



North Central State College

MASTER SYLLABUS

2026-2027

A. Academic Division: Engineering Technology, Business & Criminal Justice Division

B. Discipline: Physics

C. Course Number and Title: PHYS1130 – General Physics II

D. Assistant Dean: Brooke Miller, M.B.A.

E. Credit Hours: 4
Lecture: 3
Laboratory: 3

F. Prerequisites: PHYS1110 (a minimum grade of C- required)

G. Last Course/Curriculum Revision Date: Fall 2026 Origin date: 05/11/2011

H. Textbook(s) Title:

College Physics: A Strategic Approach with Mastering Physics w/ Pearson eText

- Author: Knight, Jones, Field
- Copyright Year: 2020
- Edition: 4TH
- ISBN: 9780134724744

I. Workbook(s) and/or Lab Manual: None

J. Course Description: A study of heat to include calorimetry, expansion, heat capacity, conductivity, phase change, kinetic theory and gas laws. A study of light including its nature, and geometric optics. Also a study of electricity and magnetism including electric charges at rest, potentials, capacitance and dielectrics, current, resistance, and voltage, alternating circuits theory of frequency, reactance, impedance, power and resonance, magnetic field definition and effects on moving charges and conductors. This course meets the requirements for TAG# OSC015. If combined with PHYS1110, TAG# OSC021 is met.

K. College-Wide Learning Outcomes:

College-Wide Learning Outcome	Assessments - - How it is met & When it is met
Communication – Written	
Communication – Speech	
Intercultural Knowledge and Competence	
Critical Thinking	
Information Literacy	
Quantitative Literacy	

L. Course Outcomes and Assessment Methods:

Upon successful completion of this course, the student shall:

Outcomes	Assessments – How it is met & When it is met
1. Calculate the Doppler Shift of sound waves for either the source or observer moving.	Class discussions, homework, labs, quizzes, and exams during the weeks 1-16
2. Solve for indicated variables in problems involving Archimedes' principle or Bernoulli's principle.	Class discussions, homework, labs, quizzes, and exams during the weeks 2-16
3. Solve for the pressure, volume, temperature, mass of gas, or amount of gas in ideal gas law problems.	Class discussions, homework, labs, quizzes, and exams during the weeks 3-16
4. Calculate the thermal expansion and thermal stresses in an object given the material and temperature range.	Class discussions, homework, labs, quizzes, and exams during the weeks 3-16
5. Solve for the indicated variables in calorimetric problems with or without change of phase and involving no more than three materials.	Class discussions, homework, labs, quizzes, and exams during the weeks 4-16
6. Calculate the heat loss due to conduction, convection, or radiation given the temperature of an object and its environment.	Class discussions, homework, labs, quizzes, and exams during the weeks 4-16
7. Calculate the net electric force and potential energy of a test charge and the electric field and electric potential at a point due to a specified array of not more than three point charges at rest.	Class discussions, homework, labs, quizzes, and exams during the weeks 5-16
8. Use conservation of energy to calculate specified electrostatic or kinematic variables due to a specified electric field or charge distribution.	Class discussions, homework, labs, quizzes, and exams during the weeks 6-16
9. Calculate the equivalent capacitance of a specified network of capacitors and the charge on, potential difference across and energy stored by specified capacitors in the network.	Class discussions, homework, labs, quizzes, and exams during the weeks 6-16
10. Calculate current, resistance, electromotive force, power loss, potential difference, and resistivity for specified parts of a direct current circuit.	Class discussions, homework, labs, quizzes, and exams during the weeks 7-16
11. Calculate related current, magnetic force and magnetic flux, induced 12. electromotive force, and torque for magnetic field problems.	Class discussions, homework, labs, quizzes, and exams during the weeks 11-16
13. Calculate the peak current, RMS current, impedance, peak voltage, and RMS voltage for alternating current problems.	Class discussions, homework, labs, quizzes, and exams during the weeks 13-16
14. Calculate the position, size and nature of an image (or object) given a problem in geometrical optics with no more than two optical devices.	Class discussions, homework, labs, quizzes, and exams during the weeks 15-16

M. Recommended Grading Scale:

NUMERIC	GRADE	POINTS	DEFINITION
93–100	A	4.00	Superior
90–92	A-	3.67	Superior
87–89	B+	3.33	Above Average
83–86	B	3.00	Above Average
80–82	B-	2.67	Above Average
77–79	C+	2.33	Average
73–76	C	2.00	Average
70–72	C-	1.67	Average
67–69	D+	1.33	Below Average
63–66	D	1.00	Below Average
60–62	D-	0.67	Below Average
00–59	F	0.00	Failure

N. College Procedures/Policies:

North Central State College believes that every student is a valued and equal member of the community.* Every student brings different experiences to the College, and all are important in enriching academic life and developing greater understanding and appreciation of one another. Therefore, NC State College creates an inclusive culture in which students feel comfortable sharing their experiences.

Discrimination and prejudice have no place on the campus, and the College takes any complaint in this regard seriously. Students encountering aspects of the instruction that result in barriers to their sense of being included and respected should contact the instructor, assistant dean, or dean without fear of reprisal.

* *Inclusive of race, color, religion, gender, gender identity or expression, national origin (ancestry), military status (past, present or future), disability, age (40 years or older), status as a parent during pregnancy and immediately after the birth of a child, status as a parent of a young child, status as a foster parent, genetic information, or sexual orientation*

Important information regarding College Procedures and Policies can be found on the syllabus supplement located at

<https://ncstatecollege.edu/documents/President/PoliciesProcedures/PolicyManual/Final%20PDFs/14-081b.pdf>



North Central State College

SYLLABUS ADDENDUM

Academic Division: Engineering Tech., Business & Crim. Jus. **Discipline:** Physics
Course Coordinator: Wesley Adams

Course Number: PHYS 1130 **Course Title:** General Physics II
Semester / Session: FA 2026 / Full Session **Start / End Date:** 08/17/2026 thru 12/11/2026

Instructor Information

Name: Peter Sandwall **Credentials:** PhD, (Nuclear Eng., Medical Physics)
Phone Number: 419-526-8883 **E-Mail Address:** psandwall@ncstatecollege.edu
Office Location: OhioHealth Mansfield / Zoom **Office Hours:** by appointment

I. Topical Timeline / Course Calendar (Subject to Change):

Weeks	Topics	Assignment	Due Date
1 8/17	Optics	Wave Optics	09/09/2026
2 8/24	Optics	Ray Optics	09/09/2026
3 8/31	Optics	Optical Instruments	09/09/2026
4 9/7	Optics	(No Class 9/7), Exam 1 (Ch 17 – 19)	09/09/2026
5 9/14	Electricity	Electric Fields and Forces	10/07/2026
6 9/21	Electricity	Electric Potential, Current and Resistance	10/07/2026
7 9/28	Electricity	Circuits	10/07/2026
8 10/5	Electricity	Exam 2 (Ch 20 – 23)	10/07/2026
-B- 10/12	Fall Break	Fall Break	
9 10/19	Magnetism	Magnetic Fields and Forces	11/04/2026
10 10/26	Magnetism	EM Induction and EM Waves, AC Electricity	11/04/2026
11 11/2	Magnetism	Exam 3 (Ch 24 – 26)	11/04/2026
12 11/9	Modern Physics	Relativity, (No Class 11/11)	12/02/2026
13 11/16	Modern Physics	Quantum Physics, Atoms and Molecules	12/02/2026
14 11/23	Modern Physics	Nuclear Physics, (No Class 11/25)	12/02/2026
15 11/30	Modern Physics	Exam 4 (Ch 27 – 30)	12/02/2026
16 12/7	Comprehensive	Comprehensive Final Exam	12/09/2026

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II. Grading and Testing Guidelines:

Assessment of your learning will come in two primary ways. First, you will be graded on your application of physics concepts in solving conceptual and mathematical problems. This grade will come from homework assignments, and exams. Secondly, assessments will be made in class through questions you will answer and demonstrations you will work together to explain. The student is responsible for his or her active learning in the course.

Final Grade Calculation

Activity	Qty	Points	Percentage
Assignments	14	Varies	50%
Exams	4	100	33%
Comprehensive Final Exam	1	200	17%

1. **Topic 1: Wave Optics (Ch. 17)**

The wave model of light. Interference, diffraction, double-slit and diffraction-grating patterns, and thin-film interference. Students connect wavelength, geometry, and observed patterns quantitatively.

2. **Topic 2: Ray Optics and Optical Instruments (Ch. 18–19)**

The ray model of light, reflection, refraction, and image formation by mirrors and lenses. Applications include the eye, magnifiers, microscopes, and telescopes, with image position, size, and nature calculated for systems of up to two optical devices.

3. **Topic 3: Electric Fields and Forces (Ch. 20)**

Electric charge, Coulomb's law, and the electric field. Calculation of net electric force and field at a point due to arrays of point charges at rest.

4. **Topic 4: Electric Potential (Ch. 21)**

Electric potential energy and electric potential. Conservation of energy applied to charges in fields, capacitance, dielectrics, and energy storage in capacitor networks.

5. **Topic 5: Current, Resistance, and Circuits (Ch. 22–23)**

Current, resistance, resistivity, electromotive force, and power. Analysis of direct-current circuits with resistors in series and parallel, and equivalent capacitance of capacitor networks.

6. **Topic 6: Magnetic Fields and Forces (Ch. 24)**

Magnetic fields and their effects on moving charges and current-carrying conductors, including magnetic force, flux, and torque.

7. **Topic 7: EM Induction, EM Waves, and AC Electricity (Ch. 25–26)**

Electromagnetic induction, induced electromotive force, and electromagnetic waves. Alternating-current circuits: peak and RMS current and voltage, reactance, impedance, power, and resonance.

8. **Topic 8: Relativity (Ch. 27)**

Galilean and Lorentz transformations for moving inertial reference frames. Time dilation, length contraction, and relativistic momentum.

9. **Topic 9: Quantum, Atomic, and Nuclear Physics (Ch. 28–30)**

Photon energy, de Broglie wavelength, and the uncertainty principle. Quantum energy levels from Bohr models and Balmer equations, quantum numbers in multi-electron atoms, atomic structure, and radioactivity.

Assignments: Assignments are required to be done online at www.masteringphysics.com by the due date given. To register, first log into the class NCSC Canvas site and select the MyLab and Mastering tab.

From there you can use the number from your textbook or buy one online. After registering, you must join the class by using the class code provided on Canvas. Assignments submitted after the due date will be marked down 3% for each day after the due date, down to receiving 50% credit. These assignments require time and are not conducive to procrastination. Note that the assignments are due a week after the date of the class discussion. Some time may be given at the beginning of class for homework related questions.

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III. Examination Policy:

There will be four exams (worth 100 points each) and a final (worth 200 points). You will be given test notes that you may use on the exam. Be sure to bring your calculator, you will need it, if you forget it there are several available to borrow in class. Cell phones must be out of pockets, lying face down in front of you during every exam. **If your cell phone is not in front of you, you are found using your cell phone, or you have a smart watch during an exam, your exam is subject to be taken, and you receive a 0.** If you have questions during an exam you are allowed to ask the professor, but they are free to be as cryptic with their response as needed. If you have a question concerning the grading of a test, feel free to bring it to my attention and argue your point either before or after class. If you need to leave the class during a test, acquire permission from your instructor and leave your cell phone in the classroom where the instructor can see it. Grading the exams will be based on your shown work and not simply the result. Your work getting the answer is more important than the answer itself. The final exam will be comprehensive, covering topics from the entire semester, including the material from Exam 4.

Extensions of time for assignments and exams are only available at the discretion of the professor and only if requested **PRIOR** to the due date. Students unable to attend the scheduled test must notify the professor **PRIOR** to the time of the test (contact info above). If an emergency arises (for example: car accident, hospitalization) then contact your instructor **IMMEDIATELY** or ASAP.

IV. Class Attendance and Homework Make-Up Policy:

Attendance will not be strictly enforced. However, attendance is strongly encouraged as physics is a difficult subject to master, and there are several labs, demonstrations, and illustrations that require attendance and cannot be made up. Homework will be available until the end of finals week, yet points will be deducted for late assignments, as outlined in mastering physics.

V. Classroom Expectations:

Keys to Success:

- ✓ Be prepared for class – read the chapter, think about the material and prepare questions you want to ask.
- ✓ Take responsibility for your learning – form study groups, and discuss class topics, do the homework early.
- ✓ Start homework the day of class and spend time every day doing more – Physics is not conducive to cramming.
- ✓ Learn how to approach problems rather than memorizing one problem and making it fit all the other.

Masteringphysics Suggestions:

- ✓ Read the submission instructions carefully. Many problems specifically state how the answer is to be submitted.
- ✓ Carefully watch your significant figures (most problems require 3 significant figures). If you use the incorrect number of significant figures, your answer will be marked wrong.
- ✓ Use the hints! You are NOT penalized for reading the hints. (You are penalized if you incorrectly answer a question within the hints).
- ✓ Do the problems on paper and save them for later. You will probably want to refer to them later.
- ✓ Each numerical answer asks for specific units. Be sure you pay close attention to this.
- ✓ Ask questions! Don't keep submitting answers repeatedly, only to get them wrong. Ask for help!
- ✓ Use the numerical values given in the problem. Most problems randomize the numbers, so you and your classmates will have different numbers.