



Lincoln University

SCI 10 – Physical Science

COURSE SYLLABUS

Fall, 2018

Instructor:	Chris Nguyen, Ph. D.
Course Credit:	3 Units (45 hours)
Level:	Introductory (I)
Lecture Schedule:	Tuesday, 12:30 pm – 3:15 pm
Textbooks:	COLLEGE PHYSICS by Frederick J. Bueche, Ph.D. and Eugene Hetch, Ph.D. Schaum's Outline Series – McGraw Hill, 11 th edition (2011) ISBN-10: 0071754873, ISBN-13 :978-0071754873
Additional Materials:	Handouts to be provided in Class
Contact:	cnguyen@lincolnuca.edu or chinguyen39@gmail.com
Office hours:	Email Dr. Chris T. Nguyen for appointment.
Last revision:	Aug. 2018

Course Description: The study of matter and energy, principles and practical applications in Physics, Chemistry, Mechanics, heat, sound, electricity, magnetism, electronics, geosciences, and astronomy.

Detailed Course Description: General Principles, Laws, relationships, and formulae on the topics of mechanics, heat, sound, electricity, magnetism, geosciences and astronomy. Observation of natural phenomena, experiments, and applications related to the above topics. Introduction of technical language, technical terms and symbols used in Physics such as Matter, Force, Velocity, Acceleration, Momentum, Energy, Work, Pressure, Density, Viscosity, Elasticity, Young Modulus, Bulk Modulus, Refraction, Reflection, Absorption, Period, Wavelength, Scattering, Radiation, Fusion ... Introduction of basic mathematical tools (Algebra, Geometry, Trigonometry, Exponential and logarithmic functions, Vector Analysis) to perform calculations in the exercises and problems using the relationships and formulae learned in General Physics.

Course Learning Outcomes¹:

- A). Capable to understand and explain simple natural phenomena around us in the language of Physics.
- B). Capable to solve some exercises and simple problems in General Physics using the physical symbols and formulae, and with the help of basic mathematical tools.

¹ Detailed description of learning outcomes and information about the assessment procedure are available at the [Center for Teaching and Learning](http://ctl.lincolnuca.edu) website (ctl.lincolnuca.edu).

C). Try to understand and figure out, if possible, about some useful applications of all the Principles, Laws, and formulae from the lessons of Physical Science that the students have learned in class.

Assessment activities on the above Learning outcome:

- a). 10 minutes Weekly Quizzes (10 Questions). Weekly Homework: 5 Exercises / Problems given. Following week: 30 minutes for correction and explanation on given Exercises and Problems.
- b). Mid-Term and Final Examinations
- c). Weekly class Q and A, Discussions (To observe / assess the students directly, openly and on the spot).

Instructional Methodology:

Fifteen (15) Lectures covering all the topics listed in the Course Description.

Weekly three (3) hours Lecture is subdivided as below:

- Forty five (45) minutes for lecture of the day
- Twenty (20) questions/answers on above Lecture
- Ten (10) minutes Weekly Quiz (10 Questions) on previous Lecture
- Twenty (30) minutes for previous Homework (5 Problems) correction and explanation
- Remaining time at the end is for general discussions and Questions/Answers

Each Lecture is presented more or less in the same format: General view, ideas, concepts, Laws, relationships, formulae... on the topic of the day are introduced layer on layer in the language and symbols of Physics. Exercises and Problems will follow to make sure that the students can understand the concept, the Laws, use the right relationships, the right formulae, correctly perform the calculations, and finally obtain the right answers.

In the study of Physics, solving Problems is the crucial culmination of the entire experience.

This is a direct classroom instruction course.

Assignments and projects require students to actively use resources of the library. Detailed guide to the *resources of the library* as well as the description of Lincoln University approach to *information literacy* are available at the [Center for Teaching and Learning](http://ctl.lincolnuca.edu) website (ctl.lincolnuca.edu).

Grading:

- Quizzes : 100 points (perfect score 10 X 10 times)
- Problems: 200 points (perfect score 20 X 10 times)
- Mid-Term: 50 points (perfect score)
- Final Exam: 150 points (perfect score)
- TOTAL: 500 points (perfect score)

Letter grades are:
A (90-100% of total score)
B (80-89% of total score)
C (65-79% of total score)

Class Schedule:

Lecture 1: Quick Review basic Mathematics required in General Physics. Basic Algebra, Calculus, Geometry, Trigonometry, Vector Analysis, Statistics, common functions such as Exp. and Log. All these are found in the Appendix of the Textbook. Questions from students related to the Lectures and answers from Instructor. Related Exercises and Problems.

Lectures **2** and **3**: Uniformly Accelerated Motions, Newton's Laws, Velocity, Acceleration, Impulse, Momentum, Work, Energy, Power. Q and A. Quizzes, Lecture related Exercises and Problems.

Lectures **4** and **5**: Density, Specific Gravity, Elasticity, Stress, Strain, Young's Modulus, Bulk Modulus, Shear Modulus. Average Pressure, Standard Atmospheric Pressure, Hydrostatic Pressure, Pascal's Principle, Archimedes' Principle, Fluid Flow, Equation of Continuity, Viscosity, Poiseuille's Laws, Bernoulli's Equation, Torricelli's Theorem, Reynolds' Number. Q and A. Quizzes, Lecture related Exercises and Problems.

Lecture **6**: Wave Motions. Frequency, Period, Velocity, Wavelength, Reflection, Refraction, Absorption. Quizzes, Lecture related Exercises and Problems

Lecture **7**: Light, Electromagnetic Waves, Visible Light, Infrared, Ultraviolet, Diffraction, Lenses, Prisms, Spectrum, LASER Light and Applications. Quizzes, Lecture related Exercises and Problems.

Lecture **8** and **9**: Sound, Mechanical and Longitudinal Motion, Medium of propagation, Velocity, Audible Sound, Infrasound and Ultrasound, Harmonics, Reflection, Refraction, Absorption, Attenuation. Application of Ultrasound in Medicine: Continuous Waves and Pulsed Waves, Ultrasound for Diagnostic Imaging, 2D-Imaging, Doppler Principle, Spectral Doppler, Color Doppler. Quizzes. Lecture related Exercises and Problems.

Lecture **10**: Electricity and Magnetism, Coulomb's Law, Electric Fields, Potential Difference, Current, Resistance, Electrical Work, Electrical Power, Resistors in Series, Resistors in Parallel, Kirchhoff's Laws, Magnetic Fields, Electro-Magnetic Forces, Electric Generators, Electric Motors. Q and A. Quizzes. Lecture related Exercises and Problems.

Lecture **11**: Relativity, Quantum Physics, Wave Mechanics, Hydrogen Atom, Atomic Structure, Nuclear Structure, Nuclei, Radioactivity, Applied Atomic Physics, Applied Nuclear Physics. Semi-conductors, Sub-Micron Technology, Nano Technology. Quizzes. Lecture related Exercises and Problems.

Lecture **12** and **13**: Review all the Principles and Laws learned in Class. Some important applications of Physics in the Industry, Communication, Navigation, Medicine, Agriculture, Fishery, Weather Forecast, Astronomy and many more. Class General Discussions.

Lecture **14** and **15**: Questions or Comments from Students related to the Lectures presented in Class. Students to think of possible / feasible applications of Physics that are useful to mankind. Class General Discussions. Present status of Physics and its limitations. Future domain of Physics.