

Indian Institute of Technology, Kanpur

Proposal for a New Course

1. Course No: SPA***A

2. Course Title: *Introduction to Planetary Remote Sensing from Space Missions*

3. Lectures per week: $L=2$, Tutorial: $T=0$, Laboratory: $P=3$, Additional hours: $(0-2)=0$ (A), Credits $(3*L+2*T+1*P+A) = 5$

Duration of Course: *Half Semester*

4. Proposing Department: *Space, Planetary and Astronomical Sciences and Engineering*

5. Proposing Instructor: *DPGC Convener, SPASE*

6. Other Instructors who may teach this course:

7. Course Description

(A) Objectives: The course.

(B) Contents:

1. Planetary surface properties and Radiation Interactions [5 lectures]

The character of planetary surfaces, differentiated and undifferentiated planetary bodies, solar system processes and interactions. Planetary regolith, megaregolith.

2. Optical Image interpretation of planetary surfaces [3 lectures]

Elements of image interpretation, concept of spatial resolution, viewing geometry, Application in identifying active surface processes (viz. wind, water, ice)

3. UV-Vis-NIR Multi-Spectral and Hyperspectral Remote Sensing of planetary surfaces [5 lectures]

Spectrometer basics, Concept of Radiance, Reflectance, spectral resolution, basic spectral classification techniques (spectral parameters), and representation of spectral data (RGB composites), Application in mineral and elemental mapping

4. Topographic Data Analysis [4 lectures]

Laser ranging basics, Image-based Topographic analysis, Topographic data and products (topographic profile, digital elevation model), 2D interpolation techniques.

5. Radar Remote Sensing [3 lectures]

Radar remote sensing basics, Dielectric properties of materials, Monostatic and Bistatic modes, Circular polarization ratio (CPR), Application to compositional and textural mapping.

(C) Pre-requisites, if any: *Course on introductory geology, remote sensing or with the permission of the instructor.*

(D) Short summary for including in the Courses of Study Booklet:

This course would provide an overview of various types of remote sensing of planetary bodies carried out by space missions through time using various techniques. The student will be introduced to the analysis of remote sensing datasets from missions.

7. Recommended Books:

R. P. Gupta / Remote Sensing Geology / Third Edition (2018) / Springer Verlag Publisher / ISBN-10 : 3662558742, ISBN-13 : 978-3662558744 / 428 pages
Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman/ Remote Sensing and Image Interpretation/ 7th Edition (2015)/ ISBN: 978-1-118-34328-9 / 736 pages
Bruce A Campbell / Radar Remote Sensing of Planetary Surfaces /2002/ Cambridge University Press / 9780521583084, 052158308X / 331 pages

8. Any other remarks:

Dated: Proposer:

Dated: DUGC/DPGC Convener:

The course is approved/not approved

Chairman, SUGC/SPGC

Dated: