

# Remote sensing of planetary surfaces

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Niveau d'étude  
Master 2



ECTS  
3 crédits



Volume horaire  
30h



Période de  
l'année  
Semestre 3

## Présentation

### DESCRIPTION

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1 – The Golden Age of Solar System exploration: from light dots to new worlds. An history of space exploration. General questions on the origin and evolution of the Solar System. Surfaces scars as fingerprints of endogenic and exogenic evolution processes: bombardments, space weathering, topography, composition.

2 – Multi-wavelengths remote sensing strategy: from radio to gamma photons. How to probe surfaces at various depths. Imaging and spectroscopy. Light-matter interactions and remote sensing instruments. Examples.

3 – From observations to structure and composition: modelling planetary surfaces. Commonly used analytical models. Modeling particles and surface scattering, energy balance and thermal emission.

4 – Methodology (after Python lectures, end of semester) with Python 3 and Notebooks: Photometric models of planetary surfaces, energy balance and radiometry, thermal emission

The session 2 mark is the sup of the ET mark and  $0.7 \cdot ET + TP \cdot 0.3$ .

### OBJECTIFS

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This lecture aims at giving a general culture on the exploration of the Solar System and describing the remote sensing methods commonly used to characterize the effects of endogenous and exogenous evolutionary processes on the structure of atmosphere-free planetary surfaces in the Solar System. The methodologic part is dedicated to understand radiometric modeling of surface radiative transfer, and know how to implement, test and validate an analytical model in Python.

### HEURES D'ENSEIGNEMENT

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Remote sensing of planetary surfaces	Cours Magistral	21h
Remote sensing of planetary surfaces	Travaux Pratiques	9h

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## PRÉ-REQUIS OBLIGATOIRES

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Basics of thermodynamics, electromagnetism and mathematics (L2 level), notions of algorithmics and Python language.

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