

KATHMANDU UNIVERSITY
SCHOOL OF SCIENCE
Department of Natural Sciences (Physics)

Subject Title : Physics and Environment
Level : B.Sc. (Applied Physics)
Year : III

Course : PHYS 301
Cr. : 3 (48 hours)
Semester : I

Course Details:

1. Introduction: 2 hours
The economic system (Human activities), Living in the greenhouse, Enjoying the sun.
2. Environmental spectroscopy: 3 hours
Introduction to the solar spectrum: Black body radiation, Emission spectrum of the sun. Solar UV and life, Ozone filter.
3. Global climate: 4 hours
The energy balance, Elements of weather and climate, Stability and vertical motion of air and clouds, Horizontal motion of air and water, Pressure gradient, Inertial forces.
4. Global warming and greenhouse effect: 5 hours
Introduction, Greenhouse effect, Greenhouse gases, Global climate change and modeling, Global warming potential, Possible impact of global warming.
5. Global ozone problem: 4 hours
Ozone in the atmosphere, Ozone depletion process, Ozone hole, Worldwide ozone trends, Consequences of ozone depletion.
6. Energy for human use: 7 hours
Energy sources, Energy from fossil fuels, Exergy, Loss of exergy in combustion, Solar energy, Wind energy, Hydropower, Geothermal energy, Tidal energy, Fuel cells, Energy storage and energy transport (distribution).
7. Radiation and environment: 4 hours
Introduction (Radioactive decay, Nuclear fusion and fission), Nuclear hazards and safety measures, Management of fuel cycle, Disposing the nuclear waste, Environmental effects of nuclear radiations.
8. Noise pollution: 5 hours
Basic acoustic phenomena, Measurement of noise, Human perception and noise criteria, Sources of noise, Effects of noise pollution, Reducing the transmission of sound (Sound insulation, Sound leaks, Hollow wall, Avoiding contact noise).
9. Applications of transport phenomena for pollutants: 5 hours
Transport of mass, Momentum and energy, Diffusion, Viscosity and Thermal conductivity in different media, Conservation of mass, Equations of fluid dynamics, Navier-Stokes equation, Reynolds number, Turbulence, Gaussian plumes in the air.

10. Remote sensing: 9 hours
Principles of remote sensing, Methods of remote sensing, System overview in remote sensing: Satellite remote sensing, Microwave remote sensing. Applications of remote sensing: Atmospheric studies, Environmental applications/analysis, Monitoring pollution of the upper atmosphere with satellites, Lidar measurements of location of atmospheric pollution, Lidar measurements of stratospheric ozone, Geospherical Information System (GIS), Geographical Positioning System (GPS).

Text books:

1. E. Boeker and R. van Grondelle, *Environmental Physics*, John Wiley and Sons, Chichester.
2. C. Smith, *Environmental Physics*, Routledge, London.
3. S. C. Santra, *Environmental Science*, New Central Book Agency (P) Ltd., London.