



# Introductory Course in Remote Sensing: Physical Principles and Digital Image Processing

Presented by the Department of Geography, Geo-informatics and Meteorology,  
University of Pretoria

26–28 March 2019

3 SACNASP CPD Points | CPD Reg No: 2018-0115-000344

This **Introductory Course in Remote Sensing: Physical Principles and Digital Image Processing** provides an introduction to the physical principles of satellite remote sensing, and basic remote sensor data processing. In particular, this includes

- examining the basic physics of electromagnetic (EM) radiation and the complex interactions of radiation with the atmosphere and surface
- examining the characteristics of the EM radiation (spectral signatures) across regions of the EM spectrum for various surface targets
- reviewing the main resolutions of a sensor system, types of sensors (passive and active), remote sensing platforms (ground-based, airborne and spaceborne) and satellite remote sensing missions
- basis for interpretation of remote sensing images, and
- hands-on basic remote sensor data processing i.e. performing image corrections for common sources of error in satellite imagery, and performing image enhancement and image classification in-order to generate thematic information.

In particular, the classification of images will entail applying selected vegetation indices, supervised pixel- and supervised object-based classification techniques to the provided image data sets; followed by verification of classification results by constructing an error assessment matrix. Furthermore course will also cover various online remote sensor data archives where imagery of varying resolution characteristics can be obtained free of charge.

*Shifting knowledge to insight*



# Introductory Course in Remote Sensing: Physical Principles and Digital Image Processing

Presented by the Department of Geography, Geo-informatics and Meteorology, University of Pretoria

## Course content

- Overview of remote sensing of the environment
- Basic theory of electromagnetic radiation (ER) and interaction of ER with the terrain features and atmosphere
- Multispectral, Hyperspectral and Lidar remote sensing systems and platforms
- Image pre-processing, enhancement, classification and accuracy assessment
- Applications of remote sensing

## Learning outcomes

After successfully completing this course, you will

- have an understanding of the key theoretical components involved in the remote sensing data collection process such as, energy sources, energy-terrain-atmosphere interactions, platforms and sensor resolution characteristics spanning multispectral and hyperspectral
- be able to search, order and download satellite imagery (free of charge) from various online data catalogues
- understand satellite imagery exploration and statistical evaluation of raw multispectral data sets using ENVI software, in-terms quality assessment and influence of the varying four sensor resolutions (i.e. spatial, spectral, radiometric and temporal)
- be able to perform basic image correction procedures such as geometric, radiometric and atmospheric corrections as well as enhancement using ENVI and Snap software
- be able to apply and compare supervised pixel-based and object-based image classification methods using high (2-10m) to ultra-high (1-5cm) spatial resolution multispectral imagery. Extract meaningful information and prepare a thematic map coupled with classification accuracy statistics, and
- have knowledge of a wide variety of applications of remote sensing e.g. in thermal, vegetation, water, soil and minerals, urban - as well as the characteristics of the full electromagnetic spectrum and wavelength selection for mapping of certain targets.

## Who should enrol?

This course is ideal for Professionals, managers and scientists who have the desire to acquire knowledge and skills in executing the remote sensing process by extracting meaningful information from remotely-sensed (i.e. satellite/aerial) multispectral imagery e.g. imagery acquisition, processing, analysis and reporting.

## Course fees

### R 7 050 per delegate (VAT incl.)

Course fees include all course material and refreshments during contact days.

**Course fees must be paid in full 14 days prior to course start dates. Proof of payment can be submitted to [enrolments@enterprises.up.ac.za](mailto:enrolments@enterprises.up.ac.za).**

## Admission requirements

Prospective delegates should at least have a basic statistics background and experience working with at least one GIS or remote sensing software.

## Accreditation and certification

Enterprises University of Pretoria (Pty) Ltd is wholly owned by the University of Pretoria. As a public higher education institution, the University of Pretoria functions in accordance to the Higher Education Act 101 of 1997. Enterprises University of Pretoria offers short courses on behalf of the University and these short courses are not credit-bearing, and do not lead to formal qualifications on the National Qualifications Framework (NQF) – unless stated otherwise. Delegates who successfully complete a short course and comply with the related assessment criteria (where applicable) are awarded certificates of successful completion and/or attendance by the University of Pretoria.

## Registration and enquiries

### Course coordinator

Getrude Hlungwani  
Tel: +27 (0)12 434 2569  
Cell: +27 (0)72 499 0162  
Email: [getrude.hlungwani@enterprises.up.ac.za](mailto:getrude.hlungwani@enterprises.up.ac.za)

### Course leader

Mr Philemon Tsele  
Department of Geography, Geoinformatics and Meteorology  
Tel: +27 (0)12 420 4939  
Email: [philemon.tsele@up.ac.za](mailto:philemon.tsele@up.ac.za)

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