**MET 2203 Physical meteorology (3CU)**

**Description**

This course seeks to develop a better understanding of the physical processes that transport momentum and energy in the atmosphere which include turbulence, convection and radiative transfer.

**Objectives**

The course will help the students to achieve the following objectives

* Describe the concepts of radiance and irradiance together with their applications
* Understand the dynamics of solar radiation in the atmosphere
* Describe the different thermodynamic diagrams

**Learning outcomes**

By the end of the course, a student should be able to:

* Explain the processes that transport energy and momentum within the atmosphere
* Critically interpret thermodynamic diagrams.

**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**

* The sun: general features of the sun’s activity, motion and duration of the sun, sunspot activity, nature and characteristics of radiation, quantities and units and solar radiation measurement techniques.
* Radiative transfer fundamentals; Radiance and Irradiance, Kirchoff and Planck’s laws, absorption, emission and scattering of radiation (Mie and Rayleigh scattering) and vertical optical depth.
* Disposition of solar radiation under cloudiness and cloudy conditions, Importance of greenhouse gases
* Heat transfer processes at the ground, maximum and minimum temperature forecasting using empirical, Brunt and Groen formulae.
* Thermodynamic Diagrams; emagram, tephigram and skew-T Log P diagram, interpretation and their application in terms of stability, inversions, lifting condensation levels, convective condensation level and tropopause level, wet-bulb temperature. Convective available energy and convective inhibition.

**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**

* **George J. Haltiner and Frank L. Martin** (1957): Dynamical and Physical Meteorology, *New York, McGraw-Hill*
* **Gary E. Thomas and Knut Stamnes** (1999): Radiative transfer in the atmosphere and Ocean, *Cambridge University Press.*
* **Seymour L. Hess** (1979): Introduction to Theoretical Meteorology, [*R.E. Krieger Pub. Co.*](http://openlibrary.org/search?publisher_facet=R.%20E.%20Krieger%20Pub.%20Co.)