INTRODUCTION TO ATMOSPHERIC AND SPACE SCIENCES

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IIT Roorkee

TYPE OF COURSE : New | Elective | UG/PG
COURSE DURATION : 12 weeks (27 Jan' 20 - 17 Apr' 20)
EXAM DATE : 25 Apr 2020

PRE-REQUISITES : BSc level Physics / B.Tech (I) level Physics course

INTENDED AUDIENCE : M.Sc (Physics), MSc (Chemistry), MSc (Mathematics), M.Tech (Atmospheric Science), B.Tech (Civil), B.Tech (Mechanical), B.Tech (Chemical), Pre-PhD

INDUSTRIES APPLICABLE TO : ISRO, CSIR, DRDO

COURSE OUTLINE :

This course introduces the basics of Earth's atmosphere to graduate and post-graduate students. It starts from the evolution of atmosphere and gives understanding of various physical and chemical processes responsible for the observed changes we see in weather and climate. It gives a comprehensive understanding of neutral atmosphere, ionosphere and various plasma processes.

ABOUT INSTRUCTOR :

1. M.Sc. (Physics) from Sri Venkateswara University, Tirupati
2. M.Phil (Theoretical High Energy Physics) from University of Hyderabad
3. Ph.D (Atmospheric and Space Physics), IIT Roorkee

Assistant Professor in Physics at IIT Roorkee since 2011.
Prof. Krishna does research in the area of atmospheric and space physics, with specific interest in understanding the space weather effects on the neutral atmosphere and ionosphere by combining satellite, ground based measurements and modeling techniques.

COURSE PLAN :

Week 1: Atmospheric evolution

Week 2: Variation of temperature with height, density and ionization with altitude

Week 3: Fundamental forces

Week 4: Thermodynamics of earth's atmosphere

Week 5: Stability of atmosphere

Week 6: Atmospheric absorption and greenhouse effect

Week 7: Forced lifting of air, cloud formation and growth, cloud morphology, growth of cloud droplets, terminal velocity of rain droplets

Week 8: Physics of lightening, radiative transfer and budget, atmospheric equations of motion, atmospheric absorption, albedo

Week 9: Earth's upper atmosphere, Ionosphere, various layers and chemistry of ionosphere

Week 10: Composite F layer, single particle motion in homogeneous fields

Week 11: Single particle motion in homogeneous electric and magnetic fields

Week 12: Chapman's theory of layer production, airglow and aurora, Earth's magnetosphere, reconnection and measurement techniques using ground based and space borne instruments.