



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 102 (102D, 102L) Intermediate Physics – Spring 2019

Course CRN # and Section

Lecture	CRN 20268 Physics 102-01:	S400	T/TH 8:00 AM – 9:15 AM
Discussion	CRN 20272 Physics 102D-1A:	S301	F 8:00 AM – 8:50 AM
	CRN 20273 Physics 102D-1B:	S301	F 12:00 PM – 12:50 PM
Laboratory	CRN 20269 Physics 102L-1A:	S304	M 11:00 AM – 12:50 PM
	CRN 20270 Physics 102L-1B:	S304	M 2:00 PM – 3:50 PM
	CRN 20271 Physics 102L-20:	S304	M 5:00 PM – 6:50 PM
Semester Taught (including year):	Spring 2019	Professor:	Dr. Aaron Paget
Credit Hours:	4 Credit Hours	Office Location:	S402C
Prerequisites:	Physics 101	Office Hours:	T/TH 9:30a - 12:00p
Course Time (if applicable):	See above	Email:	apaget@concord.edu
Building and Room Number (if applicable):	See above	Phone:	304-384-6006
		Office Fax:	304-384-6022

College/Department Websites

Department: Department of Physical Sciences (<https://www.concord.edu/physci/node/1>)

College: College of Natural Sciences, Mathematics, and Health (<https://www.concord.edu/nsmh/>)

Course Description/Rationale: A continuation of PHYS 101, including an introduction to electricity and magnetism, optics, and modern physics.

Physics 102 is a continuation of Physics 101 and also emphasizes critical thinking, problem solving, and the mathematical modeling skills essential to understanding fundamental concepts in physics. This course includes 2 – 75 minute lectures and 1 – 50 minute discussion per week. This course also 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. Upon completing PHYS 102, students are expected to be prepared to take additional coursework in physics at the 300 level or above. This algebra-based physics sequence is designed for science and pre-professional majors and is listed in the Core Coursework Transfer Agreement 2017-2018.

Course Management System: Moodle. The CU Moodle LMS and Administrators follow industry recommendations to keep your personal information private.

<https://moodle.org/mod/page/view.php?id=8148>

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.

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

Text requirements:

1. Textbook: Physics 10e or Physics 9e, by Cutnell and Johnson, (ISBN-13 978-0-470-87952-8). You may purchase the hardcover book, the looseleaf book, or the eText version. This book contains material for Physics 101 and 102 and is 32 chapters. Please be careful to avoid Version 1 or Version 2 as they are only half of the material.
2. A new, blank, sewn-bound quadrille lab or lined composition notebook
3. A standard scientific calculator (Ex. TI-30, Graphing calculators are fine, no cell phones, tablets, or computers!)

Concord University Educational Goal(s)

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

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

National Standards This course includes many components that align with recommendations from the Physics Education Research (PER) community.

Specific Learning Outcomes: By the end of the course, successful students will

- 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 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 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 and algebraic procedures. The student should be able to justify and explain their thinking and or approach to a problem or physical situation.
- 4) Use trigonometry and vector algebra while applying concepts of classical physics to a scenario.
- 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.

Course Requirements: Students are expected to prepare for each class by completing assigned readings before class, completing assignments including homework and quizzes, and being ready to focus on the material in the classroom and the laboratory. Coursework will include 4 exams (including final), weekly labs, homework, reading quizzes, in-class quizzes, exam corrections, and a final project with oral and written presentation. You are expected to participate in each class period.

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 use 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 use your notes, the textbooks, and a standard 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 Division of 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. Computers, tablets, phones, and other electronic devices can be a great resource for your education, but you will be invited to put them away if they appear to be a

distraction to you or others. 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 and are calculated using the following weighting:

Reading Quizzes (10%)

Class participation (5%)

Homework (5%)

Exam corrections (5%)

Exams (35%)

Final Exam (20%)

Lab (20%)

I anticipate the letter grade break down to be A (100% - 90%), B (89.9% - 80%), C (79.9% - 70%), D (69.9% - 60%), F (Below 60%). The ranges for the grades may be adjusted only at the end of the semester to meet university grading criteria. As for changes in the grading scale, 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.

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.

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 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

Reading Summary: Reading summaries are due before the start of the class. Reading summaries consist of at least 5 sentences about the reading for that day's class. Reading summaries also include a statement about something you liked in the reading and something you did not understand. Each reading summary is worth 7 points (1 point per 5 sentence, 1 point for what you liked, and 1 point for what you found confusing). Successful completion of 80% of the total points from reading summaries throughout the semester will be considered full credit. (Example: Aaron earns 154 of 196 points throughout the semester. $154/(80\% \text{ of } 196)=98.2\%$.) This allows you to miss a reading quiz without requiring an excusal.

Class Participation: The best way to learn and master a topic requires active learning. You should anticipate the opportunity to ask questions in class. Asking questions helps you make cognitive connections and helps others that are not willing or ready to ask the question. As part of class participation, wrong answers are acceptable. Class is the time to make mistakes and correct misconceptions. Your class participation grade will consist of participation, attendance, and occasional in class quizzes.

Homework: Homework exercises will be provided to you. You should expect to complete one homework exercise per chapter of the textbook. Since two versions of the text are used in this course, the homework questions will not necessarily come from the textbook. The due date for homework assignments will be announced. The 5-point grading scale will be used for each problem. The final homework grade will be out of the total available points from the homework assignments.

Exams: There will be 3 exams during the semester. The exams will be given during the Lecture time for the course. You may use the entire 75-minute period for the exam. Exams are worth a total of 35% of your grade. You are allowed to use a calculator during the exam. You are allowed one-8.5x11 inch paper for each exam. You may write anything you want on this paper front and back, but it must be in your own handwriting. This sheet will be turned in with your exam. Any evidence of copying (photo, printing, etc.) is considered cheating and will result in a 0% for the exam. You may reuse this sheet for each exam or create a new one. Exams are cumulative, but will focus on mostly on the new material.

Exam corrections: Your exams will be returned to you, and you will have the opportunity to make corrections to your exam and submit your corrections for credit. Exam corrections represent 5% of your grade. If you choose to make exam corrections, your exam correction grade will be used to calculate this score. If you are satisfied with your exam grade or choose not to submit exam corrections, your exam grade will be used to calculate this portion of your grade. Exam corrections are due 1 week after exams are returned.

Final Exam: The final exam will be given on 7 May 2019 at 9:00 am. The final exam is mandatory and will be comprehensive. The final exam represents 20% of your grade. You are allowed one-8.5x11 inch paper for the final exam. You may write anything you want on this paper front and back, but it must be in your own handwriting. This sheet will be turned in with your exam. Any evidence of copying (photo, printing, etc.) is considered cheating and will result in a 0% for the exam.

Labs: The laboratory section of this course represents 20% of the course. You are expected to use the entire laboratory period to work on your projects. Laboratory topics will be timely for the course and introduced at the beginning of each lab period. In lab, you will be expected to work in groups, but you are still required to submit your own work. All of your work will be contained in your lab notebook. Only work found in your lab notebooks will be graded. You will not be permitted to take your lab notebook with you. Changes and work on the lab notebook outside of lab time can be made at my office. The labs will be graded on the 5-point scale.

Lab Project: There will be a group-based self-directed two-week experiment towards the end of the semester. Groups will consist of 2-people per group. You will be required to give a 5-minute presentation about your experiment. This project represents 10% of the laboratory grade (2% of your total grade). Professional quality attire is expected for the presentation.

Bonus points: Exceptional answers or demonstrations of understanding are eligible for bonus points.

Make-up Policy and Late Work:

Late work and make-up work requires prior approval from the instructor.

Reading Summaries: Reading summaries can be submitted late by email for a 50% penalty.

Homework: late work will not be accepted after answers are posted.

Exams: Exams should be taken during the scheduled period. Exceptions will be considered on an individual basis. In general, exams should be taken the day before if necessary.

Labs: Missing need to be made up within 1 calendar week. Unexcused absences are docked 1-point.

Lab Projects: Lab reports are due on or before the date announced.

Other Excusals: University approved excusals, Doctor approved excusals, etc. must be documented.

Course Timeline (Schedule of Assignments/Assessments/Presentations)

Date	Chapter	Topic	Sections	Unit
15-Jan	18	Electric Forces and Electric Fields	18.1-18.5	1
17-Jan	18	Electric Forces and Electric Fields	18.6-18.10	1
22-Jan	19	Electric Potential Energy and the Electric Potential	19.1-19.3	1
24-Jan	19	Electric Potential Energy and the Electric Potential	19.4-19.6	1
29-Jan	20	Electric Circuits	20.1-20.8	1
31-Jan	20	Electric Circuits	20.9-20.14	1
5-Feb	23	Alternating Currents	23.1-23.6	1
7-Feb	21	Magnetic Forces and Magnetic Fields	21.1-21.5	2
12-Feb	21	Magnetic Forces and Magnetic Fields	21.6-21.9	2
14-Feb		Exam 1	Unit 1	
19-Feb	22	Electromagnetic Induction	22.1-22.6	2
21-Feb	22	Electromagnetic Induction	22.7-22.9	2
26-Feb	24	Electromagnetic Waves	24.1-24.6	2
28-Feb	25	Reflection of Light: Mirrors	25.1-25.6	3
5-Mar		Exam 2	Units 1-2	
7-Mar		Special Topic: Wave Scattering		3
12-Mar		Spring Break		
14-Mar		Spring Break		
19-Mar	26	The Refraction of Light: Lenses and Optical Inst.	26.1-26.4	3
21-Mar	26	The Refraction of Light: Lenses and Optical Inst.	26.5-26.14	3
26-Mar	27	Interference and the Wave Nature of Light	27.1-27.5	3
28-Mar	27	Interference and the Wave Nature of Light	27.6-27.9	3
2-Apr	28	Special Relativity	28.1-28.7	3
4-Apr	29	Particles and Waves	29.1-29.6	3
9-Apr	30	Nature of the Atom	30.1-30.5	4
11-Apr	30	Nature of the Atom	30.6-30.10	4
16-Apr		Exam 3	Units 1-3	
18-Apr	31	Nuclear Physics and Radioactivity	31.1-31.5	4
23-Apr	31	Nuclear Physics and Radioactivity	31.6-31.9	4
25-Apr	32	Ionizing Radiation, Nuclear Energy, and Elem...	32.1-32.7	4
30-Apr		Special Topic: Modern Physics		4
2-May		Special Topic: The Big Picture		4
7-May		Final Exam 9:00 AM - 11:15 AM	Units 1-4	

Date	Lab	Topic
14-Jan	1	Electric Forces
21-Jan		NO CLASS – Martin Luther King Jr. Holiday
28-Jan	2	Potential Energy
4-Feb	3	Circuits and Resistivity
11-Feb	4	A/C Circuits
18-Feb	5	Magnetic Fields
25-Feb	6	Transformers
4-Mar	7	Mirrors
11-Mar		Spring Break
18-Mar	8	Optics
25-Mar	9	Interference Patterns
1-Apr	10	Relativity – Group Topic Proposal Due
8-Apr		Project time
15-Apr		Project time
22-Apr		Reports
29-Apr	11	Radioactivity

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."