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Sentrum vir Geografiese Analise • Centre for Geographical Analysis

Introduction to Earth Observation short course

This introductory course is aimed at **beginners** who need instruction in basic remote sensing functions such as data acquisition, pre-processing and classification. Upon completion, participants will understand the basic principles of earth observation, the electromagnetic spectrum, digital data, image resolution, satellite systems, pre-processing techniques and classification and will apply these concepts in ArcGIS Pro.

Course structure

Option 1: Accredited option @ R 8 000

The course duration is a total of **8 weeks**. The first **4 weeks** students receive access to lectures and practical exercises requiring about 8 to 10 hours of effort per week. At the end of the 5th week students are required to write an examination. This is followed by a final 3 weeks during which students' complete assignments. Students will be assisted during the course by having access to forums and weekly online q & a sessions. A preliminary course schedule is provided below.

Option 2: Attend-only option @ R 6 000

Students who are not interested in being assessed may choose to **register for the first 4 weeks only** (i.e., only get access to the lectures and exercises and not write the exam or complete any assignments). Students choosing this option will receive a certificate of attendance.

Students need not be on campus during the duration of this course but need access to a computer loaded with **ArcGIS Pro** software. Temporary software licences (valid for two months) can be supplied if necessary.

Standard course fees are reduced by 20% for Stellenbosch University students and staff members if paid via an internal university cost point.

Accreditation

This course is accredited by Stellenbosch University, an accredited higher education provider.

Outcomes

Students who complete the full course will be able to:

1. Demonstrate a generic understanding of what Earth Observation is.
2. Demonstrate an appreciation of the specialist knowledge needed to apply remote sensing techniques.
3. Demonstrate an understanding of the functionality available in a remote sensing software package.
4. Demonstrate an understanding of the electromagnetic spectrum.
5. Understand digital data.

6. Identify suitable sources of imagery.
7. Explain why pre-processing is required and how it can be applied.
8. Identify the appropriate pre-processing techniques.
9. Do field surveys for earth observation applications.
10. Carry out a supervised and unsupervised image classification.
11. Understand how to perform and interpret an accuracy assessment.

Prescribed reading

In preparation for the course, participants can read Chapters 1-6, 10-14 of Campbell (2006). The full reference is:

Campbell JB 2006*. *Introduction to remote sensing*. Fourth Edition. London: Taylor & Francis.

*Later versions are preferred.

Software requirements

Students need not be on campus during the duration of this course but need access to a computer loaded with **ArcGIS Pro** software. Temporary software licences (valid for two months) can be supplied if necessary. To make sure your system meets the minimum requirements to run ArcGIS Pro click [here](#). To check your computer's ability to run ArcGIS Pro, click [here](#).

Assessments

Students who register for the full course will write an exam at the end of the 5th week of the course. The test will count towards 50% of the final course mark and will contain questions relating to the lectures, exercises, and the prescribed reading. An assignment will have to be completed within the 3 weeks following the exam. The assignment will be a practical task and will count towards 50% of the final course mark.

Course fees and registration

The course fees are R 8 000 per student (R 6 000 if registering for the attendance only option). Standard course fees may be reduced by 20% for Stellenbosch University students and staff members when paying via a university cost point.

To register for this short course:

1. Go to <http://www.shortcourses.sun.ac.za/courses.html> and click "Environmental; Agri & Natural Sciences".
2. Choose the relevant course and proceed with the registration.
3. Make sure to choose the correct **Option** (i.e. 1: Attendance vs 2: Competence).

Please forward any queries to:

Ms Jessica Eichhoff
Email: eichhoffj@sun.ac.za
Fax: 021 808 3109
Web: www.sun.ac.za/cga

Seats will be awarded on a first-pay-first-seated basis. Please enquire about the availability of seats before paying.

PRELIMINARY COURSE CONTENT AND SCHEDULE

Week 1
Welcome and course orientation
Lecture: History and scope of remote sensing
Lecture: Visual image interpretation
Lecture: Electromagnetic radiation
Lecture: Digital data
Practical exercise 1: ArcGIS Pro 1
Week 2
Lecture: Earth Observation Satellites
Practical exercise 2: ArcGIS Pro 2
Lecture: Image resolution
Practical exercise 3: Image visualization and interpretation
Lecture: Pre-processing 1 – Geometric Correction
Lecture: Pre-processing 2 – Radiometric Correction
Practical exercise 4: Ortho-rectification
Week 3
Practical exercise 4 (continue): Ortho-rectification
Practical exercise 5: Radiometric and atmospheric corrections
Lecture: Image classification
Practical exercise 6: Unsupervised classification
Practical exercise 7: Supervised classification
Week 4
Lecture: Field data collection
Lecture: Accuracy assessment
Practical exercise 8: GPS
Practical exercise 9: Accuracy assessment
Practical exercise 10: Various applications
Week 5
Theory exam
Week 6 – 7
Assignment