



The mission of Concord University is to provide quality, liberal arts based education, to foster scholarly and creative activities and to serve the regional community (<http://www.concord.edu/academics/>).

PHYS 201 UNIVERSITY PHYSICS WITH CALCULUS, PART 1

Course Building and Room Number, Time, CRN, Section:

Lecture in Science 400:	M and W 6:00 – 7:15 PM	(CRN 20274 SEC 20)
Lab in Science 304:	T 2:30 – 4:20 PM	(CRN 20275 SEC 01)
	<u>or</u> T 6 – 8PM	(CRN 20276 SEC 20)

You must register for both the lecture and a lab section to be fully enrolled in the course.

Semester Taught: Spring 2019

Professor: Dr. Alice M. Hawthorne Allen (Dr. H.)

Credit Hours: 4 credits

Office Location: Science 302

Prerequisites: MATH 253 or concurrently

Email: amhallen@concord.edu

Phone: 1-304-384-6273

College Fax: 1-304-384-6022

Office Hours: MW 7:30 – 8:15 pm, TW 4:45 – 5:45 pm, T 8:15 – 9 pm, F 1-2 pm

Any changes to these office hours will be announced in class and posted on my office door.

*Your instructor is your guide and resource while YOU accomplish the goals of this course during the semester. You are ENCOURAGED to come by my office during office hours, introduce yourself, and ask any questions you might have regarding the course or its content. If you are not available during my office hours, you are ENCOURAGED to email me. This is especially important if, in the future, you would like to work as a student assistant for me, you would like to work on a research project with me, or if you plan to ask me for letters of recommendation. Again, if you need assistance, **PLEASE COME ASK.***

Department Website: <http://www.concord.edu/physci/node/1>

Course Description in CU Catalog: (4 credits) A calculus-based introduction to mechanics, wave motion, and thermodynamics. Three hours lecture, two hours lab.

Course Rationale: Physics 201 is a general studies course that emphasizes critical thinking, problem solving, and the mathematical modeling skills essential to understanding fundamental concepts in physics. This course includes a 2-hour, hands-on lab, taught by the instructor of the course, in which students will work with laboratory equipment to observe or demonstrate physical concepts while developing transferable scientific lab skills. Students are expected to be prepared to take PHYS 202 upon completing PHYS 201. This calculus-based physics sequence is designed for science and pre-professional majors, is listed in the Core Coursework Transfer Agreement 2017-2018, and fulfills a General Education Program requirement from List E. Natural Sciences, under Category 3 – Physical Science.

Course Learning Management System: moodle.concord.edu

Moodle is the online Learning Management System (LMS) this course uses for homework submission and for communication in the case of a campus closure. Log into the course using your CU mycu username and password on the moodle website provided above. Contact your instructor if you have difficulty accessing the moodle portion of the class.

MOODLE PRIVACY POLICY: The CU Moodle LMS and Administrators follow industry recommendations to keep your personal information private. You can find information about privacy on moodle here:

<https://moodle.org/admin/tool/policy/view.php?policyid=1vate>

Hardware/Software Needed: Computer with internet access, MS Office Suite

Required Textbooks and Materials:

1. University Physics with Modern Physics, 14th Edition, by Young and Freedman, Pearson, 2016, ISBN 9780321973610. You may purchase the hardcover book, the looseleaf book, or the eText version. One can also utilize the copy on reserve in the CU library and in your instructor's office, on a first come, first served basis.
2. MasteringPhysics access code This can be purchased from the CU Bookstore or directly from Pearson and is good for both PHYS 201 and 202. The directions for purchasing from Pearson are part of the Getting Started on MasteringPhysics instructions posted on moodle. The cost, if you purchase directly from Pearson, is \$68.95 for homework access only and is \$115.95 if you get the version with eText. You do not need the eText if you purchase a hardcover book.
3. A *new, blank, sewn-bound* quadrille lab or lined composition notebook
4. A standard scientific calculator (Ex. TI-30, no cell phones, smartwatch, or tablets!)
5. Physics Lab Manual, by Hawthorne Allen and Cyburt, 2017

OPTIONAL MATERIALS:

Schaum's Outline College Physics, 10th Edition by Bucche and Hecht, McGraw-Hill, 2006, ISBN 0-07-144814-4 *This is a good source of concept summaries and additional problems to practice. It also serves as an excellent resource for the physics portion of standardized tests, like the MCAT. There is also a calculus-based version but most students find this one a better resource. Multiple copies are available in my office; several are in the CU library, including at least one on reserve.*

Concord University Educational Goals: This course includes many components that align with the CU Educational Goals in areas of skills, knowledge, and attitudes. Concord University Goal # 2 Knowledge, Learning Outcome 2 will be formally assessed during the semester.

Knowledge: Familiarity with principles underlying academic discourse in various fields, as demonstrated by the following capabilities:

Learning Outcome 2: An awareness of the fundamental characteristics and properties of the physical universe.

National Standards: This course is designed to meet the core transfer agreement standards for calculus-based physics, and also includes many components that align with recommendations from the Physics Education Research (PER) community.

Specific Learning Outcomes: By the end of this course, successful students should be able to:

- 1) Identify the process by which scientific models are constructed and provide examples from classical physics.
- 2) Demonstrate a mastery of the basic concepts in classical physics listed on the course schedule and outline by explaining relevant conceptual applications when presented with a new physical system or scenario.
- 3) Demonstrate a mastery of the basic concepts in classical physics listed on the course schedule and outline by critically analyzing and solving both simple and complex, multi-concept, physical scenarios, when

presented with new scenarios, as mastery implies broad understanding rather than simply memorizing the solution to a previously solved scenario. A student with complete mastery should be able to demonstrate all of the steps of problem solving including: carefully reading the problem and identifying relevant and irrelevant information; converting the problem statement to appropriate representations using pictures, figures, and graphs; converting the problem statement to appropriate mathematical variables and relationships; and answering related specified questions using proper logical, algebraic, and calculus procedures. The student should be able to justify and explain their thinking and or approach to a problem or physical situation.

- 4) Use calculus and vector algebra while applying concepts of classical physics to a scenario, including derivatives, integrals, vectors, scalar products, and cross products.
- 5) Utilize laboratory equipment to observe or design demonstrations and experiments which illustrate the physical concepts discussed in class, and to use such opportunities to practice key scientific skills including, but not limited to:
 - a. Use of safe laboratory procedures.
 - b. Characteristics of successful experimental design including safe practices, control of variables, and accurate and consistent measurements.
 - c. Use of a laboratory notebook, with standard scientific conventions.
 - d. Methods of recording and reporting observations through written descriptions, figures and sketches, describing features on a graph, and recording data.
 - e. Use of a data table for recording and reporting numerical data.
 - f. Graphical analysis of data by hand without features, by hand with features to interpret, and by hand with a slope calculation.
 - g. Methods of comparing data to scientific models including percent error, percent difference, graphical predictions, and through comparison with uncertainty ranges.
 - h. Methods for communicating scientific results to others in print and in an oral presentation.

Course Requirements:

Physics is a challenging subject for most students because it requires the existence or development of mature academic discipline, an understanding of how to apply simple scientific models to complex, every day occurrences, and requires us to think in new ways. Your mastery of the material presented, and thus success in the class, will depend on your **regular preparation** for class, your regular **participation in class and lab**, and the amount of **problem solving practice** you utilize during the semester.

Good preparation for class includes briefly reading the assigned textbook material on each topic and completing the paragraph summary prior to the discussion of that topic in class, reviewing previous lecture notes and text readings, working the assigned homework problems on the previous lecture's material, and seeking answers to questions you may have.

Class periods will be used to present the material listed on the course schedule through lecture, demonstrations, and interactive question and answer exercises. Interactive exercises in a variety of formats will be given in class to supplement the lecture and are based on the lecture and the assigned readings. You will utilize your **notes**, the **textbooks**, and a standard, non-programmable, scientific **calculator** for most of these exercises. Thus, you are encouraged to bring all three to the lecture period.

Class will be held or cancelled according to campus schedules and policy, including CU's Inclement Weather Policy. If there is need for further clarification, someone from the College of Natural Science, Mathematics, and Health will make an announcement in the classroom. You are responsible for all the material on the course schedule, whether or not it is mentioned in class. Any changes to the class schedule, homework, and syllabus will be

announced in class. You are responsible for being aware of any announcements made in class even if you did not attend. Any changes to the class schedule or homework assignments as a result of a cancelled class will also be sent to the class via email or posted on moodle. Students are expected to check for this email and on moodle, and complete the assignments prior to the next class meeting. Any additional required changes will be announced in class the next class meeting. As always, use your own good judgment in matters concerning your own safety.

Courteous behavior as outlined in the CU Student Handbook is expected in the classroom. This also includes, but is not limited to, having all necessary supplies with you in class, arriving on time, staying the full time, participating in the activities of the class, and notifying your instructor prior to a class meeting if you must be absent. If you have a personal emergency that requires you to leave during class, please do so as discretely as possible. Since computers, tablets, phones, and other electronic devices are distractions to other students in the classroom, their use is not permitted during class. Please turn them *off* prior to the start of class. Any student disrupting class will be asked and expected to remove themselves from the classroom. Disruptions during tests, including those from electronic devices such as cell phones, or the electronic recording of the class in any form without my prior permission will result in a grade of F assigned for the course.

Grading Policy and Scale, Make-up Policy, Late Work

Grades will be assigned at the end of the semester using a standard 10-point scale, calculated from the following weighting:

$$(\text{Learning Ex. } 18\%) + (\text{Lab } 20\%) + (\text{Tests } 33\%) + (\text{Final Exam } 29\%) = \text{Grade}$$

In addition, since this is a lab-based course, you must earn 60% or higher in the lab portion of the class in order to pass the class. All grades will be considered final two weeks after graded work has been returned or, in the case of the course grade, two weeks after grades are posted. As for grade inflation, if and only if, the final averages are excessively low, adjustments will be considered at the end of the semester when assigning final grades so that the average grade in the class is a C. No such grade adjustments will be made prior to the end of the semester. No individual opportunities to improve grades will be considered.

Most coursework will be graded utilizing a 5-point scale, or a multiple thereof:

- 5 = answer completely correct, neat and organized presentation (STRIVE FOR FIVE!)
- 4 = answer contains minor error, disorganized solution, but otherwise is correct
- 3 = answer needs revisions to be correct
- 2 = answer needs revisions and has significant omissions
- 1 = minimal answers written, little or no effort indicated
- 0 = absent or not submitted

Note that this is similar to what you would experience for written work submitted for publication. Your future colleagues and employers will expect you to submit completed, high quality work. This course provides you with an opportunity to practice that skill.

Learning Exercises: Learning exercises will consist of: activities given during class, activities to practice outside of class, chapter summaries, and homework problems that correspond to the lectures. Reading summaries are due at the **start** of each lecture class. Homework problems will be due on Mastering Physics at the time specified, typically 10:00 PM on the Tuesday or Friday following the next class lecture. No learning exercises will be accepted late.

Your learning exercise grade will be calculated as follows:

Learning Exercise % = (Sum of points earned + Bonus)/(Total possible)

and if the average is above 100.5, it will be truncated to 100.5.

Bonus points may be earned by completing specified optional online assignments and other activities as discussed in class.

No Make-Ups Needed: The grading rubric above allows you to miss some points or have limited absences and still achieve a perfect Learning Exercise grade. Thus, “make-up” opportunities are unnecessary, so none will be given.

By the end of the course you should be able to identify multiple central concepts within a physical scenario, determine information that is not needed to address the critical questions of the scenario, use scientific jargon to describe fundamental parts of a scenario, and know the limitations of the models you use or create to make predictions based on the expectations of the scenario. We will start off learning simple models relating to the various concepts introduced and then will combine them into more complicated systems.

Completing class exercises, homework assignments, and solving sample problems on tests will be the primary method you use to master these concepts and will use to demonstrate you have met the first course goal and objective. The assigned problems are to encourage you to learn the basic skills expected and begin to master the concepts presented. Some assignments will be harder than others or take longer than others. You are urged to start on them as soon after the lecture as possible. Physics is best learned if practiced daily, so plan to spend at least a half an hour on the course each day, and a total of 6-10 hours MINIMUM outside of class per week. You may need to practice more problems in order to fully absorb the subtleties of the material. If this practice is insufficient for your learning or the required textbook is difficult for you to understand, additional books will be placed on reserve in the library. Other suggestions for how to do well are posted on my office door and on moodle. You are also encouraged to come by during office hours to discuss additional suggestions.

Lab: The lab portion of the course provides you with hands-on opportunities to clarify concepts using scientific apparatus, work cooperatively with others to investigate ideas, practice lab skills utilized by scientists, and have detailed discussions of concepts. All students are to work diligently in lab with the safety of all students and equipment of utmost importance. Failure to follow safe lab practices will result in a grade of 0% for lab and thus earn a grade of F for the course.

Lab Attendance: A quality lab experience requires your attending lab prepared, with an attitude that reflects a willingness to learn, and your active participation in performing the experiments of the day. Doing this earns you 10 points each lab period. Since most group lab experiences cannot be replicated outside of lab, no make-up opportunities for the attendance grade will be provided. All absences, excessively late arrivals to lab, and excessively early departures, excused or unexcused, will be assigned a grade of zero.

On Tuesdays with Inclement Weather Delays, the 2:30 pm lab will start at 2:45 pm and the 6 pm lab will meet as scheduled. If evening classes are canceled on a Tuesday, then no lab sections will meet and the instructor will hold office hours during the afternoon lab slot.

Skill Exercises: During each lab period, one or more exercises will be assigned to practice a particular lab skill. These will utilize the same grading rubric as the learning exercises and are due at the time specified in lab, usually at the end of the lab period or the beginning of the next lab period. If you need additional time to complete these exercises, you may come by during office hours during the same week to complete them. Any lab exercise

submitted after an assignment has been graded for the majority of the class will be worth a maximum of 2 points. No skill exercises will be accepted more than one week after the due date specified during the lab period. A few lab skills will be extended into a form ready for public presentation. These examples of skills will be due no later than 8 PM on the day specified in lab.

Lab Presentation: During the semester you will be given the opportunity to design your own experiment and report the results to the class in a 10-minute presentation. The presentation is expected to contain pictures of your equipment, evidence of you conducting your experiment, your experimental results and observations, and the final outcome and conclusions of your experiment. It will be worth 70 points, and is due in lab on April 24th. Professional quality attire is expected for the presentation.

Lab Grade: Your lab grade will be calculated as follows:

$$\text{Lab \%} = (\text{Sum of lab points earned}) / (\text{Total possible} - 10)$$

And if the average is above 100.5, it will be truncated to 100.5. This grading rubric allows you to miss some points or have one absence and still achieve a perfect Lab Grade. As stated previously, since this is a lab-based course, you must earn 60% or higher in the lab portion of the class in order to pass the class.

Completing the lab portion of the course will be the primary method you will demonstrate you have met the course objectives relating to lab skills. If you need suggestions on how to improve the lab portion of your grade, have difficulty completing lab, have a problem with your lab partner, or need additional opportunities to work with lab or demonstration materials, you are encouraged to come by during office hours. Lab materials will be available for one week after the lab is completed.

Test: There will be three tests completed during class time as specified on the course schedule. Each test will have 7 partial credit questions that are either conceptual discussions or problems with numerical solutions. All questions will involve **concepts similar to** material included in the assigned reading, presented in class, or problems completed in your homework. These should take no more than one lecture class period to complete. You will be allowed to use pencils, erasers, a 4 by 6 sq. in. reference card, and a standard scientific calculator on each test. Make up tests must be pre-approved and completed within 48 hours.

Final exam: The final exam will be cumulative, similar in format to the in-class tests, and will be given on Wednesday, May 2nd, from 6 - 8pm as specified by the Provost. You may use pencils, erasers, a scientific calculator, and one 8.5 in. by 11 in sheet of paper for reference formulas and the like, for the final exam.

Course Timeline

The course schedule is appended to the end of this document for ease of printing. An additional supplemental outline of concepts and formulas will be provided in class.

Mandatory Syllabus Statements that apply to all CU courses:

Accessibility/Accommodations:

Concord University is committed to responding to the needs of students with disabilities as defined by the Americans with Disabilities Act. Please inform your instructor at the beginning of the class semester if you have a disability and are requesting accommodations. It is your responsibility to self-disclose that you are requesting accommodations. The University and instructor will provide you with a reasonable accommodation. You should register with CU's Disability Services Office, located in the Athens campus Jerry and Jean Beasley Student Center, Bottom Floor, across from the Campus Post Office. The Disability Services Office phone is 304-384-6086 or you can email the Director, Nancy Ellison, at nellison@concord.edu for assistance.

Academic Dishonesty

Academic dishonesty is morally unacceptable as well as destructive to the learning and teaching atmosphere. Academic dishonesty includes the giving or receiving of improper help on examinations or assignments, falsifying documents, and plagiarism (the act of stealing and using, as one's own, the ideas or the expression of the ideas of another). Such dishonesty can lead to a variety of penalties — including but not limited to failure of assignment, failure of course, loss of institutional privileges, or dismissal from the University. (See University Catalog Academic Policies and Procedures.)

Concord University Honor Code

A Concord University Honor Code was approved by students, staff, faculty, administration, and the CU Board of Governors. The Code states:

"As a member of the Concord University Community I will act with honesty and integrity in accordance with our fundamental principles and I will respect myself and others while challenging them to do the same."

The Honor Code is intended to unite the Concord community behind a culture of honesty, integrity, and civility.

Class/Online Attendance Policy

Regular class attendance is part of a student's academic obligation at Concord. Irregular attendance may affect academic performance adversely and is detrimental to the atmosphere of a class. (See University Catalog Academic Policies and Procedures.)

Emergency Alert System

In an effort to increase safety and security on our campus, Concord University encourages everyone to register for instant text message alerts. Alerts will only be used for security and safety notices. All students, faculty, and staff are eligible to receive text message alerts on their cell phones or email alerts. Please contact the IT Help Desk for further assistance (304-384-5291).

Emergency Information

Emergency/courtesy telephones are located at the main entrance of each residence hall and at various other locations on campus. Emergency telephones can be identified by the flashing blue light and will provide the user with a direct link to Public Safety at the press of a button. To report an on-campus emergency, call 304-384-5357 or 911. The Office of Public Safety is located on the bottom floor of the

Rahall Technology Center. For further emergency information go to:
<http://www.concord.edu/administration/office-public-safety>.

Inclement Weather Policy

As a general policy, the University will remain in normal operations during adverse weather conditions. In the event of severe weather conditions, the following may occur:

University Closure

No students or employees are to report.

Classes Cancelled

Students do NOT report BUT employees are expected to report to work at their normal time.

Operating on an Inclement Weather Delay

Under this schedule, all 8 a.m. classes will start at 10 a.m. Students and faculty will follow the Inclement Weather Schedule. (See <http://www.concord.edu/emergency-alerts> for Athens/Beckley Inclement Weather Schedules.)

**Announcements invoking the late schedule or other options referenced above are aired on area radio and television stations and are sent as text and email messages to those enrolled for this service.*

Student Conduct

In classrooms, online, laboratories, and during any activities that are part of course requirements, students are expected to observe reasonable rules of conduct.

Sexual Harassment & Assault

Federal law, Title IX, and Concord University policy prohibits discrimination, harassment, and violence based on sex and gender (Including sexual harassment, sexual assault, domestic/dating violence, stalking, sexual exploitation, and retaliation). If you or someone you know has been harassed or assaulted, you can receive confidential counseling support through the Concord University Counseling Center (304-384-5290). Alleged Violations can be reported non-confidentially to the Concord University Title IX Coordinator at 304-384-6327 or titleix@concord.edu. Reports to Campus Security can be made at (304-384-5357). As an employee at Concord University, I am a mandatory reporter which means I must report any sexual misconduct I am made aware of. This includes verbal or written (such as in an assignment) disclosures of sexual harassment or sexual assault.

Technology Services

Contact the CU Help Desk at extension 5291 from campus or 304-384-5291 off campus. You may also e-mail cuhelpdesk@concord.edu.

Syllabus Disclaimer

"This syllabus is subject to change based on the needs of the class. Please check it regularly."

PHYSICS 201 COURSE SCHEDULE

SPRING 2019

14 Jan	Introduction and Science Skills	Pgs. ix – Ch. 1, App A-F
15 Jan	<i>Notebooks and Measurements</i>	
16 Jan	Where are we exactly? Sitting Still and Moving	2.1-2.3, 3.1-3.2
21 Jan	MLK HOLIDAY	
22 Jan	<i>Motion & Free Fall</i>	
23 Jan	Speeding Up, Slowing Down	2.3 – 2.5, 3.2
28 Jan	Moving All Around	3.2 - 3.3
29 Jan	<i>Vectors on Force Tables</i>	
30 Jan	Launching Objects and How	3.3, 4.1 – 4.3
4 Feb	Making Objects Move	4.1-4.6, 5.1
5 Feb	<i>finish Force Tables, Friction Forces</i>	
6 Feb	Making Objects Stop and Other Uses of Newton's Laws	5.2-5.3
11 Feb	Going in Circles	3.4, 5.4
12 Feb	<i>Circular Motion, Peer Review</i>	
FEBRUARY 13	TEST 1 ON CHAPTERS 1-5	
18 Feb	Forces on Objects by Objects	13.1-13.5
19 Feb	<i>Acceleration due to Gravity, Indep Lab Project Work</i>	
20 Feb	Work, Kinetic Energy, Potential Energy, Energy Conservation	6.1-6.4
25 Feb	Applications of Energy Conservation	7.1-7.5
26 Feb	<i>Hooke's Law Springs, Formal Acceleration Graphs Due</i>	
27 Feb	Momentum—Big vs. Little	8.1-8.3
4 Mar	Collisions	8.3-8.5
5 Mar	<i>Power, Momentum, Proposals Due</i>	
6 Mar	Going in Circles Again	9.1-9.4
	SPRING BREAK	
18 Mar	Going in Circles Once More	10.1-10.6
19 Mar	<i>Ballistic Pendulum</i>	
MARCH 20	TEST 2 ON CHAPTERS 6 – 10, 13	
25 Mar	Balancing on the Edge	11.1-11.3
26 Mar	<i>New York Balance</i>	
27 Mar	Stress, Strain, Pressure, and Fluids at Rest	11.4-11.5, 12.1-12.3
1 Apr	Fluids in Motion	12.4-12.5
2 Apr	<i>Archimedes</i>	
3 Apr	Moving Back and Forth	14.1-14.8
8 Apr	Waves and Wiggles	15.1-15.8
9 Apr	<i>Pendulum</i>	
10 Apr	Where are Waves?	16.1-16.7
15 Apr	Waves, Doppler, and Review	16.8
16 Apr	<i>Wave Phenomena—Bring Musical Instruments</i>	
APRIL 17	TEST 3 ON CHAPTERS 11, 12, 14-16	
22 Apr	Combining Hot and Cold	17.1-17.6
23 Apr	<i>Phase Transitions, Calorimetry</i>	
24 Apr	Full of Hot Air	17.7,18.1-18.6
29 Apr	Moving Heat Around	19.1-19.8, 20.1-20.4
30 Apr	<i>Independent Project Reports</i>	
1 May	Order Out of Chaos	20.5-20.7

COMPREHENSIVE FINAL EXAM

6 – 8 PM

MONDAY MAY 6TH