**MET 1105 Classical Mechanics (3 CU)**

**Description**

This is an introductory course in classical mechanics designed to cover topics that are important in Meteorology. Major topics covered are motion in one and two dimensions, Newton's laws of motion, conservation of energy and momentum, vibrations and waves.

**Objectives**

The course will help the students to achieve the following objectives

* Describe the different types of motion
* Understand the energy conservation laws and apply them in different processes
* Understand different wave types and their properties

**Learning outcomes**

By the end of the course students should be able to:

* Explain and describe motion in one- and two-dimensions,
* State Newton's laws of motion and apply them to solve some problems,
* State the laws of conservation of energy and momentum and their applications to some physical processes,
* Explain oscillations of some systems and explain their relationship with waves
* Describe different types of waves and their common properties.

**Intellectual, Practical and transferable skills**

* Problem solving
* Analytical
* communication

**Teaching and learning patterns**

The mode of learning involves direct contact with students in form of lectures, Tutorials and assignments

**Indicative content**

Kinematics of a point: displacement, instantaneous velocity and acceleration, motion of projectiles,

Frames of references: inertial and rotating frames, co-ordinate frames (Cartesian and spherical),

Newton’s laws of motion and some of their applications,

Work, conservative and non-conservative force fields, conservation of energy and linear momentum;

Circular motion: centrifugal force, angular frequency and acceleration, vector representation of acceleration and velocity,

Rotating rigid bodies: torque, angular momentum and conservation of angular momentum. Orbital motion: gravity, gravitational potential energy, satellite and planetary orbits.

Vibrations and wave motion: Simple harmonic motion, types of waves, general equation of waves, and complex representation of oscillations, superposition of waves and Doppler effects.

**Assessment Method**

The assessment method is structured to include course work, and final examination. Course work consists of assignments, reports and tests and accounts for 30% of the final grade. The final examination will account for 70% of the final grading

**Core Reference materials**

* **David Morin** (2008): Introduction to classical mechanics, *Cambridge University Press.*
* **T. W. B. Kibble** **and F. H. Berkshire** (1995), Classical mechanics, 4th Ed., *Addison Wesley Logman Ltd. Essex.*