Bennett University
Course Handout for EPHY108L, Spring 2021
Bachelor of Technology (B.Tech.)

Course name	Mechanics (EPHY108L)			Semester	Two
Faculty	Dr. Soumyendu Roy, Dr. Ayan Khan			Type	Core
No. of Contact Hours	2-0-2	Credits	3	Pre-requisites	None

Course Description
Detailed Syllabus or lecture plan

Module 1 (11 hours)
Mathematical prerequisites, Kinematics, Newton's Laws, Work Energy Theorem, Conservation of Momentum and Energy, Conservative Forces and Potential Energy, Non-conservative forces. Harmonic Oscillator: Free, Damped and Forced Oscillations, Resonance.

Module 2 (12 hours)
Rotational Motion, Conservation of Angular Momentum, Moment of Inertia, Parallel and Perpendicular axis theorem, Rigid Body Motion, Euler's Equations and its application, Non-Inertial Frames of Reference, Pseudo Forces, Coriolis and Centrifugal Forces, Central Forces, Kepler's Laws, Planetary Motion.

Module 3 (5 hours)
Special Theory of Relativity: Michelson-Morley Experiment, Lorentz Transformation, Length contraction, Time Dilation, Velocity transformation and Mass-Energy Equivalence

Lab Experiments

The course covers basic college level experiments on a wide range of topics in physics. In the current online format the course includes virtual experiments from Amrita Viswa Vidhyapeetham (vlab.amrita.edu). This virtual lab is sponsored by Ministry of Human Resource Department under National Mission on Education through ICT. Experiments include study of Instrumental Error in physical measurements involving Vernier callipers and screw gauge, demonstration of Newton's Second Law of Motion, Conservation of momentum and kinetic energy during Elastic and inelastic collisions, determination of acceleration due to gravity by Kater's pendulum, Determination of Young's Modulus by the method of bending, etc.

Course Learning Outcomes:

CLO1: Learn how to apply Newton's Laws and understand the concept of energy

CLO2: Solve problems involving rotational motion

CLO3: Get introduced to the concept of central forces and planetary motion

CLO4: Learn about harmonic oscillators

CLO5: Introduction to special theory of relativity

CLO6: Perform basic physics experiments, tabulate observations, analyse data and draw conclusions

Books:

Text Book:	1. Daniel Kleppner & Robert J. Kolenkow, An Introduction to Mechanics (2nd ed.), Cambridge University Press, 2014. ISBN 978-0-521-19811-0 (If second edition is not available first edition can also be used)
References:	1. Hugh D. Young and Roger A. Freedman, University Physics (13th ed.), Pearson (Addison-Wesley), 2012. ISBN 13: 978-0-321-69686-1; ISBN 10: 0-321-69686-7. 2. Charles Kittel, Walter D. Knight, Malvin A. Ruderman, Berkeley Physics Course, Mechanics (Vol. 1, 2nd ed.), McGraw-Hill, 1973. ISBN 0-07-004880-0. 3. David Halliday, Fundamentals of physics (10th ed.), Wiley, 2013, ISBN 9781118230718.

Evaluation policy of the course:

Components of Course Evaluation	Percentage Distribution
Mid Term Examination	15%
End Term Examination	35%
Quiz	30%
Lab continuous evaluation	10%
Lab End Term Examination	10%