

**New York City College of Technology
The City University of New York
Physics Department**

**PHYS 1111 – Principles of Science
Fall 2020 Online Course – Synchronous**

GENERAL INFORMATION

Lecture: Monday & Wednesday 2:30 – 3:45

Instructor: Vincent Tedeschi

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This is a **synchronous course**. Students need to be in an online class during the class time. This is 4 credit course.

Number of Hours and Credits: 5 hours each week: 3 hours of lecture + 2 hours of laboratory = 4 credits

COURSE DESCRIPTION

This is the first of a sequence of two Principles of Science courses that is designed for non-science majors. This course embodies a conceptual framework of the physical world. Here, concepts are stressed over computation, and the basic principles that underlie the natural world are taught in a non-intimidating manner via concrete and comprehensible concepts that come from your daily experiences. Topics covered in the course include Newton's Laws of Motion, Heat and Properties of Matter, Electricity and Magnetism, Optics, Atoms and Atomic Energy. Laboratory work illustrates and supplements the lecture material.

Textbook: Conceptual Physical Science (4th Edition), Hewitt, Suchocki, Hewitt - 2008

Lab. Manual: Principles of Science Laboratory Manual Vol. 1 (revised edition) , Mongroo and Blake,

McGraw Hill Publishing

COMPUTER REQUIREMENTS

The online classes (both lecture and lab.) will be organized through Zoom and Blackboard Collaborate.

To communicate during the class, you need a working microphone (built-in or external) connected to your computer or tablet.

A **smartphone** is **not recommended as a primary tool** in the online class. It is technically possible to use a smartphone to take the class, however a typical smartphone's screen was found too small to show online materials, especially formulas and their annotations, in reasonable quality.

COURSE COMMUNICATION

The main venue for course communication is Zoom and Blackboard Collaborate Ultra.

GROUPS. In the laboratory course, we will have a number of group assignments and group work sessions. Classwork will be done in groups, however individual submission will be required via Blackboard.

INTERACTIVITY: The course is interactively oriented, and to get the full grade for the course you need to participate in any *in-class activities*. Specifically, you might be asked to unmute your microphone and answer a question a few times per class session.

MEET AND GREET: During the first class meeting, you will be encouraged **to turn on your camera and microphone** to introduce yourself.

ANNOUNCEMENTS will be posted on Blackboard on a regular basis. They will appear on your Blackboard dashboard when you log-in and enter the course. They will also be sent to your e-mail registered on Blackboard. Please make certain to check the announcements regularly, as they will contain any important information about upcoming events or class concerns.

E-MAIL: Send e-mails to your instructors only regarding personal matter. General questions and questions regarding the course organization should be posted at the Discussion Forum on Blackboard. To post a question log into Blackboard and enter the course and do to *Discussions* section of the menu.

Online Office Hours: One hour after lecture.

NETIQUETTE: When posting on the discussion boards and chat rooms it is important to understand how to interact with one another online, netiquette. You can read more about the rules of netiquette at <http://www.albion.com/netiquette/index.html> .

COURSE PARTICIPATION POLICY

Participation is essential to your success in this class. In distance education courses you are required to participate just as if you were in a face-to-face course. This means that in order to get full credit for participation, you will have to complete your discussion assignments, lesson assignments and quizzes on a timely basis. Consistent failure to participate in class will result in being dropped from the course.

WORK SUBMISSION

Your laboratory reports should be submitted through Safe Assign on Blackboard. Your submission will be automatically checked on plagiarism. When you prepare your submission you need to adhere ACADEMIC INTEGRITY POLICY as described below.

All examinations will be taken on Zoom during the class meeting time. During the examination you can use a calculator, scrap paper for calculations, and a formula sheet. The formula sheet will be provided. Students can not use a textbook, online materials, or their lecture notes during the tests. See the ACADEMIC INTEGRITY POLICY below.

FINAL LAB. PRESENTATION. At the end of the lab. course students will present in groups (no more than 4) on one particular laboratory experiment.

GRADING POLICY

Students will be evaluated through three in-class examinations and their laboratory work. The final grade will be based on a weighted average of the grades.

Total grade = Lecture class grade 75% + Laboratory grade 25%

Lecture class grade is composed of the following components:

- Exam 1 - 15%
- Exam 2 - 15%
- Exam 3 - 15%
- Final comprehensive examination - 30%

Laboratory grade is composed of:

- Average of on-line laboratory reports (submitted in writing) - 60%
- Group presentations - 40%

GRADES: You can view your current grades as well as the final grades at the end of the course on Blackboard in the Grade Center. If you have a question about a grade then e-mail your instructor to the e-mail address provided in GENERAL INFORMATION section of this syllabus.

LATE WORK: Laboratory work up to one week late will be accepted with 30% reduction grade. Work more than one week late will not be accepted. If you have an extenuating circumstance please contact your instructor through e-mail before the assignment is due to make alternate arrangements. The instructors e-mail addresses are provided in GENERAL INFORMATION section of this syllabus.

GRADING out of maximum 100 points:

A	93-100
A-	90-92.9
B+	87-89.9
B	83-86.9
B-	80-82.9
C+	77-79.
C	70-76.9
D	60-69.9
F	59.9 and below
WU	Unofficial Withdrawal (attended at least once)

ACADEMIC INTEGRITY POLICY

As a student at City Tech. online class you are expected to follow the College's Academic Integrity policy.

http://www.citytech.cuny.edu/academics/docs/academic_integrity_policy.pdf

This means that you should not:

- Cheat
- Plagiarize, that is, use another person's words or ideas as your own without proper documentation
- Collaborate with others to solve test problems unless specifically requested in an assignment or discussion
- Let another student log into your Blackboard account

Failure to follow this policy will result in disciplinary action which can affect your academic standing in the College.

SCHEDULE

Lecture and laboratory class time are stated in the GENERAL INFORMATION section above.

An **approximate schedule of topics** and **suggested homework problems** is provided below. Please note that while the basic list of topics is fixed, the precise schedule may change somewhat due to the dynamics of a particular class. The instructor may assign other homework problems.

	Topics	Reading	Problems
1	The Scientific Method and Motion Properties of Motion: speed, velocity, acceleration, and terminal velocity	Prologue, 1.1 - 1.10	3, 7, 16, 17, 21, 22, 28, 39, 40, 45, 48, 50, 54, 93, 95, 101
2	Newton's Laws of Motion Newton's First Law of Motion; Newton's Second Law of Motion; Forces and Interactions; Newton's Third Law of Motion	2.1 - 2.5	5, 11, 13, 23, 40, 41, 52, 64, 69, 77, 94, 97
3	Momentum and Energy Momentum and Impulse; Conservation of Momentum; Energy and Work; Work-Energy Theorem; Conservation of Energy; Power; Sources of Energy	3.1 - 3.7, 3.10	1, 16, 18, 20, 22, 55, 57, 64, 67, 76, 93, 97, 124
4	Gravity The Universal Law of Gravity; Gravity and Distance; The Inverse-Square Law; Weight and Weightlessness; Universal Gravitation; Projectiles and Satellites; Escape Velocity	4.1 - 4.7, 4.9	2, 7, 12, 15, 22, 42, 43, 47, 67, 72, 74, 91, 95
5	Exam #1 Fluid Mechanics Hydrostatics: Density, Pressure, & Buoyancy, Archimedes' Principle; Atmospheric Pressure; Pascal's Principle; Bernoulli's Principle	5.1, 5.4, 5.6, 5.7, 5.9	2, 6, 15, 26, 30, 51, 52, 59, 73, 108, 109, 123
6	Thermodynamics Temperature; Absolute Zero; Heat; Specific Heat Capacity; Thermal Conductivity; Thermodynamic Laws; Entropy	6.1 - 6.5	2, 7, 8, 19, 50, 73, 74, 75
7	Thermodynamics; Heat Transfer and Change of Phase Thermal Expansion; Heat Transfer and Change of Phase; Boiling; Melting and Freezing	6.6 - 6.8, 7.6 - 7.9	Chp. 6: 22, 24, 39, 40, 42 Chp. 7: 19, 26, 30, 47, 48, 87, 102

8	Exam #2 Static and Current Electricity Electric Charge; Coulomb's Law; Electric Field; Electric Potential; Voltage Sources; Electric Current & Resistance; Ohm's Law; Electric Power	8.1 - 8.8, 8.10	1, 6, 7, 19, 20, 22, 42, 47, 54, 70, 84
9	Magnetism Magnetic Poles; Magnetic Fields; Electric Currents and Magnetic Fields; Magnetic Forces on Moving Charges	9.1 - 9.2, 9.4 - 9.5	3, 4, 12, 13, 48, 52, 58, 63, 64, 65, 68, 96
10	Electromagnetic Induction Electromagnetic Induction; Generators and Alternating Current; Power Production; The Transformer—Boosting or Lowering Voltage; Field Induction	9.6 - 9.10	20, 25, 27, 30, 37, 39, 76, 81, 88
11	Exam #3 Light Electromagnetic Spectrum; Transparent and Opaque Materials; Reflection; Refraction; Color; Optics	11.1 - 11.5	6, 10, 13, 20, 21, 39, 40, 45, 53, 54, 56, 60
12	Waves and Sound Vibrations and Waves; Wave Motion; Transverse and Longitudinal Waves; Speed of Sound; Resonance; Doppler Effect	10.1, 10.4, 10.8, 10.10	2, 6, 7, 9, 25, 30, 44, 47, 49, 74, 75, 82, 101
13	Atoms Physical and Conceptual Models; Identifying Atoms using the Spectroscope; The Quantum Hypothesis; Electron Waves	12.1, 12.5 - 12.8	1, 3, 13, 19, 41, 42, 71, 76, 84, 85
14	The Atomic Nucleus and Radioactivity Radioactivity; Radiometric Dating; Nuclear Fission; Mass-Energy Equivalence: $E = mc^2$; Nuclear Fusion	13.1, 13.4 - 13.7	2, 3, 4, 17, 21, 23, 24, 30, 42, 61, 68, 71, 75
15	Review and Final Exam		

Laboratory Schedule:

1	Introduction to Excel and Data Analysis and Lab Report Format
2	Measurements and Graphical Analysis
3	Measurement of Mass and Weight: Hooke's Law
4	Density
5	Free-Fall
6	The Simple Pendulum
7	Archimedes' Principle & Specific Gravity
8	Boyle's Law
9	Conservation of Energy
10	Ohm's Law
11	Spherical Mirrors
12	Focal Length of Thin Lenses
13	Photoelectric Effect
14	Laboratory Final Exam
15	Laboratory Presentation

LEARNING OUTCOMES

This course is designed to give students an understanding of the basic concepts and principles of mechanics, heat and mechanical waves. Topics include: kinematics, dynamics, statics, work and energy, rotational motion, oscillations and wave motion, fluids, temperature, heat and concepts of thermodynamics. Algebra and vector methods are used throughout the course. Laboratory experiments are computer-based and illustrate and supplement the lecture material. Laboratory activities will also help students to improve their general skills in writing, organizing the learned material, and analyzing the experimental data.

Learning objectives include:

1. Understanding the relationships between displacement, velocity and acceleration.
2. Applying Newton's laws of motion in various physical situations involving forces such as gravitation, friction, electricity and magnetism.
3. Understanding the relationships between force, work and energy, as well as the conservation laws for energy and momentum.
4. Understanding the various Principles of fluid mechanics.
5. Understanding the thermal properties of matter, temperature scales, and the laws of thermodynamics.
6. Understanding the notion of electric charge, and the relationships between electric field, electric potential and electric force.

7. Understanding the various components of electric circuits, such as electric current, voltage and resistance.
8. Understanding how electric currents give rise to magnetic fields, and how electromagnetic induction can be used to generate an alternating electrical current.
9. An appreciation of the electromagnetic spectrum and the properties of light.
10. An appreciation of the physical and conceptual models of the atom, as well as radioactivity, nuclear fission and nuclear fusion.

ACCESSIBILITY STATEMENT

City Tech is committed to supporting the educational goals of enrolled students with disabilities in the areas of enrollment, academic advisement, tutoring, assistive technologies and testing accommodations. If you have or think you may have a disability, you may be eligible for reasonable accommodations or academic adjustments as provided under applicable federal, state and city laws. You may also request services for temporary conditions or medical issues under certain circumstances. If you have questions about your eligibility or would like to seek accommodation services or academic adjustments, please contact the Center for Student Accessibility, Phone: 718-260-5143 E-mail: jcurrie@citytech.cuny.edu. For additional information, see <http://www.citytech.cuny.edu/accessibility/>.