CHATTANOOGA STATE COMMUNITY COLLEGE
Chattanooga, Tennessee
Mathematics and Science Division

Course Syllabus

PHYS 1030 - Concepts of Physics

Instructor:	CREDIT HOURS: 4
Phone	CLASS HOURS: 3
E-Mail:	LABORATORY HOURS: 3

Catalog Course Description:

This is a one-semester introductory physics course for non-science and non-engineering majors. Emphasis is placed on understanding the nature of physics and applying basic physics concepts in one's everyday life experience and work. The use of mathematics is limited to basic algebraic manipulations required to understand and apply physics concepts. Topics covered include mechanical motion, energy, temperature and heat, fluids, electricity, magnetism, wave motion, and light. Three hours lecture and three hours laboratory.

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PREREQUISITES AND/OR CO-REQUISITES:

Prerequisites: DSPM 0850 and DSPR 0800)
Co-requisites : None

Entry Level Standards:

The student should have the mathematical competence level necessary to perform basic algebraic manipulations required to solve for an unknown variable in an algebraic equation: operations involving decimal fractions, ratios, percentages and scientific notation; and vector addition using graphical methods.

Textbooks/Materials:

W. Thomas Griffith, *The Physics of Everyday Phenomena, A Conceptual Introduction to Physics, Sixth*, 2009.

Chattanooga State, *PHYS 1030 Laboratory Manual,* August 2008

WebAssign access code

Calculator, protractor, and ruler

Supplemental Materials:

A copy of the PowerPoint notes are available online or at the bookstore for most sections.

Hardware Requirements:

Specific hardware requirements for this course include a CDROM drive, Pentium level computer, and as fast and reliable an internet connection as the student can provide.

This is considered a hybrid course, which means it has required elements of the course online. These elements may include, but are not limited to, syllabi, calendars, announcement, notes, and homework. Homework will be completed online.

CSTCC provides computer access to all students, in computer labs throughout the campus. The homework may be printed off in the computer labs, completed at home, and entered into the computers at school. If you have any questions, please contact the instructor.

I. **PSLO 5 Goal:** Issues in today's world require scientific information and a scientific approach to informed decision making. Therefore, the goals of the Natural Science requirement is to guide students toward becoming scientifically literate. This scientific understanding gained in these courses enhances students' ability to define and solve problems, reason with an open mind, think critically and creatively, suspend judgment, and make decisions that may have local or global significance.

CSLO Student Learning Outcomes

CSLO 1. Students will demonstrate the ability to conduct an experiment, collect and analyze data, and interpret results in a laboratory setting.

CSLO 2. Students will demonstrate the ability to analyze, evaluate and test a scientific hypothesis.

CSLO 3. Students will demonstrate the ability to use basic scientific language and processes, and be able to distinguish between scientific and non-scientific explanations.

CSLO 4. Students will demonstrate the ability to identify unifying principles and repeatable patterns in nature, the values of natural diversity, and apply them to problems or issues of a scientific nature.

CSLO 5. Students will demonstrate the ability to analyze and discuss the impact of scientific discovery on human thought and behavior.

Required assessments:

1 Tests: the students will be tested upon their ability to use basic physics language and processes, indentify unifying principles, demonstrate the ability

to analyze and discuss the impact of scientific discovery, and use mathematics to solve problems and model the real world.

2 Lab Reports: Students will demonstrate the ability to conduct an experiment, collect and analyze data, and interpret results in a laboratory setting.

3 Homework: the students will be assessed upon their ability to use basic physics language and processes, identify unifying principles, demonstrate the ability to analyze and discuss the impact of scientific discovery, and use mathematics to solve problems and model the real world.

CSLO / Assessment Alignment:

CSLO:	CSLO #1	CSLO #2	CSLO #3	CSLO #4	CSLO #5
Assessments:	Labs	Static Electricity Lab Newton's Laws Lab	Tests HW Final Exam	Tests HW Final Exam	HW

II. Topics

Unit 1 Chapter 1: Physics, The Fundamental Science, pp. 1-15
Appendix A: Using Simple Algebra, pp. 467-469
Appendix B: Decimal Fractions, Percentages, and Scientific Notation, pp. 470-473
Experiment 1: Measurements, Ratios, and Graphs

Unit 2 Chapter 2: Describing Motion, pp. 18-37
Experiment 2: Constant and Accelerated Motion

Unit 3 Chapter 3: Falling Objects and Projectile Motion, pp. 38-57
Appendix C: Vectors and Vector Addition, pp. 476-479
Experiment 3: Vector Sums and Components
Experiment 4: Projectile Motion

Unit 4 Chapter 4: Newton's Laws - Explaining Motion, pp. 58-78
Experiment 5: Newton's Second Law of Motion

Unit 5 Chapter 6: Energy and Oscillations, pp. 102-121
Experiment 6: Work and Simple Machines
Experiment 7: Motion and Energy Problems

Unit 6 Chapter 7: Momentum and Impulse, pp. 122-141
Experiment 8: Conservation of Momentum

Unit 7 Chapter 8, Section 8.2: Torque and Balance, pp. 146-149
Experiment 9: Torque and Rotational Equilibrium

Unit 8 Chapter 9: The Behavior of Fluids, pp. 166-186

Unit 9 Chapter 10: Temperature and Heat, pp. 187-207
Experiment 10: Specific Heat Capacity

Unit 10 Chapter 12: Electrostatic Phenomena, pp. 232-252
Experiment 11: Electric Charge

Unit 11 Chapter 13: Electric Circuits, pp. 253-276
Experiment 12: Electric Circuits and Ohm's Law

Unit 12 Chapter 14: Magnets and Electromagnetism, pp. 277-298
Experiment 13: Magnetism

Unit 13 Chapter 15: Making Waves, pp. 300-321
Experiment 14: Standing Waves in Strings

Unit 14 Chapter 16, Section 16.1: Electromagnetic Waves, pp. 323-326
Electromagnetic Waves activity (handout)

FINAL EXAM: Comprehensive on all materials covered during the semester

III. Instructional Activities

Instructions activities used in this course include, but are not limited to the following:

I1. Lecture

I2. Power Point presentations

I3. Videos

I4. Student class participation; clicker questions, online research, group study and response, and web searches

I5. Outside class participation; online and traditional homework, web searches, research

I6. Laboratory experiences, traditional activity labs, online labs, computer simulations

I7. Assessments, tests, lab reports, quizzes, homework

IV. Indicators:

At the conclusion of this course students will be able to:

I1. Students will demonstrate the ability to conduct an experiment, collect and analyze data, and interpret results in a laboratory setting.
I2. Students will demonstrate the ability to analyze, evaluate and test a scientific hypothesis
I3. Students will demonstrate the ability to use basic scientific language and processes, and be able to distinguish between scientific and non-scientific explanations.
I4. Students will demonstrate the ability to identify unifying principles and repeatable patterns in nature, the values of natural diversity, and apply them to problems or issues of a scientific nature.
I5. Students will demonstrate the ability to analyze and discuss the impact of scientific discovery on human thought and behavior.
I6. Students will be able to use mathematics to solve simple and complex Physics formulas, use critical thinking to set up the problems, and be able to state the formulas in mathematical terms and describe what they mean or predict in conceptual terms.
I7. Students will demonstrate basic knowledge of the vocabulary and concepts of physics and how they apply to everyday life and the careers of the students. They should be able to analyze problems and predict solutions.
I8. Deal with physical qualities and their appropriate units for both SI and British systems of measurement as well as convert between systems without reference manuals.
I9. How observation, generalization, formulation of hypotheses and theories, and testing of theories proceeds in science.
I10. The difference between science and technology.
I11. The use of mathematical statements to represent quantities.
I12. The definition and use of distance, displacement, speed, velocity, and acceleration.
I13. The calculation of average and instantaneous speeds and velocities
I14. The calculation of acceleration.
I15. The use of graphs to determine displacement, velocity, and acceleration.
I16. The manipulation of units in calculations of velocity, speed, and acceleration.
I17. The nature of gravitational acceleration.
I18. The calculation of displacement and velocity for an object experiencing uniformly accelerated motion.

I19. The graphical method of finding the components of a vector.
I20. The independence of vertical and horizontal components of projectile motion.
I21. The calculation of time of flight and horizontal distance covered by a projectile.
I22. The difference between the approach of Aristotle and that of Galileo and Newton in describing the relationship between force and motion.
I23. The difference between mass and weight.
I24. How to calculate the acceleration produced by a given force.
I25. The effects of friction and air resistance upon motion.
I26. How to draw a free body diagram.
I27. Energy can be converted from one form to another and can do useful work
I28. Energy can be converted from one form to another and can do useful work.
I29. The difference between work and power.
I30. How to calculate work and power in the Metric and British system.
I31. How to calculate gravitational potential energy and the potential energy of a spring.
I32. How to calculate linear kinetic energy.
I33. How to use the principle of conservation of mechanical energy to solve problems.
I34. The effect of friction on the mechanical energy of a system.
I35. How to use the impulse/momentum theorem.
I36. How to use the principle of conservation of momentum in applications.
I37. How to use momentum conservation to calculate recoil of objects after collisions.
I38. How to calculate torque given information about force and lever arm.
I39. How torque causes an object to rotate.
I40. Understand conditions required to produce rotational equilibrium.
I41. How to calculate forces acting on 1st, 2nd, and 3rd class levers that are in rotational equilibrium.
I42. The origin of atmospheric pressure.
I43. How the height of a column of liquid such as mercury can be used to measure pressure.
I44. The use of Boyle's Law and the ideal gas law.
I45. How the pressure of a column of fluid depends upon the height and density of the fluid.
I46. How Archimedes' Principle can be used to determine whether an object will float or sink in a fluid.
I47. The meaning of fluid viscosity.
I48. How to measure temperature and how to express the results on the three temperature scales.

I49. How the differences in specific heat capacities of substances lead to different temperature changes for a given amount of heat transfer.
I50. How latent heats are involved in changes in state.
I51. How heat transfer is achieved in the processes of conduction, convection, and radiation.
I52. How objects acquire charge.
I53. The inverse square law dependence of electrostatic force on distance between charges.
I54. How to draw electric field lines.
I55. How to calculate electrostatic potential energy.
I56. How to charge an object by induction.
I57. How current flows in a complete circuit.
I58. How to use Ohm's Law to calculate current, potential difference, or resistance in a circuit.
I59. How to reduce series and parallel combinations of resistance to a single resistance.
I60. How to calculate the power supplied by or dissipated by circuit element.
I61. The characteristics of a magnet including its poles, magnetic force, magnetic field, and how a compass works.
I62. The relationship between electric current, magnetic force, and magnetic field.
I63. How an electromagnet is constructed and how it works.
I64. How electric currents can be produced using magnetic fields.
I65 How an electric generator and a transformer work.
I66. The characteristics of a wave including frequency, wavelength, and velocity.
I67. A basic understanding of the general wave equation.
I68. The features of a simple wave traveling on a string including how the wave properties of frequency, period, wavelength, and velocity are related to one another.
I69. Describe the general properties and characteristics of sound waves.
I70. The difference between electromagnetic waves and mechanical waves such as sound waves.
I71. The different types of electromagnetic radiation and their characteristics, including what the electromagnetic spectrum is.
I72. How different types of electromagnetic radiation interact with the human body.
I73. The law of reflection.
I74. The law of refraction.

V. Assessment

Student evaluation and mastery of course materials will be based on performance on unit tests, laboratory exercises, and a comprehensive final exam. The final grade will be determined as follows:

Unit Tests	45%	A = 90 - 100
Lab	25%	B = 80 - 89
Homework	10%	C = 70 - 79
Final Exam	20%	D = 65 - 69
		F = less than 65

TESTS

No special makeup tests will be given. However, if you miss a test and circumstances warrant it, you may be able to make arrangements with the instructor and take the test prior to the next scheduled class. You may also be able to take the test early if you know in advance that you will miss a test. If you take all tests during the semester, your score on the final exam may be substituted for a low unit test score. If you missed any tests, your score on the final exam can be substituted for one missed test.

LABS

At the discretion of the lab instructor, a quiz may be given at the start of any lab class covering the material in that day's lab. Labs will be performed as a team effort with the other students at your table. Each group will complete the lab experiment and turn in one lab report at the end of the lab period. Since concept questions from lab frequently appear on lecture tests, all members of the group should record all the data, perform all the calculations, and discuss and record the answers to any lab questions. This will also prevent one person's miscalculation from lowering everyone's lab grade! Some labs will require formal write-ups and each student will have to write up their own.

No makeup lab exercises will be conducted. You will receive a zero for any missing lab reports. Your lowest lab report grade will be dropped.

There will be a lab final given on the last day of lab covering all of the labs done during semester. The lab final will count as 20% of your lab grade.

HOMEWORK

Exercises similar to those at the end of each chapter will be assigned on WebAssign and graded. This grade determines your homework grade. See the Appendix in the lab manual for information on how to use WebAssign.

Students should also answer all "Questions" at the end of each assigned chapter. Questions that students have difficulty with should be brought up in class for clarification. Completion of the homework is necessary to prepare for tests.

FINAL EXAM: Comprehensive on all materials covered during the semester.
The final exam will include material from the entire semester. Your unit tests should be thoroughly reviewed prior to taking the final exam. The correct answers to exam questions and problems usually will be posted after the graded tests are returned. You should check your answers against the posted answers and make corrections as appropriate. Prior tests will not be re-posted at the end of the semester.

VI. Grading Scale

A = 90 - 100
B = 80 - 89
C = 70 - 79
D = 65 - 69
F = less than 65

VII. Course Delivery Format

Faculty may require on-line activities and assignments to include on-line tests and submission of all written and on-line communications. The extent of on-line activities/assignments may vary by course but will be specified on the syllabus.

Hybrid Format – This format requires significant online activity. Students in hybrid classes must access course content and assessments using the Internet in order to pass the class, whether it meets full-time or part-time in the classroom. Faculty need not hand out a copy of the syllabus and any other required course material, including their contact information.

VIII. College Policies

This class is governed by the policies and procedures stated in the current Chattanooga State Student Handbook. Additional or more specific guidelines may apply.

ADA Statement

Students who have educational, psychological, and/or physical disabilities may be eligible for accommodations that provide equal access to educational programs and activities at Chattanooga State. These students should notify the instructor immediately, and should contact Disabilities Support Services within the first two weeks of the semester in order to discuss individual needs. The student must provide documentation of the disability so that reasonable accommodations can be requested in a timely manner. All students are expected to fulfill essential course requirements in order to receive a passing grade in a class, with or without reasonable accommodations.

Disruptive Students

The term "classroom disruption" means – student behavior that a reasonable person would view as substantially or repeatedly interfering with the activities of a class. A student who persists in disrupting a class will be directed by the faculty member to leave the classroom for the remainder of the class period. The student will be told the reason(s) for such action and given an opportunity to discuss the matter with the faculty member as soon as practical. The faculty member will promptly consult with the division dean and the college judicial officer. If a disruption is serious, and other reasonable measures have failed, the class may be adjourned, and the campus police summoned. Unauthorized use of any electronic device constitutes a disturbance. Also, if a student is concerned about the conduct of another student, he or she should please see the teacher, department head, or division dean.

Affirmative Action

Students who feel that he or she has not received equal access to educational programming should contact the college affirmative action officer.

Academic Integrity/Academic Honesty

In their academic activities, students are expected to maintain high standards of honesty and integrity. Academic dishonesty is prohibited. Such conduct includes, but is not limited to, an attempt by one or more students to use unauthorized information in the taking of an exam, to submit as one's own work, themes, reports, drawings, laboratory notes, computer programs, or other products prepared by another person, or to knowingly assist another student in obtaining or using unauthorized materials. Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are immediately responsible to the instructor of the class. In addition to other possible disciplinary sanctions, which may be imposed through the regular institutional procedures as a result of academic misconduct, the instructor has

the authority to assign an "F" or zero for an activity or to assign an "F" for the course.

Email Communication

Please note all communication with instructors about your course work should be through the eLearn Email system. For assistance on how to use the eLearn Email tool go to this url: http://river.chattanoogastate.edu/orientations/Student_PDFs/eLearn_eMail_aug09.pdf.

For all other communication the official email system used by the college is through Tiger Mail. This is accessible by clicking the blue paw icon from the top right hand side of your Tiger Web home page https://tigerweb.chattanoogastate.edu/cp/home/displaylogin.

IX. Instructor Policies

Note: The correct answers to exam questions and problems will be posted after the graded exams are returned. You should check your answers against the posted answers and make corrections as appropriate. Your corrected exam should be thoroughly reviewed prior to taking the final exam. **Old exams will not be reposted at the end of the semester.** The idea is to review mistakes on exams while it is fresh on your mind.

CHILDREN ON CAMPUS

The safety of children requires that children may not accompany adults into classrooms, offices, or other workspaces as a baby-sitting function, nor be left unsupervised in the halls or grounds of the college.

Student Concerns

If you are concerned about any issue related to this course, please discuss the issue first with your instructor. Student concerns that cannot be resolved with the instructor may be brought to the attention of the Department Head for Physical Sciences, Dr. Mitchell Rhea, office OMN F-7, phone 697-2544.

Guidelines for Communications

Email: Do not use the WebAssign e-mail. Use the eLearn mail system, or feel free to call the phone number provided in eLearn.

The instructor reserves the right to modify this syllabus in writing during the course of the semester.