PH101
Lecture 1

04.08.14

PH101: Physics Lectures
Time Table

Day	A1 LT-2	A2 LT-2	A3 LT-2	A4 LT-2	B1 LT-4	B2 LT-4	B3 LT-4	B4 LT-4
MON	8.30	8.30	8.30	8.30	10.30	10.30	10.30	10.30
TUE	9.30	9.30	9.30	9.30	11.30	11.30	11.30	11.30
WED	-	-	-	-				
THU	9.30	9.30	9.30	9.30	11.30	11.30	11.30	11.30
FRI	8.30	8.30	8.30	8.30	11.30	11.30	11.30	11.30

Attendance:

Expected: > 90%
Minimum: 75%

Evaluation*:

1. Mid Term I: 15
2. Mid Term II: 15
3. End Semester Exam: 30
4. Lab: 30
5. Quizzes/Assignments: 10 (late submission would be penalized by 25% reduction in assignment marks/grades)

*copying/cheating in exams will attract severe academic punishment as per code of conduct of the college MEC

Make up Tests:

- No make up tests will be given unless allowed absence on prior official approval

Policy on plagiarism:

If any student is found to have cut and copy pasted from any prior copyrighted published materials (these can be easily checked through certain software) infringing on copyright rules in assignments, she/he would be given zero in that assignment and would have to face disciplinary committee of the College MEC

PH101: Physics I – Classical Mechanics and Thermodynamics

Syllabus for Classical Mechanics

- Vectors and Kinematics
- Frame of reference and Coordinate Systems – Cartesian and Polar
- Newton Laws
- Friction
- Momentum
- Work & Energy
- Conservative and Non-conservative forces
- Angular momentum
- Dynamics of rigid body rotation
- Inertial (Galilean) and non-inertial frames of reference
- Gravitation and planetary motion, Kepler's laws
- The harmonic oscillator

An Introduction to Mechanics (Special Indian Edition, 2009) by Daniel Kleppner and Robert Kolenkow

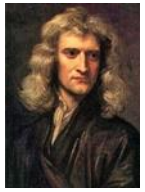
Syllabus for Thermodynamics

- Temperature and zeroth law of thermodynamics
- Equation of state
- Hydrostatic systems
- Intensive and extensive coordinates
- Work
- PV diagram and $\int PdV$ for quasi-static processes
- Heat and first law of thermodynamics – Internal energy, Heat energy, Thermal conductivity
- The second and third laws of thermodynamics – Reversibility, Entropy, Absolute temperature

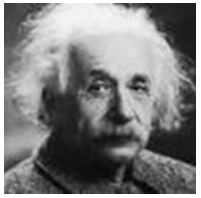
Heat and Thermodynamics (8th edition) by Mark W Zemansky and Richard H Dittman

Reference books:

- Physics for Scientists and Engineers (Third Edition) by Paul M. Fishbane, Stephen Gasiorowicz, and Steve Thornton
- Berkeley Physics Course
- Feynman's Lectures on Physics



Isaac Newton



Albert Einstein

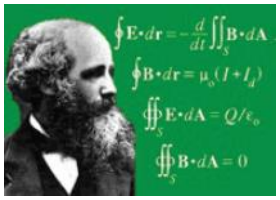
Max Planck

W. C. Röntgen

W. Heisenberg

Niels Bohr

Michael Faraday



James Clerk Maxwell

C. V. Raman

S. N. Bose

A-M Ampere

N L Sadi Carnot

Meghnad Saha

S Chandrasekhar

Homi J Bhabha

Joseph Fourier

Marie S Curie

Pierre Curie

Irène Joliot-Curie

Jean Frédéric Joliot

Henri Becquerel

- Why we can not teach physics by just giving basic laws on p.1?

- Show how these work in all possible circumstances as in Euclidian geometry

Axioms and all sorts of deductions

1. We do not yet know all the basic laws

2. Proper understanding and correct statement of Physics laws requires some advanced mathematics

"One needs a considerable amount of preparatory training even to learn what the words mean. …. We can only do it piece by piece. Each part of the whole nature is only an approximation to complete truth. ….Because *we know that we do not know all the laws* as yet." Feynman

Theoretical physicists imagine, deduce, and guess at new laws

Experimental physicists experiment, imagine, deduce, and guess at new laws

Test of all knowledge is experiment

How can the results of an experiment be wrong?

By being inaccurate!

Example of mass of an object

Spinning top and a still one have the same mass

Mass is now known to increase with velocity!

Our picture of the world needs to be altered even though the mass changes only by a bit!

At first the phenomena of nature were divided into classes:

Heat, electricity, mechanics, magnetism, material properties, optics, Gravitation, Nuclear physics, Meson phenomena, …..

Physicists aim to see *complete nature* as different aspects of *one set* of phenomena i.e. to *amalgamate these different classes*.

Historically physicists were able to amalgamate them but as time goes on new things were found e.g. x-rays, mesons, Higgs Bosons, and so on

Heat, electricity, mechanics, magnetism, material properties, optics, Gravitation, Nuclear physics, Meson phenomena, …..

Amalgamation of heat and mechanics – heat and all temperature effects can be represented by laws of mechanics!

Amalgamation of electricity, magnetism, and light – different aspects of electromagnetic field!