

Physics 1 : Fundamental Physics 1 (3 credits)

Prerequisite: -

Linear and rotational motions, conservation of momentum; angular momentum and energy, elasticity, simple harmonic motion, damped oscillation and resonance, wave propagation, sound wave and light wave.

Physics 1 : Fundamental Physics 1 (3 lectures/w) (total 39)

Force and motions (review, using vectors, calculus concepts) (3)

Rotational motions (center of mass, moment of inertia, angular momentum) (4)

Torque and conservation of angular momentum (+precession) (4)

Conservation of Energy (including rotational energy) (2)

Elasticity and simple harmonic motion, damped SHM & resonance (5)

Wave propagation, properties of wave (review water wave) (2)

Wave in strings (speed depends on tension, standing wave) (3)

Sound wave (diffraction, interference, beats, musical tone, loudness, overtones, Power & inverse square law, Doppler effect) (6)

Light wave (diffraction, interference from single slit, double slits, grating, colour & spectrum, polarization, filters, illuminations, laser light) (8)

Physics 2 : Fundamental Physics 2 (3 credits)

Prerequisite:

Fluid flow, heat and thermodynamics, kinetic theory of gas, electrostatics field and potential, current & resistance, superconductivity, magnetic field & magnetic induction, atoms & molecules, nucleus, quarks; leptons & the big bang.

Physics 2 : Fundamental Physics 2 (3 lectures/w) (total 39)

Fluid flow (Bernoulli law, viscosity) (3)

Heat and thermodynamics (1st & 2nd law, heat engines, efficiency) (5)
entropy & statistical view (concepts) (2)

Kinetic theory of gas (mean free path, c_p , c_v , γ) (4)

Electrostatics field, Potential (Gauss law) (3)

Current & resistance (microscopic view of Ohm's law, circuits) (4)

Superconductivity (basic concept) (2)

Magnetic field & magnetic induction (Ampere law, Faraday law) (4)

Atoms & Molecules (emission of light) (4)

Nucleus (radioactive isotopes) (4)

Quarks, leptons & the big bang. (4)

Physics 3 : Electricity and Magnetism (3 credits) (option)

Prerequisite: Calculus 2

Current & voltage in RC,LC circuits, energy stored in L & C, magnetic materials, magnetic core inductor, capacitance & dielectric materials, LC oscillation and resonance, AC voltage sources; AC circuits with RLC, impedance, Maxwell's equations & electromagnetic waves, Semiconductor & devices, rectifier; amplifier; oscillator.

Physics 3 : Electricity and Magnetism (Option , 3 lectures/w)

Capacitance, RC circuits (DC charge & discharge) (4)

Inductance, RL circuits (calculation of currents) (4)

Energy density (stored in L & C) (2)

Magnetic materials, magnetic core inductor (para, dia, ferro, ferri magnetics, B & H, hysteresis & loss) (5)

Capacitance & dielectric materials (3)

LC oscillation and resonance (4)

AC voltage sources, AC circuits with RLC, impedance (6)

Maxwell's equations & Electromagnetic waves (2)

Semiconductor & devices (diode, transistor, IC) (4)

Rectification, Amplification, feed back, oscillator (5)

Physics 4 : Radiation Physics (3 credits) (option ,ผลิตพืช ผลิตสัตว์)

Prerequisite: -

Nucleus & isotopes, emission of α , β , γ , life time & half life, interaction of α , β , γ with matter; biological effects, measurement and units of radiations, doses & hazards, precaution and safety, radioactive series, accumulation of daughter radioactives, radioactive dating, food irradiation, radioactives in researches.

Physics 4 : Radiation Physics (Option, 3 lectures/w)

Nucleus & isotopes (structure of nucleus, stable & instable isotopes, transformation) (3)

Emission of α , β , γ (3)

Life time & half life (disintegration equations,solutions)(2)

Interaction of α , β , γ with matter, biological effects (ionization of air and biological tissue) (3)

Measurement and units (of radiations, Curie, Gray, Becquerel etc.)(3)

Doses & hazards (Rad, Rem, fallout) (3)

Precaution and Safety (3)

Radioactive series, accumulation of daughter radioactives (examples, calculations from disintegrations) (8)

Radioactive dating, Food irradiation, radioactives in researches (examples of uses in genetics, fertilization, medical researches, etc.) (11)

Physics 5 : Quantum Physics (3 credits) (option)

Prerequisite: Physics 1, 2

Quantum description of atoms; molecules; solids, energy bands & conduction, conductors, semiconductors, insulators, major, minor carriers, PN junction, forward; reverse bias, solar cell, LED, tunneling diodes, transistor and other solid state devices. lasers & masers, sensors.

Physics 5 : Quantum Physics (Option, 3 lectures/w)

Basic principle of quantum theory (wave- particle duality and introduction to the principle of wave mechanics: uncertainty principle, wave function and probability interpretation) (4)

Quantum description of atoms, molecules, solids (emphasis on energy states)(5)

Conduction - energy bands, conductors, semiconductors, insulators.(3)

Conduction in semiconductor (major, minor carriers)(3)

PN junction (forward, reverse bias ; solar cell, LED, tunneling diodes)(7)

Transistor and other solid state devices (4)

Lasers & masers (principle of gas, semiconductor laser with some applications)(6)

Modern sensors (temperature, pressure, etc.and role in electronics and controls) (7)

Physics Lab.1 (1 credits)

Prerequisite: - (concurrent with Physics 1)

Experiments in physics were set up to support theories in Physics 1 and for students to experience experimental physics. Completion of 8-10 experiments are required in the area of mechanics, waves, sound and light.

Physics Lab. (Revision 1)

Physics Lab 1 (one 3 hrs period / week, (8-10 expt)*(3 Stations)*(3 students) = 72-90 students/section maximum)

480 students = 8 sections (60 each section - 4 instructors)

Expt 1 might be arranged to do all at the same time.

Experiments

E1 Weight & Measure

E2 Air track

E3 Rotational Motion

E4 Physical pendulum

E5 Damped SHM

E6 Elasticity

E7 Wave in string

E8 Sound resonance

E9 Light Diffraction

E10 Viscous flow

Equipments

[metal ruler (40), meter (40)

vernier caliper (40)

micrometer (20)

digital balance .01g (20)]

PASCO #ME9218 (4)

PASCO#ME9280 (4)

stop watch + constructed

PASCO#ME9210 (4)

to be constructed

to be constructed

generator PASCO#WA9301A (4)

PASCO#WA9303 (10), 9305 (20)

PASCO#OS9252 (4)

to be constructed

Physics Lab.2 (1 credits)

Prerequisite: - (concurrent with Physics 2)

Same as Physics Lab.1 in the area of light, electronics, microwaves, radioactivity.

Physics Lab 2

E11 Interferometer	PASCO#OS9258 (4)
E12 Speed of light	PASCO#OS9261
E13 Lens & refractive index	to be constructed (Lens mirror)
E14 Oscilloscope	Hitachi Mod.212 (20 MHz) (4)
E15 LC resonance	Hitachi 212 (4) + Gen. in E8
E16 RC, RL circuits	digital voltmeter
E17 Basics amplifier	to be constructed
E18 Radioactivity	PASCO#SN7951 (4)
E19 Microwave	PASCO#WA9316(4)
E20 Polarization of light	polaroid

Wave demonstrator PASCO#SE-9600 (2) + #SE-9604 (2)

GM System PASCO # SE7985 (2) + SE 6590 (2)

Spectrometer PASCO # SP9268 (2) + SE 9285(2) + SE9460(2) + SE9461(2) + SE 9466(2) + SE9467(2)

PASCO scientific

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Physics Courses , course description (Revised Sept.92)

Physics 1 : Fundamental Physics 1 (3 credits)

Prerequisite: -

Linear and rotational motions, conservation of momentum; angular momentum and energy, elasticity, simple harmonic motion, damped oscillation and resonance, wave propagation, sound wave and light wave. Microwave waveguide, optical fibre and communication.

Physics 2 : Fundamental Physics 2 (3 credits)

3 + 5 1m

Prerequisite: -

Current & voltage in RC, LC circuits, energy stored in L & C, magnetic materials, magnetic core inductor, capacitance & dielectric materials, LC oscillation and resonance, AC voltage sources; AC circuits with RLC, impedance, Maxwell's equations & electromagnetic waves, Quantum description of atoms; molecules; solids, energy bands & conduction, Semiconductor & solid state devices.

Physics 3 : Radiation Physics (3 credits) (option ,ผลิตพืช ผลิตสัตว์)

Prerequisite: -

Nucleus & isotopes, emission of α , β , γ , life time & half life, interaction of α , β , γ with matter; biological effects, measurement and units of radiations, doses & hazards, precaution and safety, radioactive series, accumulation of daughter radioactives, radioactive dating, food irradiation, radioactives in researches.

Physics Lab.1 (1 credits)

Prerequisite: - (concurrent with Physics 1)

Experiments in physics were set up to support theories in Physics 1 and for students to experience experimental physics. Completion of 8-10 experiments are required in the area of mechanics, waves, sound and light.

Physics Lab.2 (1 credits)

Prerequisite: - (concurrent with Physics 2)

Same as Physics Lab.1 in the area of light, electronics, microwaves, radioactivity.

Physics 1 : Fundamental Physics 1 (3 lectures/w) (total 39)

- Force and motions (review, using vectors, calculus concepts) (3)
- Rotational motions (center of mass,moment of inertia,angular momentum)4
- Torque and coservation of angular momentum (+precession) (4)
- Conservation of Energy (including rotational energy) (2)
- Elasticity and simple harmonic motion, damped SHM & resonance (4)
- Wave propagation, properties of wave (review water wave) (1)
- Wave in strings (speed depends on tension, standing wave) (3)
- Sound wave (diffraction, interference,beats,musical tone, loudness, overtones, Power & inverse square law, Doppler effect) (6)
- Light wave (diffraction, interference from single slit, double slits, gratting, colour & spectrum, polarization, filters,illuminations, laser light and holography) (8)
- Microwave, waveguide,Optical fibre and communication (compare wave guide and optical fibre and discussion on application in modern communication) (3)

Physics 2 : Fundamental Physics 2 (3 lectures/w) (total 39)

- Capacitance, RC circuits (DC charge & discharge) (4)
- Inductance, RL circuits (calculation of currents) (3)
- Energy density (stored in L & C) (2)
- Magnetic materials, magnetic core inductor (para, dia, ferro, ferri magnetics, B & H, hysteresis & loss) (5)
- Capacitance & dielectric materials (3)
- LC oscillation and resonace (3)
- AC voltage sources, AC circuits with RLC, impedance (5)
- Maxwell's equations & Electromagnetic waves (2)
- Quantum description of atoms, molecules, solids (emphasis on energy states)(5)
- Conduction - energy bands, conductors, semiconductors, insulators.(3)
- Smiconductor & devices (diode, transistor, IC,Other devices) (4)

References for Physics 1 &2 :

- 1.Halliday & Resnick "Fundamentals of Physics" extended 3rd ed. Wiley 1988.

- 2.ภาควิชาฟิสิกส์ คณะวิทยาศาสตร์ จุฬาลงกรณ์ "ฟิสิกส์ 1 ฟิสิกส์ 2 " สำนักพิมพ์จุฬาลงกรณ์
3. Serway " Physics for Scientist and Engineers with Modern Physics" 3rd ed. Saunders 1990.
4. Alonso "Physics" Addison -Wesley 1992
5. Brophy " Physical Electronics " Wiley

Physics 3 : Radiation Physics (Option, 3 lectures/w)

Nucleus & isotopes (structure of nucleus, stable & instable isotopes, transformation) (3)

Emission of α , β , γ (3)

Life time & half life (disintegration equations,solutions)(2)

Interaction of α , β , γ with matter, biological effects (ionization of air and biological tissue) (3)

Measurement and units (of radiations, Curie, Gray, Bequerel etc.)(3)

Doses & hazards (Rad, Rem, fallout) (3)

Precaution and Safty (3)

Radioactive series, accumulation of daughter radioactives (examples, calculations from disintegrations) (8)

Radioactive dating, Food irradiation, radioactives in researches (examples of uses in genetics, fertilization, medical reseaches, etc.) (11)

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PASCO#ME9280 (4)

stop watch + constructed

PASCO#ME9210 (4)

to be constructed

to be constructed

generator PASCO#WA9301A (4)

PASCO#WA9303 (10), 9305 (20)

PASCO#OS9252 (4)

~~to be constructed~~

Physics Lab 2

E11 Interferometer

E12 Speed of light

E13 Lens & refractive index

~~E14 Oscilloscope~~

E15 LC resonance

E16 RC, RL circuits

E17 Basics amplifier

E18 Radioactivity

E19 Microwave

E20 Polarization of light

PASCO#OS9258 (4)

PASCO#OS9261

to be constructed (Lens mirror)

Hitachi Mod.212 (20 MHz) (4)

Hitachi 212 (4) + Gen. in E8

digital voltmeter

to be constructed

PASCO#SN7951 (4)

PASCO#WA9316(4)

polaroid

Wave demonstrator PASCO#SE-9600 (2) + #SE-9604 (2)

GM System PASCO # SE7985 (2) + SE 6590 (2)

Spectrometer PASCO # SP9268 (2) + SE 9285(2) + SE9460(2) + SE9461(2) + SE 9466(2) + SE9467(2)

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