Physics 120   FUNDAMENTALS OF PHYSICS   Spring 2019

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Bulletin Description: Application of physics concepts and principles to the real world. Topics selected from mechanics, heat, optics, electricity, and magnetism. Astronomy and modern physics will also be surveyed. This course has been approved for the Science and Technology category of the General Education requirements.

Objectives: The goal of this course is to provide students with the knowledge and understanding of basic physical principles that will aid them in their everyday lives, careers, and personal decision making as scientifically literate and technologically informed members of society. Students attain an appreciation for the impact of science on society and history and for the interplay between experiment and reasoning to describe, explain, and predict physical phenomena.

Prerequisites: High-school algebra

Meetings: **Tuesday and Thursday 3:30pm-4:45pm** in *NDSU A.G.Hill building, Rm 122*
According to NDSU Policy 333 (www.ndsu.edu/fileadmin/policy/333.pdf), attendance in classes is expected.

Office hours: Monday 11:00am-12:00pm, Friday 11:00am-12:00pm, or by arrangement

Textbook: Art Hobson, *Physics: Concepts & Connections*, 5th edition, Pearson, 2010

Topic Outline: The chapters in the textbook to be discussed in this course are listed below, along with the tentative exam dates.

Chapter 1:   Scientific method, early astronomy, and the solar system
Chapter 2:   Matter, units, unit conversion
Chapter 3:   Motion: speed, velocity, acceleration
Chapter 4:   Force, Newtons laws of motion
Chapter 5:   Gravity, stellar evolution
              Exam I: Thursday, February 14
Chapter 6:   Work, energy, conservation of energy, power
Chapter 7:   Second law of thermodynamics, entropy, energy efficiency
Chapter 8:   Electricity, atomic structure, magnetism
Chapter 9:   Waves, electromagnetic radiation, atmospheric issues
              Exam II: Tuesday, Tuesday, March 26
Chapter 10:   Special theory of relativity, mass-energy equivalence
Chapter 11:   General theory of relativity, cosmology
Chapter 12:   Introduction to quantum mechanics, quantization of light & matter
Chapter 13:   Quantum uncertainty & nonlocality, quantum model of the atom
              Exam III: Thursday, April 25
Chapters 14-17: Selected topics in nuclear & particle physics (time permitting)
              Final Exam: Wednesday, May 08 (10:30am – 12:30pm)

Format: The class will involve traditional lecture, along with discussions and problem solving. If desired, paper flash cards will be distributed and used. Students are encouraged to ask questions at any time during or after class.

How to succeed: Attending class, reviewing lecture notes, reading the textbook, taking part in class activities and discussions, and doing homework problems are keys to success. Each student is encouraged to contact the instructor with any concerns, questions, and suggestions. If desired, review sessions will be held prior to exams.

LON-CAPA: The LON-CAPA course management system will be used to post homework, lecture notes, grades, and other information. LON-CAPA can be accessed by selecting the appropriate server at **http://www.ndsu.edu/physics/lon_capa/**. Your username is everything to the left of the @ in your NDSU email address (use all lowercase letters). For example, if your email address is Sheldon.Cooper.2@ndsu.edu, then your LON-CAPA username is sheldon.cooper.2. Initially you create your own password by following the link "Forgot Password". For help using LON-CAPA contact your instructor or laboratory technician Paul Omernik (SE110, Paul.Omernik@ndsu.edu, 231-7047).

Homework: Three homework problem sets will be assigned via the LON-CAPA online system.

set #	coverage	assigned	due	# of problems
1	chapters 1-5	Jan 08	Feb 17	solve 40 out of 50
2	chapters 6-9	Feb 19	March 31	solve 40 out of 50
3	chapters 10-13	March 28	April 28	solve 40 out of 50

Each set will contain 50 problems, but you only need to solve 40 to earn full credit. Each solved problem yields 1 point (incorrectly solved problems don't affect the score). The maximal number of points per homework set is thus 40. All three homework sets together earn up to 120 points. You may work together on homework sets, but simply copying the answers is neither recommended nor beneficial. No late homework will be accepted.

Exams: Three in-class "midterm" exams and a comprehensive final exam will be given. The midterm exams will be based primarily on material covered since the last exam, but certain questions may require previous knowledge. The final exam will be comprehensive, covering all course material. Each exam (midterm and final) consists of 20 multiple-choice problems. Each correctly solved problem earns 3 points. The problems are a mix of conceptual and computational problem-based questions. Your lowest of the four exam scores (either midterm or final) will be dropped. That is, only the best three exam scores (with maximal 60 points for each exam) count toward the final grade.

All exams are open lecture notes (i.e., using the lecture notes but not the textbook is permitted during an exam). A calculator will be required for successful completion of the exams; all other electronic devices must be turned off and stored. The use of calculator software in cell phones, translators, laptop computers, etc., is not permitted on an exam. Bring a #2 pencil, photo ID, and calculator for each exam.

No makeup exams will be scheduled.

Grading: Grading will be based on LON-CAPA homework score (max. 120 points) and best 3 out of 4 exams (max. 3×60 points). From the actual number of points and the maximal number (300 points) the percentage will be calculated and used to grade according to: 88.0% -100% A, 77.0% - 88.0% B, 66.0% - 77.0% C, 55.0% - 66.0% D, 0% - 55.0% F. The instructor reserves the right to lower the grade cutoffs in response to class performance, but they will not be raised.

Additional Statements: *Veterans and student service members with special circumstances or who are activated are encouraged to notify the instructor as soon as possible and are encouraged to provide Activation Orders. Any students with disabilities or other special needs, who need special accommodations in this course, are invited to share these concerns or requests with the instructor and contact the Disability Services Office (www.ndsu.edu/disabilityservices) as soon as possible. The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.*