

Credit Hours: 3

Contact Hours: This is a 3-credit course, offered in accelerated format. This means that 16 weeks of material is covered in 8 weeks. The exact number of hours per week that you can expect to spend on each course will vary based upon the weekly coursework, as well as your study style and preferences. You should plan to spend 14-20 hours per week in each course reading material, interacting on the discussion boards, writing papers, completing projects, and doing research.

COURSE DESCRIPTION AND OUTCOMES

Course Description:

This is an introductory course in classical Newtonian physics. Areas treated include the scientific method, measuring the fundamental characteristics of length and mass, scalars and vectors, acceleration and gravity, Newton's laws of motion, Kepler's laws of planetary motion, potential and kinetic energy, momentum, fluids, temperature, and heat, electricity and magnetism, and optics. This course fulfills a general education Natural and Physical Science requirement. This is an approved Colorado gtPathways course.

Course Overview:

This introductory course in classical Newtonian physics emphasizes the explanatory power of Newtonian physics on everyday events. From understanding how a falling object accelerates through static electricity, generators, electromagnets and optics, the mathematical basis of the behavior of familiar phenomena will become clear.

Course Learning Outcomes:

1. Explain Newton's laws of motion in relevance to everyday life.
2. Discuss the nature and relationship of fluids, temperature, and heat.
3. Describe the elements of electricity and magnetism, and their interrelationship.
4. Explain the wave nature of light and its effect on color and image formation.

PARTICIPATION & ATTENDANCE

Prompt and consistent attendance in your online courses is essential for your success at CSU-Global Campus. Failure to verify your attendance within the first seven days of this course may result in your withdrawal. If for some reason you would like to drop a course, please contact your advisor.

Online classes have deadlines, assignments, and participation requirements just like on-campus classes. Budget your time carefully and keep an open line of communication with your instructor. If you are having technical

problems, problems with your assignments, or other problems that are impeding your progress, let your instructor know as soon as possible.

COURSE MATERIALS

Textbook Information is located in the CSU-Global Booklist on the Student Portal.

COURSE SCHEDULE

Due Dates

The academic week at CSU-Global begins on Monday and ends the following Sunday.

- **Discussion Boards:** The original post must be completed by Thursday at 11:59 p.m. MT and Peer Responses posted by Sunday 11:59 p.m. MT. Late posts may not be awarded points.
- **Opening Exercises:** Take the opening exercise before reading each week's content to see which areas you will need to focus on. You may take these exercises as many times as you need. The opening exercises will not affect your final grade.
- **Mastery Exercises:** Students may access and retake Mastery Exercises through the last day of class until they achieve the scores they desire.
- **Critical Thinking:** Assignments are due Sunday at 11:59 p.m. MT.
- **Late Nite Labs:** Assignments are due Sunday at 11:59 p.m. MT.
- **Exams:** Exams are due on Sunday at 11:59 p.m. MT.

WEEKLY READING AND ASSIGNMENT DETAILS

Module 1

Readings

- Chapter 1 in *College Physics*
- Gibney, E. (2017). New definitions of scientific units are on the horizons. *Nature*, 550(7676).
- Maguire, P., Moser, P., & Maguire, R. (2016). Understanding the foundations of measurement: Why a clock that ticks randomly is the best clock. *Physics Essays*, 29(4), 574-581.
- NIST Education. (2018). *A turning point for humanity: Redefining the world's measurement system* [Video file]. Retrieved from <https://www.youtube.com/watch?v=21vElKsU3K4>
- University of California Berkeley. (2015) How science works. Understanding science: How science really works. Retrieved from http://undsci.berkeley.edu/article/howscienceworks_01.

Opening Exercise (0 points)

Discussion (25 points)

Imagine that you are a contemporary of Galileo. Would you offer your scientific insights that might threaten establishment views? How would you make scientific reasoning about the position of the earth and the sun palatable to the powers in place?

Be sure to post an initial, substantive response by Thursday at 11:59 p.m. MST and respond to two or

more peers with substantive responses by Sunday at 11:59 p.m. MST. A substantive initial post answers the question presented completely and/or asks a thoughtful question pertaining to the topic. Substantive peer responses ask a thoughtful question pertaining to the topic and/or answer a question (in detail) posted by another student or the instructor.

Mastery Exercise (10 points)

Critical Thinking (40 points)

Option #1: Cannonball Physics Essay

Think about a simple physics experiment like firing a cannonball, as mentioned in Chapter 1 of your textbook. Now, imagine that you have devised your own length measurement system based on the span of your forearm. Apply the scientific method to ask the question, "How far will the cannonball fly?" and use your measurement system to record the distance.

Part of the scientific method is the testing of your experiment by other physicists like you. Include the following in your analysis:

- Which difficulties would arise for them in confirming or denying the validity of your results?
- What are the control variables in your experiment?
- Which other measurements would you need to devise to monitor them?

Your paper should be 2-3 pages long and conform to CSU-Global Guide to Writing & APA. Provide support for your findings with in-text citations. Include at least two scholarly references in addition to the course textbook to support your statements. The CSU-Global Library is a good place to find these references.

Option #2: Cannonball Physics Presentation

You are to present your findings to a committee in the form of a presentation for the following experiment. Use diagrams and the scientific method to describe what you have discovered.

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Part of the scientific method is the testing of your experiment by other physicists like you. Include the following in your analysis:

- Which difficulties would arise for them in confirming or denying the validity of your results?
- What are the control variables in your experiment?
- Which other measurements would you need to devise to monitor them?

Your presentation should be 5-7 slides long with complete speaker's notes and a references page. Your presentation must conform to CSU-Global Guide to Writing & APA. Provide support for your findings with in-text citations. Include at least two scholarly references in addition to the course textbook to support your statements. The CSU-Global Library is a good place to find these references.

Late Nite Labs (35 points)

Error Analysis

This week you have a virtual lab to complete. Follow the instructions in the Late Nite Labs Student User Manual PDF found on the Course Information page to get started. Log in to www.latenitelabs.com and select the title of the lab to complete the assignment. You can register at latenitelabs.com using this section code: **81448434**.

Record the virtual lab data using the accompanying form: LNL1_Error_Analysis_WORD.doc and submit for credit in the Module 1 area.

Ask your instructor for assistance early in the week if you need help. Consult the Support page on the Late Nite Labs website for tutorials, frequently asked questions and system requirements.

Module 2

Readings

- Chapters 2 and 3.1-3.2, 3.4 in *College Physics*
- Oh, J.-Y. (2016). Understanding scientific inquiries of Galileo's formulation for the law of free falling motion. *Foundations of Science*, 21(4), 567-578.
- Smith, R. (2015). Shining a light on Harriot and Galileo: On the mechanics of reflection and projectile motion. *History of Science*, 53(3), 296-319.

Opening Exercise (0 points)

Discussion (25 points)

Galileo determined the relationship between the length of a pendulum and its period. How would you design and execute an experiment to determine the relationship of a pendulum's length and its period? How would you depict the results to make your analysis of the relationship clear?

Be sure to post an initial, substantive response by Thursday at 11:59 p.m. MST and respond to two or more peers with substantive responses by Sunday at 11:59 p.m. MST. A substantive initial post answers the question presented completely and/or asks a thoughtful question pertaining to the topic.

Substantive peer responses ask a thoughtful question pertaining to the topic and/or answer a question (in detail) posted by another student or the instructor.

Mastery Exercise (10 points)

Critical Thinking (45 points)

Option #1: Non-Intuitive Results of Simple Experiments

Some results of simple physics experiments conducted on planet Earth are not intuitive. Examples include determining the acceleration of a ball tossed upward at the point when its instantaneous vertical velocity is zero, and the time it takes two balls to hit the ground when they are tossed off the same horizontal surface at different initial horizontal velocities.

Discuss each of these results and provide the reasoning that explains the apparently non-intuitive outcomes.

Your paper should be 2-3 pages long and conform to CSU-Global Guide to Writing & APA. Provide support for your statements with in-text citations. Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

Option #2: Non-Intuitive Results of Simple Experiments

Create a presentation on the following experiment complete with diagrams and descriptive captions. Toss a ball into the air and describe what happens in scientific terms using this week's readings and research for your analysis. Support your statements with citations from scholarly articles and a solid knowledge of theories used.

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Your presentation should be 5-7 slides long with speaker's notes and a references page and conform to CSU-Global Guide to Writing & APA. Provide support for your statements with in-text citations. Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

Late Nite Labs (35 points)

Two-Dimensional Kinematics

This week you have a virtual lab to complete. Follow the instructions in the Late Nite Labs Student User Manual PDF found on the Course Information page to get started. Log in to www.latenitelabs.com and select the title of the lab to complete the assignment. You can register at latenitelabs.com using this section code: **81448434**.

Record the virtual lab data using the accompanying form:

LNL2_TwoDimensionalKinematics_WORD.doc and submit for credit in the Module 2 area.

Module 3

Readings

- Chapter 4.1-4.4 in *College Physics*

- Liacos Educational Media. (2017). Shedding light on motion: Episode 8 – Newton’s third law [Video file].
- Low, D., & Wilson, K. (2017). Weight, the normal force, and Newton’s third law: Dislodging a deeply embedded misconception. *Teaching Science*, 63(2), 17-26.

Opening Exercise (0 points)

Discussion (25 points)

When a multi-stage booster is fired into space, the mass of the booster changes as the fuel is burned during flight. Discuss how the change in mass influences the acceleration of the booster. When should the first stage of the booster be jettisoned (at maximum velocity, maximum acceleration, maximum altitude, or at some other time)? Justify your selection and give your own example of how mass influences acceleration and describe the process as it happens in your example.

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Mastery Exercise (10 points)

Critical Thinking (45 points)

Option #1: Spacewalk—Paper Assignment

Imagine you are an astronaut on the International Space Station, and you are about to take a spacewalk to remove a faulty station component and replace it.

Using Newton’s three laws of motion, discuss the challenges you will face in unbolting and removing a massive component and replacing it. If you do not wish to use this example, choose your own scenario and describe it in detail before applying the three laws of motion to describe challenges associated with the situation.

Your paper should be 2-3 pages long and conform to CSU-Global Guide to Writing & APA. Provide support for your statements with in-text citations. Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

Option #2: Visual Representation

Imagine you are an astronaut on the International Space Station, and you are about to take a spacewalk to remove a faulty station component and replace it.

Using Newton’s three laws of motion, discuss the challenges you will face in unbolting and removing a massive component and replacing it. If you do not wish to use this example, choose your own scenario

and describe it in detail before applying the three laws of motion to describe challenges associated with the situation.

Create one infographic, media presentation or diagram for each of the three laws of motion and depict the challenges in a visual way with captions describing what is happening. Follow the CSU-Global Guide to Writing & APA and cite scholarly sources to support your statements. Include at least three scholarly resources in addition to the course textbook, one for each law of motion. The CSU-Global Library is a good place to find these references. Include a complete references page in your submission.

Late Nite Labs (35 points)

Free Falling Bodies

This week you have a virtual lab to complete. Follow the instructions in the Late Nite Labs Student User Manual to get started. Log in to www.latenitelabs.com and select the title of the lab to complete the assignment. You can register at latenitelabs.com using this section code: **81448434**.

Record the virtual lab data using the accompanying form:

LNL3_Free_Falling_Bodies_WORD.doc and submit for credit in the Module 3 area.

Module 4

Readings

- Chapter 6.1, 6.2, 6.5, and 6.6 in *College Physics*
- Berdichevsky, N. (2016). Tycho Brahe: Denmark's eccentric genius. *Scandinavian Review*, 103(2), 36-44.
- Brown, G. (2016). Did Samuel Clarke really disavow action at a distance in his correspondence with Leibniz?: Newton, Clarke, and Bentley on gravitation and action at a distance. *Studies in History and Philosophy of Science*, 60, 38-47.
- Crash Course in Physics #8. (2016, May 12). *Uniform circular motion - Dr. Shini Somara* [Video file]. Retrieved from <https://youtu.be/bpFK2VCRHUs>
- The Organic Chemistry Tutor. (2017, September 13). *Kepler's third law of planetary motion explained* [Video file]. Retrieved from <https://www.youtube.com/watch?v=CCsbSq9wlyI>
- Wowk, V. (2015). What is centrifugal force? *Sound and Vibration*, 49(6), 13-15.

Opening Exercise (0 points)

Discussion (25 points)

It has been speculated that gravity does not truly exist as a force in itself, but is instead a manifestation of the electrostatic force, which is the force responsible for the repulsion of like-charges and the attraction of opposite charges. Do you believe this is a credible theory? Why or why not? What experiment could you devise to test this theory?

Be sure to post an initial, substantive response by Thursday at 11:59 p.m. MST and respond to two or more peers with substantive responses by Sunday at 11:59 p.m. MST. A substantive initial post answers the question presented completely and/or asks a thoughtful question pertaining to the topic.

Substantive peer responses ask a thoughtful question pertaining to the topic and/or answer a question (in detail) posted by another student or the instructor.

Mastery Exercise (10 points)

Late Nite Labs (35 points)

Newton's Second Law

This week you have a virtual lab to complete. Follow the instructions in the Late Nite Labs Student User Manual to get started. Log in to www.latenitelabs.com and select the title of the lab to complete the assignment. You can register at latenitelabs.com using this section code: **81448434**. If going through the bookstore, reference the ISBN: **9781464142932**. Ask your instructor for assistance early in the week if you need help.

Record the virtual lab data using the accompanying form:

LNL4_Newtons_Second_Law_WORD.doc and submit for credit in the Module 4 area.

Midterm Exam (100 points)

This week you have a midterm exam. Take extra time to prepare for this exam. You may wish to review any of materials from the first four weeks of class for which you have questions. When you are ready, access and complete the Midterm Exam directly in Canvas.

You are given only one attempt at this exam. Good luck!

Module 5

Readings

- Chapters 7.1-7.7, 8.1-8.5, and 9.5 in *College Physics*
- Liacos Educational Media. (2018). Shedding light on energy: Episode 1—Forms of energy [Video file].
- Petroski, H. (2017). Bottle and can openers as levers. *American Scientist*, 105(2), 90-93. Retrieved from <https://www.americanscientist.org/article/bottle-and-can-openers-as-levers>

Opening Exercise (0 points)

Discussion (25 points)

The ancient Egyptians most likely used simple machines to build the pyramids. Discuss how you might use one or more of the simple machines to move the massive stone blocks up the growing pyramid, and into their proper places. (Hint: Space aliens are not part of the answer!) How else could you use simple machines?

Be sure to post an initial, substantive response by Thursday at 11:59 p.m. MST and respond to two or more peers with substantive responses by Sunday at 11:59 p.m. MST. A substantive initial post answers the question presented completely and/or asks a thoughtful question pertaining to the topic. Substantive peer responses ask a thoughtful question pertaining to the topic and/or answer a question (in detail) posted by another student or the instructor.

Mastery Exercise (10 points)

Critical Thinking (45 points)

Option #1: Weightless in the Space Station Essay

You are still orbiting earth, as one of the astronauts on the International Space Station. In moving between compartments, you come to a complete stop and cannot reach any handholds.

Describe several approaches you might take to get moving again, and use the principle of conservation of momentum to assess how well or poorly each approach would work. How will you finally get to your destination on the station?

Your paper should be 2-3 pages long and conform to CSU-Global Guide to Writing & APA. Provide support for your statements with in-text citations. Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

Option #2: Weightless in the Space Station Presentation With Diagram

For this assignment you will create a presentation with illustrated diagrams on how to solve the following dilemma: You are still orbiting earth, as one of the astronauts on the International Space Station. In moving between compartments, you come to a complete stop and cannot reach any handholds.

Draw a diagram with captions of several approaches you might take to get moving again, and use the principle of conservation of momentum to assess how well or poorly each approach would work. Explain in detail how you will finally get to your destination on the station.

Your presentation should be 5-7 slides long with complete speaker's notes and references page and conform to CSU-Global Guide to Writing & APA. Provide support for your statements with in-text citations. Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

Module 6

Readings

- Chapters 11.1-11.7, 14.1-14.2, & 15 in *College Physics*
- Conover, E. (2017). Maxwell's demon's memory tested. *Science News*, 192(2), 14.
- Kenyon, K. (2015). Grooved balls can move faster in water. *Physics Essays*, 28(4), 452-454.
- Olton, J. (2018). Why do kites fly? *Fantasy and Science Fiction*, 135(1/2), 193-198.

Opening Exercise (0 points)

Discussion (25 points)

On the International Space Station, sensors have identified an interstellar gas cloud approaching the station. It seems to have temperatures in the millions of degrees K. The gas cloud has a very low density.

Are you concerned about the heat from this cloud? Is it time to abandon the station? Discuss your answer, focusing on the difference between temperature and heat.

Be sure to post an initial, substantive response by Thursday at 11:59 p.m. MST and respond to two or more peers with substantive responses by Sunday at 11:59 p.m. MST. A substantive initial post answers the question presented completely and/or asks a thoughtful question pertaining to the topic. Substantive peer responses ask a thoughtful question pertaining to the topic and/or answer a question (in detail) posted by another student or the instructor.

Mastery Exercise (10 points)

Late Nite Labs (35 points)

Centripetal Force

This week you have a virtual lab to complete. Follow the instructions in the Late Nite Labs Student User Manual to get started. Log in to www.latenitelabs.com and select the title of the lab to complete the assignment. You can register at latenitelabs.com using this section code: **81448434**.

Record the virtual lab data using the accompanying form:

LNL6_Centripetal_Force_WORD.doc and submit for credit in the Module 6 area.

Module 7

Readings

- Chapters 18.1-18.4, 20.1-20.5, 21, 22.1-22.3, & 23.3-23.7 in *College Physics*
- Chapters 18.1-18.4, 20.1-20.5, 21, 22.1-22.3, & 23.3-23.7 in *College Physics*
- Liacos Educational Media. (2015). *Extraordinary electromagnetism* [Video file].

Opening Exercise (0 points)

Discussion (25 points)

Your flashlight is getting dimmer and dimmer, so you assume the batteries are nearly dead. They are “D” cells producing 1.5 volts. You take the batteries out and test them with a voltmeter. The meter reveals the batteries have nearly 1.5 volts of potential. Are the batteries dead or is something else going on? Discuss how you can tell whether the batteries are dead, and how you would test the flashlight to see whether there is some internal problem. Is it an either-or proposition? Explain.

Be sure to post an initial, substantive response by Thursday at 11:59 p.m. MST and respond to two or more peers with substantive responses by Sunday at 11:59 p.m. MST. A substantive initial post answers the question presented completely and/or asks a thoughtful question pertaining to the topic. Substantive peer responses ask a thoughtful question pertaining to the topic and/or answer a question (in detail) posted by another student or the instructor.

Mastery Exercise (10 points)

Late Nite Labs (35 points)

Torque

This week you have a virtual lab to complete. Follow the instructions in the Late Nite Labs Student User Manual to get started. Log in to www.latenitelabs.com and select the title of the lab to complete the assignment. You can register at latenitelabs.com using this section code: **81448434**. If going through the bookstore, reference the ISBN: **9781464142932**. Ask your instructor for assistance early in the week if you need help.

Record the virtual lab data using the accompanying form:

LNL7_Torque_WORD.doc and submit for credit in the Module 7 area.

Module 8

Readings

- Chapters 17.1-17.3, 24.1-24.3, and 25 in *College Physics*
- BBC. (2017). *Sound waves: The symphony of physics. Using sound* [Video file].
- Brooks, M. (2015). Harnessing the light fantastic. *New Statesman*, 18-19.
- Jorgensen, T. J. (2016). Shocking revelations. *Natural History*, 124(4), 30.

Opening Exercise (0 points)

Discussion (25 points)

The U.S. Navy conducts sonar tests that may be harmful to undersea creatures like whales and dolphins. Discuss the propagation of sound waves under water and speculate on how Navy sonar waves might interfere with cetacean undersea navigation.

Be sure to post an initial, substantive response by Thursday at 11:59 p.m. MST and respond to two or more peers with substantive responses by Sunday at 11:59 p.m. MST. A substantive initial post answers the question presented completely and/or asks a thoughtful question pertaining to the topic. Substantive peer responses ask a thoughtful question pertaining to the topic and/or answer a question (in detail) posted by another student or the instructor.

Mastery Exercise (10 points)

Late Nite Labs (35 points)

Harmonic Waves

This week you have a virtual lab to complete. Follow the instructions in the Late Nite Labs Student User Manual to get started. Log in to www.latenitelabs.com and select the title of the lab to complete the assignment. You can register at latenitelabs.com using this section code: **81448434**.

Record the virtual lab data using the accompanying form:

LNL8_Harmonic_Waves_WORD.doc and submit for credit in the Module 8 area.

Final Exam (200 points)

This week you have a final exam. This exam is cumulative. Take extra time to prepare for this exam. You may wish to review any of materials from the class on which you have questions. When you are ready, access and complete the final exam directly in Canvas

You are given only one attempt at this exam. Good luck!

Grading Scale	
A	95.0 – 100
A-	90.0 – 94.9
B+	86.7 – 89.9
B	83.3 – 86.6
B-	80.0 – 83.2
C+	75.0 – 79.9
C	70.0 – 74.9

D	60.0 – 69.9
F	59.9 or below

COURSE POLICIES

Course Grading

20% Discussion Participation
0% Opening Exercises
24.5% Laboratory Assignments
8% Mastery Exercises
17.5% Critical Thinking Assignments
30% Exams (Midterm and Final)

IN-CLASSROOM POLICIES

For information on late work and incomplete grade policies, please refer to our [In-Classroom Student Policies and Guidelines](#) or the Academic Catalog for comprehensive documentation of CSU-Global institutional policies.

Academic Integrity

Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing/repurposing your own work (see *CSU-Global Guide to Writing & APA* requirements for percentage of repurposed work that can be used in an assignment), unauthorized possession of academic materials, and unauthorized collaboration. The CSU-Global Library provides information on how students can avoid plagiarism by understanding what it is and how to use the library and internet resources.

Citing Sources with APA Style

All students are expected to follow the *CSU-Global Guide to Writing & APA* requirements when citing in APA (based on the APA Style Manual, 6th edition) for all assignments. For details on CSU-Global APA style, please review the APA resources within the CSU-Global Library under the “APA Guide & Resources” link. A link to this document should also be provided within most assignment descriptions in your course.

Disability Services Statement

CSU-Global is committed to providing reasonable accommodations for all persons with disabilities. Any student with a documented disability requesting academic accommodations should contact the Disability Resource Coordinator at 720-279-0650 and/or email ada@CSUGlobal.edu for additional information to coordinate reasonable accommodations for students with documented disabilities.

Netiquette

Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted in accordance with the student code of conduct. Think before you push the Send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom. If you have concerns about something that has been said, please let your instructor know.