

PRINCIPAL SUBJECT AREA

PHYSICS

200 LEVEL COURSES

PH 200 Mechanics and Fluid Dynamics (2 credits)

Coordinate systems, Inertial Frames, Newton's Laws of Motion, Central Forces, System of Particles, Rotating Coordinate Frames, Motion of Rigid Bodies, Flow characteristics, Newtonian and Non-Newtonian fluids and Measurement of viscosity.

Recommended Texts:

1. French, A.P., *Mechanics* (1971), Massachusetts institute of Technology, U.K
2. Smith, P. and Smith, R.C., *Mechanics* (1990), John Wiley & Sons, 2nded
3. Massey, B.S., *Mechanics of Fluid*, ELBS

PH 205 Thermal and Statistical Physics (2 credits)

First and Second laws of Thermodynamics, Entropy, Thermodynamics potentials, Maxwell relations, First and second order phase transitions, Nernst postulates and its applications to solids, magnetic and electric systems, thermodynamics of dilute solutions, Gaussian reactions, adsorption.

Introduction to and applications of Statistical Methods, Classical Statistical Mechanics and Thermodynamics: Statistical equilibrium of a system, Partition function, Thermal equilibrium, Temperature and Zeroth law of Thermodynamics, Application to the ideal gas. Conservation of energy of a system of particles, Many particle systems, The First law of Thermodynamics, Entropy of a system in statistical equilibrium, Discussion of processes in terms of entropy; Quantum Statistics: Fermi - Dirac, Bose - Einstein Statistics, and their applications.

Recommended Texts:

1. Callen, H.B., *Thermodynamics* (1985), John Wiley & sons, 2nd ed.
2. Reif, F., *Fundamentals of Statistical Thermal Physics* (1965), McGraw-Hill, 1sted.
3. Alonso and Finn, *Fundamental University Physics (Vol III)* (1967), Addison-Wersley

PH 211 Vibrations and AC Theory (2 credits)

Free and Force Vibrations, Normal Modes, Progressive waves. AC generation, Series and Parallel LCR circuits, Mutual inductance and Transformers, Filters.

Recommended Texts:

1. French, A.P., *Vibrations and Waves* (1971), Chapman & Hall, 1sted
2. Pain, H.J., *The Physics of Vibrations and Waves* (2001), John Wiley & sons, 5thed
3. Yarwood, J., *Electricity and Magnetism*

PH 230 Quantum Mechanics and Atomic Physics (2 credits)

Failure of classical physics, Schrodinger's equation and its applications: ex: proton beam in a cyclotron; electron conduction in metal; alpha emission, electron scattering from negative ion core; quantum well, infrared detectors and neutrons inside nucleus; simple harmonic oscillator: lattice vibrations. Hydrogen atom: Out line of the solution in spherical polar coordinates, spherical harmonics, wave functions, energy levels, selection rules. Hydrogen-like atoms, alkali atoms; spin and angular momentum: L-S coupling, selection rules; fine and hyperfine structure, Effect of external fields: Electric and Magnetic, Applications: stimulated emission, laser, periodic table.

Recommended Texts:

1. Resnik, Robert and Halliday, David, *Basic Concepts in Relativity and Early Quantum Theory* (1992), Macmillan Publishing Compund, 2nd ed., USA
2. Constantinescu, F. and Magyari, E., *Problems in Quantum Mechanics* (1971), Pergamon press
3. Thomas, Albert and Fromhold Jr, *Quantum Mechanics for Applied Physics and Engineering*

PH 240 Introductory Solid State Physics (2 credits)

Crystal Structure, Experimental Determination of Structures, Crystal Defects, Lattice vibrations, heat capacity of solids; Electron in solids.

Recommended Texts:

1. Kittel, C., *Introduction to Solid State Physics* (1996), John Wiley & sons, 7thed
2. Srivastava, J.P., *Elements of Solid State Physics* (N.A), PHI, India
3. Omar, Ali, *Elementary Solid State Physics* (1975), Addison-Wesley publishing

PH 245 Electronics Theory I (2 credits)

Circuit analysis, Diodes and Transistors, Operational amplifier. Digital Electronics, Combinational & Sequential logic: ROM; PROM; EPROM; EEPROM; PALs and PLAs, registers, RAMs; digital communication basics; sequential ICs, Counters.

Recommended Texts:

1. Horowitz, P. and Hill, W., *The Art of Electronics 2nd ed.* (1989), Cambridge uni. press, 2nded
2. Malvino, A. P., *Electronics Principles 5th ed* (1953), McGraw-Hill

PH 261 Medical Physics (2 credits)

Biomechanics of the human body: forces on and in the body, metabolism and energy balance of the body, fluid dynamics of the human circulatory system; Physics of the cardiovascular system and cardiovascular instruments: mechanics of cardiac contraction, pressure volume curves, ECG, pacemakers, defibrillators; Fiber optics in medicine: physics of fiber optics, endoscopes; Laser in medicine: physics of Laser, Laser treatment, Laser safety; Physics of diagnostic techniques: ultrasound imaging; Nuclear medicine and Radiation physics: properties of nuclear radiation, radioisotopes for nuclear medicine, radiopharmaceuticals, nuclear medicine instrumentation, radiation dosimetry, radiation protection.

Recommended Texts:

1. P. Davidovits (2001) *Physics in Biology and Medicine*, Harcourt/Academic
2. R.K. Hobbie (1997) *Intermediate Physics for Medicine and Biology*, Springer.
3. J.R. Cameron, J.G. Skofronick and R.M. Grant (1999) *Physics of the Body*, Madison: Medical Physics Publishing
4. R.S. Khandpur (2003) *Hand book of Biomedical Instrumentation*, Tata McGraw-Hill.
5. J.G. Webster (1998) *Medical Instrumentation: Application and Design*, Houghton Mifflin.

PH 262 Energy, Weather and Environment (2 credits)

Environmental Pollution: Air, Noise, and Radiation. Energy: socio-economic importance of energy: renewable and non-renewable energy sources, impact on environment. Atmosphere; composition, evolution, thermal structure, radiation; solar and terrestrial, global warming, atmospheric dynamics and circulation, monsoons. Clouds, turbulence, Atmospheric waves, modeling, climate atmospheric measurements.

Recommended Texts:

1. Kraushaar, J. J. and Ristinen, R. A., *Energy and Problems of a Technical Society*.
2. Moran, J. M. and Morgan, M. D., *Meteorology*
3. Houghton, John T., *The Physics of Atmospheres, 2nd Ed.*, (2001), Cambridge uni. press, 2nded

PH 263 Introductory Astronomy (2 credits)

Astronomy before and after Copernicus; gravity; light and telescopes; solar system; properties, formation and evolution of stars; star systems; Milky Way and galaxies; galaxy clusters; cosmology.

Recommended Texts:

1. Fox, John D, *Astronomy: Journey to the Cosmic Frontier* (1995), McGraw -Hill
2. Zeilik, Michael and Gregory, Stephen A., *Introductory Astronomy and Astrophysics 4th Ed.* (1998), Saunders college publishing, 4thed

PH 280 General Physics Laboratory I (1 credit)

(Prerequisites: PH 103, PH 104)

PH 281 General Physics Laboratory II (1 credit)

(Prerequisites: PH 103, PH 104)

PH 285 Electronics Laboratory I (1 credit)

(Prerequisite: PH 245)

Available only for maximum of 60 students who have performed well in PH245.

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