Read the book.** Study your book and your homework, study the provided solutions, your lecture notes, my posted lecture notes/videos, your previous exams/quizzes/ and solutions, and ask questions!

<u>Grading*:</u>	End of the Semester Assessment Test (ESAT)	2%†
	In Class Weekly ~ 5-10-minute Quizzes:	15%
	Common Final Exam	15%
	Written Homework:	20%
	In Class Exams (4 total, 12% each)	48%

<u>Determination of Final Grade*:</u>	90% or above:	A
	80% or above:	B
	70% or above:	C
	60% or above:	D
	59.9% or lower:	F

* I reserve the right to adjust these percentages and letter grade cutoffs based on the overall class performance, or individual assignments, thus stay above the average grade of the class and assignment average to ensure an above average grade in the class. Any potential curve for the class or assignments will be based only on only students that participate in all parts of the class or the specified assignment. Typically, but not in all semesters, the top student has a final grade close to 100% after an applied curve and the average/median final course grades after an applied curve ends up being near 75%. If you are below the average/median grade, chances are you will receive a below average grade. If you are above the average/median grade, chances are you will receive an above average grade. The number that actually represents the average/median is irrelevant. Typically, but not guaranteed, letter grade breaks at the end of the semester are roughly 5 points below those stated above. An average letter grade is a 'C'. Grade distributions will be given frequently in Blackboard so you know exactly where you stand at any point in the class relative to your peers. Previous class distributions from previous/similar courses are located on my [Teaching Homepage: https://netapps.marshall.edu/mcbrides/teaching/](https://netapps.marshall.edu/mcbrides/teaching/). Email me at any time to find out your exact class rank relative to your peers.

† You must take both the pre and the post ESAT to get the 2%. Taking just one or the other earns 0%.

Remember, physics is some tough stuff. Regardless of the number that represents the course average/median, you always want to stay above this average course grade relative to your peers to achieve an above average grade in the class. An average grade is a 'C'. Grade example: before the Final Exam and ESAT are included, if you're getting 90% of all the homework correct and getting a 50% on the in-class exams and quizzes, you are only pulling a ~ 59.6 % for the course. **Acing the homework does not equate to passing the course.** The average for the course maybe a 75%, which means you are doing far below the average relative to your peers, seek immediate help to get ahead of the class average with the aim to earn an above average grade. See **"How to write-up my physics solutions on homework and exams?"** or the **"Example Written Homework Solution"** on Blackboard to get the most points on the written homework, quizzes, and exams. See also the **"How To calculate Your Grade"** example in Blackboard. An attempt will be made to post class averages, medians, and distribution plots before and after each exam to let you know exactly how you are doing relative to the rest of the class.

Calculators: No programmable/graphing calculators are allowed during quizzes or exams (No TI-83 through TI-Nspire CX and beyond for example). Get a simple TI-30 or TI-35 for example (model numbers and brands may vary, but you get the idea). Do not buy it the night before the exam, or do all the homework with a TI-89 or a TI-Nspire CX, and then try to switch to a TI-35 for the exam, neither of these will go well for you, guaranteed (I have witnessed multiple times students that could not turn on new calculators or figure out how to convert fractions to a decimal answer, I will not be able to help with that during an exam). My advice is to learn how to use your simple calculator early and stick with the same one for the homework, the quizzes, and exams. **Cell Phones are NOT allowed to be out and must be turned off or put in silent mode during exams and quizzes, therefore, calculator cell phone apps are NOT allowed. Make sure there is nothing in the calculator cover during quizzes or exams.**

Electronic Devices: All cell phones, headphones, air/ear buds, laptops, I-pads, smart watches & other communication devices, etc., should be turned off/silenced and should **not be used at any time during class and exam/quiz time**; if a phone or similar device or one of the above is out during an exam or quiz, **you earn a zero for the exam or quiz, no questions asked**. If your cell phone or other electronic device is out during class time and is distracting/affecting others ability to learn, and you do not sit in the back of the class, you will be asked to leave the classroom. If you use a laptop to take notes, please sit in the back of the class so as to not distract others around you. Understand, three different versions of the notes will be posted for each lecture including a video with audio. Whether you take notes in class or just listen is up to you and your learning style.

The 1-Week Rule: I am happy to fix any grading errors. Any grading disputes or grading mistakes needs to be brought to my attention within one week of when the assignment was distributed or made available to the entire class. After 1-week from this date, regardless if you did not attend class to receive your graded assignment, grades are permanent. You must turn your assignment back in to be regraded. You must write a cover page or write on the top of the assignment on the first page what problem needs regraded and why. It is advisable to take a picture of your work before turning back in for a regrade. Any attempt to alter a previously graded assignment in any way, such as adding information to it, removing information from it, or simply altering the previously presented work for a better grade is considered Academic Dishonesty and will be treated as such. Regrades will be returned any time before the end of the semester and are often very delayed in getting returned due to current grading taking precedence over regrades and there being limited time for grading. Make sure your cover page has enough detail so I know what I am looking for to regrade and why.

Homework Extensions: **Late homework is simply not accepted even if you have a University Excused Absence.** Homework will be due every week at the same time, Monday, beginning of class, plan accordingly. If you must miss class on Monday (for whatever reason), plan to turn the written homework in earlier, not later (scan the assignment and email to me, use a quality app to scan homework or find an actual scanner). If needed, CamScanner works well (<https://www.camscanner.com/>). Turn in the missed assignment as a single pdf document. Multiple pdfs or multiple pictures will not be graded. Independent of all factors, once homework solutions are posted after class, any late homework received, for any reason, will not be accepted or graded. Homework exemptions are only given in very rare circumstances, requiring documentation and must be a qualifying event (see Emergencies Section regarding university excused absences at the end of this syllabus). If you are sick, you still must turn in your homework via email to me.

Written Homework: For your homework, always try it yourself first; however, you are all encouraged (but not required) to discuss it with your peers for help. A great place to do this is at **"HERD Hours"** where students are encouraged to come to the **Science Building room 179 from 11 am - 2 pm on Fridays & 3-5 pm on Fridays**, either individually or especially in groups or herds, to come and work on homework together in a non-classroom and/or non-typical-professor-office-hour setting. I encourage students to discuss homework with each other if you arrive at different answers. If you think the answer you got is correct, and you are confident in your solution, try and explain it to your fellow students, use the chalkboard, write it out, see what they think. Maybe they solved the problem a different way, arriving at a different answer (or the same), encouraging you to review and rethink how you solved the problem. Hopefully this encourages discussion of physics among you and your fellow students and builds your confidence in problem solving and improves your ability to explain your work to others. If you cannot get the required help from your peers, or simply have a question, come see me anytime, email me, and/or make an appointment with me, and/or apply for a tutor. You must pick up the new homework problem sheets in class on Monday (the questions will only be posted in Bb after they are due). Extra copies will be placed in the bin attached to my office door (S152) if you lose or misplace your original; they will not be emailed over the weekend or at other time before they are due.

8-15 problems per week. Anywhere from 0 to 4 of the problems may be randomly chosen out of the total number of problems to be graded in detail. If no problems are graded in detailed you will be given a score based on your effort and completion of your work. If not graded in detail, some problems may be graded for just correctness, or for just completeness (independent of correctness), or simply not graded at all depending upon the resources available during the semester. Note: I very much dislike the fact that you do not get all your homework problems graded, but it is impossible to grade ~ 400 – 750 problems in detail per week for a full class with little-to-no support staff. After solutions are posted, rework the problems you got wrong, make sure you understand how to do all the problems regardless of your grade. Written problems are due at the beginning of class on Monday each week (**if the university is closed on Monday due to a holiday or weather, it will be due on Wednesday of that same week, or the next scheduled class day the university is open**). New problems will be given in return on Mondays or the next time the class meets when the university is open. It is advantageous to take pics of your homework before turning in to study from, especially on exam weeks. More points will be awarded for more difficult/longer problems, total points per assignment may vary, but each assignment will have the same weight. Turn in homework on perforated stapled paper (**unstapled homework and homework and/or bits and pieces of paper from a spiral bound note book are unacceptable and will result in points being deducted**). The purpose of these written problems is to make sure you can clearly write out your thought process for someone to follow, showing all the details of your work and how you arrived at your final answer (you need to do this for quizzes and exams and jobs in the real world). **Do not try and answer all the problems on the homework sheet, use separate sheets of paper** (this will result in a 50% reduction of earned points for that assignment; same goes for the second time this happens, if you do this more than two times, you will simply receive a zero for that homework on the third instance and every following instance).

For all homework problems, draw all sketches, diagrams, and Force Body Diagrams (FBDs) that are needed/required. In some cases, you may need to add information to provided diagrams. You will likely get potential points for showing diagrams or providing correctly drawn vectors on FBDs for example. **To receive the maximum number of points on homework it is best to follow the mnemonic "E-CAN-SU". ECANSU stands for Equations, Canceling/zeroing, Algebra, Numbers, Significant figures, and Units. You can remember this as, "Everyone CAN be Successful and Useful."** Therefore, the first thing you do when solving a problem is write out the full starting equation you have been taught for a subject, then you cancel out or draw a line through the terms in the equations that go to zero, then you do any needed algebra to solve for the desired variable, then plug in the numbers, then report the answer to the correct number of significant figures, with the appropriate units. Box your final answer. There is no secret, that is the procedure. See also the document "How to write-up my physics solutions on homework and exams?" and "Example Student Homework Solution" on Blackboard to get the most points on your written homework and exams. Solutions to Written Homework, Quizzes, and Exams will be posted in Blackboard shortly after they are due or completed (if not posted promptly after class when turned in, email me immediately).

Keep in mind that acing the homework with a 100%, though homework is a significant portion of your grade (20% of the total grade) this will not be enough to allow you to pass the class if you do poorly on quizzes and exams; thus, it is not beneficial to copy the homework each week from your peers or unauthorized sources without understanding it. Independent of whether you work in groups on your homework outside of class or work individually and never collaborate with your fellow classmates, **your performance and your performance alone is the determining factor that will allow you to pass course (exams total 63% of the overall class grade and individual quizzes total another 8.2 % of the overall class grade)**. I expect everyone to put the time and effort in on the homework and to try to do very well on it, what will separate out the A, B, C, D, F, and W students will be individual exam/quiz performance. It is ill advised to continually ask your peers for answers on the homework and group quizzes and then simply copy what they say without understanding the concepts or the detailed math behind the problem; you might get some partial credit on the written homework and group quizzes, but this is a surefire way to fail the individual quizzes and exams and thus the course (**71.2% of your total grade is based solely on your knowledge**). If you do not understand the concepts and math, continually ask questions to me or your peers until you understand the concepts and the math, this is how to pass the course.

Quizzes: 5-10-minute quizzes will either be given first thing or at the end of class every Wednesday on non-exam days (first or last is TBD). So, there is either a quiz or an exam every Wednesday. Ideally these will be at the end of class, but depends on several factors. There will be two types of quizzes: (1) Individual and (2) Group-oriented quizzes. **The first quiz, on the third day of the semester, second class, will be an individual quiz and it will be on this syllabus (so study this document)**. These individual quizzes will be closed-book, closed-note, very quiet, and the equation sheet will be provided. The group-oriented quizzes will allow you the option to work together within a small group of three to four students, but all students must turn in their own quiz (answers can be different), you are not allowed to use any resources for the group quizzes, but are allowed to converse with each other (equation sheets will also be provided, cell phone use is prohibited, using other resources or a cell phone will earn everyone in the group a zero). You are encouraged to discuss and work together to solve the group quizzes. These group quizzes should be a very noisy time with lots of physics being discussed between you and your peers. Ask permission to work with people first, as some students may still choose to work alone. All quizzes are designed to test your understanding of the previous week's homework problems and concepts discussed in lecture the previous week (see schedule at the end of this syllabus). The quizzes may contain a mix of multiple-choice, true & false, require some small written work/calculations, and/or to do a homework like problem in full detail, showing all steps. Be prepared, do not let yourself or your group members down. There will be a total of 11 quizzes.

Exams: The exams are individual, closed-book, closed-note, and an equation sheet will be provided. All graded materials require the name that matches your course enrollment in Blackboard, no nicknames. There are 4 in-class exams during the semester, plus a common final exam on Wednesday May 7th from 10:15 am to 12:15 pm (all mandatory). Any exam conflicts need to be brought to my attention at least 2 weeks before each exam (check the tentative schedule at the end of this document **now** for all exam dates, if you have known conflicts, report them early). The final common exam will be 'cumulative'. That being said, a lot of the discussed topics in the class will rely on the previous learned material, thus it is best to treat **all material in this class as cumulative** in the sense that new material on exams can use concepts from the previous material. For example, on the second exam, which will have a focus on vector forces among other topics, you most certainly will need to remember concepts from exam 1, which covers vector components among many other topics. Basically, you cannot forget what you learn after each exam. I want you all to do well on the exams, thus I will volunteer myself before each regular exam and the final exam for a non-required review session. Experience has informed me that the best time for an Exam Review session is 2 days before the exam and 1 hour is typically enough. Thus, your exam reviews will be after class the Mondays before your exams in the Science Building room 179 from 11-12 pm. These reviews are your time to ask questions, not for me to re-lecture; if no one has questions, reviews will be most likely be very short, come with specific or general questions. Exams will typically contain a mix of longer written problems (typically 3) similar (but not identical) to homework problems, quiz problems, lecture material,

and/or lecture demos, and there will also be some conceptual problems (typically 15). The conceptual questions could be a mix of multiple-choice, true & false format, fill in the blank, and/or require a small amount of written work/calculations, the longer written problems, will require you to show ALL your work for full and partial credit. **Follow ECANSU for the maximum number of points.** No partial credit is given for the conceptual problems. Written problems will make up 60% of the exam score and the conceptual section will make up 40% of the exam score. **Cell phone use and/or the use any material found in your area or inside your calculator cover, besides the equation sheet, will result in an automatic zero, no questions asked, and additional academic dishonesty sanctions and/or failure of the class may result.**

The Common Final Exam: Your Common Final Exam ***IS*** comprehensive, mandatory, and makes up 15% of your final grade in the course. This is worth more than one in-class exam and equal to your entire quiz grade. Your final exam is 10:15 am – 12:15 pm, Wednesday May 7th in the Science Building. Room locations will be announced closer to the exam date. **If you miss the final exam, you fail the course.** Previous years have had approximately 30 multiple choice questions, with the questions covering all concepts taught in the class unless otherwise stated, there will be no free response questions. Focus on understanding the basic concepts and doing basic problems with the basic starting equations and basic algebra manipulation. If you study and understand the concepts well, you should do very well on the common final exam. The common final exam is meant to test your basic understanding (algebra will be needed) and is not meant to trick you. If a final exam conflict exists with the scheduled final exam time, follow the steps outlined on the Marshall University Spring 2025 Exam Schedule available at: <https://www.marshall.edu/registrar/exam-schedules/>. If the two-hour time allowance results in a conflict in exam times, it is the student's responsibility to notify the professor of the later course and to reschedule the later exam. Rescheduled exams must be concluded by Friday, May 9, at 6:00 p.m. Depending on the semester, the 1-week rule may not apply for the final exam simply due to lack of time between when you take the final exam and when final grades are due (so if there are questions on final exam grading, ask them during or before the end of final exam week, grades are due Monday, December 12th 12:00 pm). The Final Exam Review will be in the Science Building, Friday, May 2nd, room TBD from 3 – 4 pm (we can go beyond 4 pm if needed).

Emergencies/Unexpectedly Missed an Exam or Quiz: Unexpected emergencies & accidents happen, that is life. Make email contact with me as soon as possible; you must give your reason for missing or, if the reason is too personal, indicate you are applying for a University Excused Absence (UEA) for missing the exam or quiz in the email. Fill out the required form: https://marshall-advocate.symplcity.com/collections/student_advocacy_and_support. **After homework solutions are posted, the same homework assignments cannot be made up, the same goes for Quizzes and Exams; this is independent if you have a UEA.** If you are sick you must email me your homework before class starts. If proper documentation is received, an exemption may be provided instead of the zero for quizzes at the discretion of the professor. All missed assignments must have a university excused absence and are counted as zeros until one is received. If you experience a traumatic event in the immediate moments before a quiz or exam, this means the 10-15 minutes or so before the quiz or exam (or some event occurs that alters your normal state of mind in any way for a Quiz or Exam), and you are fairly certain you can get a University Excused Absence (UEA), do not take the quiz or exam; instead, file for the UEA (to take the Quiz/Exam before the next scheduled class or for an exemption). An example for this would be witnessing a homicide of any kind, a violent crime, or witnessing a horrifying accident/fatality on your way to class to take the exam/quiz. Something that could be confirmed via emergency personnel for example, breaking up with a boyfriend or girlfriend, etc. does not count). **Any exam or quiz taken counts, independent of state of mind when exam was taken, even if a UEA is received later. All make-up exams must be completed before the next scheduled class, so submit for the UEA as soon as possible.**

As it is often hard to ensure the same level of difficulty for make-up exams as original exams, students are strongly encouraged to participate in the original scheduled exam to ensure an as fair as possible experience. Exam make-ups must be retaken before the next scheduled class after the missed exam. Failure to do so could result in a zero without proper documentation (a UEA) received before the next scheduled class. Only, in very rare circumstances is an exemption with a UEA on an exam allowed. Only one Exam exemption with a legitimate UEA is allowed for an emergency situation (or university sponsored events that span the time of the missed exam past the next class period); thus, all students must take 3 out of the 4 in class exams to pass the course. More than 1 missed exam with a proper UEAs does not allow for proper assessment and assignment of a letter grade in the course for a student, it is recommended that the student withdraw from the class. Depending upon the semester schedule, if the second exam miss occurs past the withdrawal date and cannot be made up before the next scheduled class, the student will receive an Incomplete in the course. Make-up exams will contain completely different problems and will not be returned, though they can be reviewed during office/“HERD Hours”. Make up exams will be completed only after the rest of the class completes the exams, not before. If you are quarantined due to covid or some other illness, and the proper documentation is provided for a UEA, you will be allowed to take the exam in a quarantined environment virtually with very strict proctoring conditions imposed following the PHY 211 protocol form the fall 2020 semester, contact me immediately once you know you test positive and have documentation that can be verified. The protocol will be shared with students in need when the situation arises.

A missed exam or quiz, with no prior email/message & no legitimate supporting documentation before or immediately after counts as a zero and cannot be made up (same goes for quizzes). Makeup exams, with different content, will be given only after the missed event and only in very rare circumstances, which require official legitimate documentation. An “excused absence”- a qualified event for missing exams/quizzes and unexpectedly not being able to turn in homework on the provided due date. **Examples include: extreme personal emergencies (house fires, serious crimes, and grave emergencies), university-sponsored activities, medical circumstances, death or critical illness of an immediate family member, short-term military obligations, jury duty, subpoenas for court appearance, etc.** If an exam, quiz, or homework is missed, and one of the above is the reason, I will need immediate legitimate official documentation to verify the event in order to schedule a make-up exam/assignment, complete the following form: https://marshall-advocate.symplicity.com/collections/student_advocacy_and_support. Response time for excuses is quick, but may take up to 3 institutional days to process. Check with Student Affairs daily so you can do the make-up exam by Friday.

Computer Requirements: Access to Blackboard and a @marshall.edu email are both required. You are expected to check both frequently. I use Blackboard to distribute lecture notes, supplementary material, and class performance information; sign in at www.marshall.edu in the upper right corner using your unique MU username and password. I also seldom send notices to your Marshall e-mail account and I frequently use ‘Announcements’ in Blackboard. It is highly advisable to set up your Announcements in Blackboard to email you and/or text you when a ‘Announcement’ posts for the course. If you need help setting this up contact the Design Center team (<https://www.marshall.edu/design-center/course-help/>). All electronic course communication must be through your Marshall email account (not Gmail, yahoo, etc.). My advice to all university students is to check your Marshall email at least twice a day. Many amazing opportunities for students and much information is lost in unchecked email inboxes.

Statement Regarding Students Requiring Special Accommodations & Accessibility (Students with Disabilities): For University policies and the procedures for obtaining any services, please go to MU Academic Affairs website (<http://www.marshall.edu/academic-affairs/policies/>) and see information under “Students with Disabilities”. For help with setting up accommodations, contact the Office of Accessibility and Accommodations in Prichard Hall 117 (304-696-2467). For more information, access the website for the Office of Accessibility and Accommodations: <https://www.marshall.edu/accessibility/>. If no official documentation from the Office of Accessibility and Accommodations is given to the instructor, no accommodations can be made by the instructor. Paperwork must come from Office of Accessibility and Accommodations, not the student. Trying to get the process for accommodations started the week before an exam will likely not work out for you, more time is needed. Again, before any type of accommodations can be given by instructors, the instructor must receive official documentation from the Office of Accessibility and Accommodations (a.k.a./formally the Office of Disabilities Services) or the required program; therefore, take care of this the first week of classes (this is true for the H.E.L.P Center and the WV Autism Training Center and the Office of Accessibility and Accommodations).

Statement Defining Expectations for Student Conduct: I will expect everyone in all portions of this class, including, but not limited to lecture time, exam times, quiz times, “HERD Hours”, and office hours to act in a professional and courteous manner. Students are expected to conduct themselves in a manner that creates a productive learning environment for all members of the class. To this end, disruptive, abusive, or offensive behavior directed at anyone involved in the class will not be tolerated, and offenders may be asked to leave the classroom and forfeit any associated grades for that day. Disruptive behavior is any behavior that interferes with the normal conduct of lecture/quizzes/exams/“HERD Hours” or behavior that inhibits a productive learning environment (this includes sleeping in lecture and using any non-approved electronic devices). If you are experiencing, disruptive, abusive, or offensive behavior directed towards you from others in the class (this includes when working together in groups outside of class if desired), please make me aware of the problem as soon as possible. In addition to acting professional and courteous in class, I only respond to emails that are written with professionalism and courtesy. “All members of the Marshall University community are expected to always observe health and safety protocols. This includes general health and safety protocols as well as specific protocols that might emerge in response to community and campus health conditions.”

Prohibited Use – Generative AI is fully prohibited in the course: Students are prohibited from using generative AI for graded materials; violation of this, will be considered a violation of both Marshall’s Academic Dishonesty Policy (URL: <https://www.marshall.edu/academic-affairs/policies/#academicdishonesty>) and the Student Code of Conduct (URL: <https://www.marshall.edu/student-conduct/files/Student-Code-of-Conduct-24-25.pdf>). Any assignment deemed as coming from artificial intelligence, at a minimum, will be given zero points with possible additional academic dishonesty sanctions imposed.

Campus Services: There are many [Campus Services & Resources](#) that you or someone you know throughout your college career may find useful or desperately need at some point. The above link provides contact information for the Counseling Center (304-696-3111) and Health Services, Services for Students in Financial Need, Tutoring Services, and a wide variety of other services and resources (there are many services within each of these categories - check them out now so you know what is available to students). Chances are a version of this syllabus will always be posted on my [Teaching Homepage](#) if you ever need this information, even well after the class is over.

University Policies: By having the privilege of being enrolled in higher education and thus this course, you agree to all the University Policies and Codes listed in the below link. It is the student's responsibility to read the full text of each policy and code by going to <http://www.marshall.edu/academic-affairs/policies/>. The individual policies and codes are: Academic Dishonesty Policy, Academic Dismissal Policy, Academic Forgiveness Policy, Academic Probation and Suspension Policy, Affirmative Action Policy, Pre-Finals Week Policy, D/F Repeat Rule, Excused Absences, Inclement Weather Policy, Sexual Harassment Policy, Students with Disabilities, University Computing Services Acceptable Use Policy, and the Code of Student Rights and Responsibilities - also referred to as the Student Code of Conduct (<https://www.marshall.edu/student-conduct/files/Student-Code-of-Conduct-24-25.pdf>).

Authorized vs Unauthorized Aid in Academic Work: In this course, you are permitted to talk with other students about your written homework problems and even encouraged to work together in groups on the homework during "HERD Hours", but you may not copy solutions verbatim from each other or answers verbatim from any other source. You must work the problems out for yourself and understand them. **Remember, 71.2 % of your final grade is based on how you, and only you, can answer questions on the individual exams and quizzes (Exams, 63% and individual quizzes, 8.2 %).** Copying something and not understanding it does you no good now or later. If you have any questions about what constitutes authorized vs. unauthorized aid, contact me immediately. If you copied all your homework and understood nothing, but ace the homework with 100%, congratulations, you have a 20 % as your total grade, certainly an 'F'. Understanding the homework and the quizzes are the single most valuable items for passing this course, they help you pass the bigger items such as exams.

Technology Assistance:

If you have technical problems, please contact one or more of the following:

- [Blackboard Student Guide](https://www.marshall.edu/design-center/files/2020/03/Student-Guide-Bb-at-Marshall.pdf) (<https://www.marshall.edu/design-center/files/2020/03/Student-Guide-Bb-at-Marshall.pdf>)
- Marshall [Information Technology \(IT\) Service Desk](#) (Help Desk) (<http://www.marshall.edu/it/departments/it-service-desk/>)
 - Huntington: (304) 696-3200
 - [Email the IT Service Desk](mailto:itservicedesk@marshall.edu) (itservicedesk@marshall.edu) or start a chat with a staff member in the browser. The chat will be saved and emailed to you for your records.

Technical Skill Requirements: For computer and browser requirements for Blackboard, see [IT: Recommended Hardware](#) (<http://www.marshall.edu/it/recommendations/>).

- To check your browsers, use the [Blackboard Browser Checker](#) and ensure that you set permissions properly and have all the necessary plug-ins:
- https://help.blackboard.com/Learn/Administrator/Hosting/Release_Notes/Browser_Support/Browser_Checker
- Students must be able to use Marshall email and check it regularly, as well as the basic tools in Blackboard, including the Announcements option. Links to Blackboard Help and tutorials are available on the Start Here page and on the Tech Support tab in Blackboard. Blackboard recommends Google Chrome browser or Mozilla Firefox browser.
- The Microsoft Office suite (Office 365) is available at no extra charge to students enrolled at MU. For information visit [Marshall IT: Office 365](#) (<http://www.marshall.edu/it/office365/>).
- See the Tech Support tab in Blackboard for additional information on browsers, technology, and apps.

This current syllabus is based on available information available several days prior to the start of the Spring 2025 semester. If at any time, policies, or a large amount of due dates change, due to covid or for any other reason, an addendum to this syllabus will be provided informing you of what those changes are and the new due dates. The most up to date syllabus will be posted in the syllabus repository when available: <https://mubert.marshall.edu/syllabi/>.

Campus Carry Policy: “University Policy, UPGA-12 (Campus Carry Policy) derives its authority from West Virginia State law, including the Campus Self-defense Act (W. Va. Code § 18B-4-5b). It pertains to the exercise of Concealed Carry on Marshall University’s campus, except in designated areas, by individuals with a valid permit to Conceal Carry. Individuals who choose to Conceal Carry are responsible for knowing and understanding all applicable federal, state, and local laws and Marshall University Board of Governors Rules, University Policies, and Administrative Procedures. University Policy, UPGA-12 applies to areas of campus and buildings that are directly under the possession or control of Marshall University. Concealed Handguns are not observable to others and must be holstered and concealed on the body of the permit holder or in a personal carrier, such as a backpack, purse, or other bag that remains under the exclusive and uninterrupted control of the permit holder. This includes wearing the personal carrier with a strap, carrying or holding the personal carrier, or setting the personal carrier next to or within your immediate reach at all times. If your participation in class activities impedes your ability to maintain constant control of your Handgun, please make alternate arrangements prior to coming to class.”

Statement for Copyright Notification: Copyright (2024) - Dr. Sean P. McBride, as to this syllabus and all course material. During this course, students are prohibited from selling notes to, or being paid for taking notes by, any person or commercial firm without the expressed written permission of the professor teaching this course. *“All materials used in this class (in any form, electronic, printed, or verbal), including, but not limited to, exams, quizzes, handouts, lectures, homework assignments, and all material on the university’s learning management system (currently Blackboard) and its peripherals, are copyright protected works under US Code Title 17. (1) Unauthorized copying, distribution, recording, selling, or posting of any portion of class materials, in any form, in any way, is a violation of federal law; this specifically includes posting any portion of the class materials to the World Wide Web through the Internet, and/or via any other means of electronic communication. (2) Unauthorized sharing of class materials in any form, specifically including, but not limited to, uploading class materials to websites for the purpose of seeking/providing solutions or sharing those materials with current or future students is a violation of the Academic Dishonesty Policy set forth in Marshall University’s Student Code of Conduct. ‘Unauthorized’ means without explicit permission from the instructor. Violation of (1) or (2) will result in all necessary disciplinary actions taken against the student.”* ~ Marshall University Copyright Statement, updated fall 2016.

Week	Day	L #	Date	PHY 201 - Subjects	Chapter - (Sections) Required Reading
1	M	1	January, 13	Introduction slides, Syllabus, and ESAT (Drop/Add Week)	-
	W	2	January, 15	Unit Conversions, Distance, and Displacement (Quiz 1 and Drop/Add Week)	Ch. 1 - (1-6)
	F	3	January, 17	Speed, Velocity, and Review of Sig figs and Unit Conversions (Drop/Add Week)	Ch. 2 - (1-3)
2	M	-	January, 20	Martin Luther King Day (University Closed - No Classes)	
	W	4	January, 22	One Dimensional Motion Problems (W1 Due) & (Quiz 2)	Ch. 2 - (6)
	F	5	January, 24	Free Fall	Ch. 2 - (7)
3	M	6	January, 27	Acceleration (both Average and Instantaneous) and Main Kinematics Equations (W2 Due)	Ch. 2 - (4-5)
	W	7	January, 29	Vectors and Components of Vectors (Quiz 3)	Ch. 3 - (1-4)
	F	8	January, 31	Projectile Motion and Relative Velocity	Ch. 3 - (5,6, 8)
4	M	9	February, 3	Finish Projectile Motion Introduction to Forces (W3 Due)	Ch. 4 - (1-4)
	W	10	February, 5	Forces and Newton's Laws (Quiz 4)	Ch. 4 - (5-7)
	F	11	February, 7	FBDs, Static Equilibrium, Linked Bodies, and Friction - 3 Step Process	Ch. 5 - (1-4)
5	M	12	February, 10	Finish Up forces (W4 Due)	Ch. 5 - (5, 7-8)
	W	-	Feb. 12th	Exam 1 - 2:00 - 2:50 pm	
	F	-	February, 14	February Break (No Classes)	
6	M	13	February, 17	More Newton's Second Law Examples With and Without Friction and Circular Mot	Ch. 3 - (7)
	W	14	February, 19	Examples Problems with Various Forces Including Circular Motion (Quiz 5)	Ch. 6 - (1-3)
	F	15	February, 21	Newton's Law of Gravitation	Ch. 6 - (5-6)
7	M	16	February, 24	Introduction to the Work Energy Theorem (W5 Due & Midterm Grades Due)	Ch. 10 - (1-4)
	W	17	February, 26	Examples with the Work Energy Theorem	Ch. 10 - (1-4)
	F	18	February, 28	Energy Stored by Springs and Power (Quiz 6)	Ch. 10 - (6), Ch. 8 - (3)
8	M	19	March, 3	Work Energy Combined with F=ma (W6 Due)	Ch. 10 - (7, 10)
	W	-	Wed, March 5th	Exam 2 - 2:00 - 2:50 pm	
	F	20	March, 7		Ch. 9 - (1-4)
9	M	21	March, 10	Collision, momentum, and Conservation of Momentum Examples (W7 Due)	Ch. 9 - (5)
	W	22	March, 12	Ballistic Pendulum, Angular Motion, and Newton's second Law (Quiz 7)	Ch. 7 - (1-2), Ch. 7 - (6)
	F	23	March, 14	Examples of Angular Motion and Angular Momentum	Ch. 10 - (3), Ch. 9 - (7)
10	M	-	March, 17	Spring Break (University Closed - No Classes)	
	W	-	March, 19		
	F	-	March, 21		
10	M	24	March, 24	Rolling Without Slipping and Conservation of Angular Momentum (W8 Due)	Ch. 7 - (3, 5-7)
	W	25	March, 26	Angular momentum Examples, Center of Mass (Quiz 8)	Ch. 7 - (4)
	F	26	March, 28	Pulley's and Static Equilibrium	Ch. 8 - (1-2, 5)
11	M	27	March, 31	Finish Static equilibrium and torque, Pulley's, start Oscillations (W9 Due)	Ch. 14 - (1-4)
	W	-	Wed, April 2nd	Exam 3 - 2:00 - 2:50 pm	
	F	28	April, 4	Position, Velocity, and Acceleration in Oscillations	Ch. 14 - (5)
12	M	29	April, 7	Pendulums (simple and physical) and Resonance (W10 Due)	Ch. 14 - (5)
	W	30	April, 9	Introduction to Waves (Quiz 9)	Ch 15 - (1-6), Ch. 16 - (1-3)
	F	31	April, 11	Sound Waves in Open-Open and Open-Closed Tubes and sound intensity	Ch. 16 - (4)
13	M	32	April, 14	Doppler Effect and Interference (W11 Due)	Ch. 15 - (7)
	W	33	April, 16	Pascal's Laws (Quiz 10)	Ch. 13 - (1-2)
	F	34	April, 18	Bernoulli's Principle and Bouyancy	Ch 13 - (3, 4)
14	M	35	April, 21	Bernoulli and Bouyancy Examples (W12 Due)	Ch. 13 - (4-5)
	W	-	Wed, April 23th	Exam 4 - 2:00 - 2:50 pm	
	F	36	April, 25	Bernoulli and Bouyancy Examples 2 (Last Day to Drop)	Ch. 13 - (4-5)
15	M	37	April, 28	Catch Up Day [More fluid or review examples if time permits] (W13 Due)	-
	W	38	April, 30	Catch Up Day [More fluid or review examples if time permits] (Quiz 11)	-
	F	-	May, 2	Discussion to Improve the Course/ESAT	-
W Wed, May 7th PHY 201 Final Common Exam 10:15 - 12:15 pm					All Chapters As Metioned on Exams

Version 1.0
1/10/2025

This is a tentative schedule and syllabus; guidelines, rules, policies, and due dates can be subject to change at any time throughout the semester. We will try to stick as close to the policies and schedule presented here. The most up to date schedule with up to date policies and topics can be found on MU Online. An addendum will be provided with any major changes if needed.

Quiz #	Date	PHY 201 - Subjects
1	January, 15	Anything from the Syllabus is fair game.
2	January, 22	Quiz: Up to and including Written Homework 1 and L3
3	January, 29	Quiz: Up to and including Written Homework 2 and L5
4	February, 5	Quiz: Up to and including Written Homework 3 and L8
5	February, 19	Quiz: Up to and including Written Homework 4 and L12
6	February, 26	Quiz: Up to and including Written Homework 5 and L15
7	March, 12	Quiz: Up to and including Written Homework 6 and 7 and L20
8	March, 26	Quiz: Up to and including Written Homework 8 and L23
9	April, 9	Quiz: Up to and including Written Homework 9 and 10 and L28
10	April, 16	Quiz: Up to and including Written Homework 11 and L31
11	April, 30	Quiz: Up to and including Written Homework 12 and 13 and L37

Final 201 Topics - 15 Week Semester - Possible Topics to Appear on Common Final Exam

1. Motion in 1 and 2 dimensions
 - a. Motion diagrams
 - b. Motion graphs (x - t , v - t , a - t)
 - c. Determining average and instantaneous values of velocity and acceleration from graphs
 - d. Kinematic equations
 - e. Free fall
 - f. Vector addition and subtraction
 - g. Relative velocity (limited to 1D for relative velocity)
 - h. Projectile motion
 - i. Uniform circular motion

2. Forces
 - a. Newton's Laws
 - b. Free-body diagrams, action-reaction pairs
 - c. Mass vs. weight
 - d. Equilibrium problems
 - e. Friction
 - f. Motion on an incline
 - g. Systems with 2 objects (Atwood)
 - h. Hooke's law
 - i. Forces on objects in circular motion
 - j. Law of gravitation

3. Work and Energy
 - a. Definition of work
 - b. Net work and kinetic energy
 - c. Gravitational and elastic potential energy
 - d. Conservation of mechanical energy
 - e. Nonconservative systems
 - f. Power

4. Momentum
 - a. Momentum and impulse
 - b. Conservation of momentum, isolated systems
 - c. Elastic, inelastic, and totally inelastic collisions
 - d. Center of mass

5. Rigid Body Rotation
 - a. Angular kinematics
 - b. Rigid bodies and center of gravity
 - c. Moment of Inertia
 - d. Torque
 - e. Newton's 2nd law for rotational motion
 - f. Static equilibrium
 - g. Angular momentum and angular kinetic energy
 - h. Conservation of angular momentum

6. Oscillations
 - a. Mathematical description of SHO, motion graphs (x , v , and a as a function of time)
 - b. Spring oscillations, period and energy
 - c. Simple pendulum
 - d. Physical pendulum

7. Waves
 - a. Standing waves
 - b. Mathematical description of a transverse wave in 1 dimension, snapshots
 - c. Waves on a string
 - d. Interference of waves in 1 dimension
 - e. Standing waves on a string
 - f. Doppler effect

8. Sound Waves
 - a. Speed of sound, audible frequencies
 - b. Sound Interference
 - c. Standing sound waves

9. Fluid Mechanics
 - a. Volume and density
 - b. Pressure
 - c. Hydrostatic pressure, Pascal's principle
 - d. Buoyancy, Archimedes' principle, floating objects
 - e. Fluids in motion, continuity equation
 - f. Bernoulli's principle