Course Specifications

Valid as from the academic year 2019-2020

Land Information Systems (I001553)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)

Credits 5.0 Study time 135 h Contact hrs 60.0 h

Course offerings in academic year 2020-2021

A (semester 1) English Gent

Lecturers in academic year 2020-2021

Verdoodt, Ann	LA20	lecturer-in-charge

Offered in the following programmes in 2020-2021	crdts	offering
Master of Science in Physical Land Resources (main subject Land Resources Engineering)	5	A
Master of Science in Physical Land Resources (main subject Soil Science)	5	A

Teaching languages

English

Keywords

Georeferenced information, natural resources, GIS, thematic maps, spatial analysis, cartographic modeling; QGIS

Position of the course

A land information system consists of a database containing spatially referenced land-related data for a defined area and of procedures and techniques for their collection, updating, processing and distribution. This course aims to build insight in the science behind Geographic Information Systems (GIS) with a focus on natural land resources, complemented with a hands-on PC training in the use of GIS software to perform an advanced integrated spatial analysis that supports land use related decision-making.

Contents

Theory
Partim A - Essential Functionalities and Basic Spatial Analysis
1. GIS definition and general functionalities
2. Basic map concepts: vector and raster data structures, topology, sources of geographical information (maps, remote sensing, GPS)
3. Map scale, projections and coordinate systems
4. GPS
5. Hardware and software, DBMS
6. Basic GIS functions (editing, transformations, map join,..)
7. Basic spatial analysis

Partim B - Advanced spatial analysis
8. Advanced spatial analysis and cartographic modeling (reclassification, overlay, buffer, network connectivity, contiguity, proximity, spreading, digital terrain model analysis)
9. Interpolation methods (trend surfaces, Thiessen polygons, Inverse distance weighting)
10. Quality assessment of land information systems

Practical exercises
Partim A - Essential Functionalities and Basic Spatial Analysis
1. On-screen digitalisation, editing of vector layers and adding attribute information
2. Correct visualization of spatial information (coordinate reference systems, color maps)
3. GIS analysis and basic cartographic modeling

Partim B - Advanced spatial analysis
4. GIS analysis and advanced cartographic modeling
5. Applying interpolation techniques

Initial competences

The student understands the meaning and use of statistical descriptives, regression analyses, and statistical tests (t-test, ANOVA)

Final competences

1 Understand and correctly use specific terminology and principles related to GIS in general and land information systems more specifically when communicating with experts
2 Being capable to equip a GIS laboratory with the necessary hardware and software, being at the same time aware of the importance of required human expertise
3 Understand and recognize the importance of map projections in GIS and LIS, and being capable to define and/or change map projection and coordinate systems
4 Being aware of the applicability of LIS in various other scientific disciplines and in interdisciplinary assessments involving natural land resources
5 Importing, exporting and editing digital information from various sources
6 Performing basic as well as advanced spatial analyses on digital maps representing vector and raster data structures
7 Performing advanced analyses on digital elevation models
8 Interpolate point maps to raster maps
9 Perform an integrated spatial analysis on the basis of digital information (cartographic modelling)

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Demonstration, lecture, seminar: practical PC room classes

Extra information on the teaching methods

The theoretical lessons are lectures with some demonstrations in ArcGIS.
Practical exercises consist of supervised practicum and demonstration in a PC-class using QGIS.
The students can prepare themselves to each practical exercise through a series of weblectures, handling specific actions and commands in the software package QGIS.
The student can also monitor his/her progress in skills and understanding throughout the practical sessions using curios tasks.

Learning materials and price

An English syllabus (course + practical exercises) will be made available during the first lectures, downloadable from Minerva (about 180 pages, estimated printing cost: €12).
During the course of the lectures, an electronic version of the slides will be deposited at the Minerva site. Weblectures will be provided that illustrate specific actions and commands in QGIS. QGIS software is available for download and is installed on the computers in the PC rooms of the faculty.

References

- Longley, P.A., Goodchild, M.F., Maguire, D.J., Rhind, D.W. 2015. Geographic Information Science and Systems. 4th Edition. Wiley
- Burrough, P., McDonnell, R.A., Lloyd, C.D. 2015. Principles of Geographic Information Systems. 3rd Edition. Oxford University Press
- Heywood, I., Cornelius S., Carver, S. 2012. An Introduction to Geographic Information Systems. Pearson Education Limited, Prentice-Hall
- DeMers M.N. 2017. Geographic Information Systems in Action. 1st Edition. Wiley.

Course content-related study coaching

GIS-library for additional information is available. The software package is freely downloadable on personal computer and has been installed as well in different PC classes for easy access during self-study. Consultancy by professor and assistant if needed.

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination with open questions

Examination methods in case of periodic evaluation during the second examination period

Written examination with open questions

Examination methods in case of permanent evaluation

Written examination with open questions, participation, skills test

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

The period-aligned evaluation consists of a written examination with open questions on the theory.

The non-period aligned practical examination consists of an integrated exercise, combining different tools seen in the practical exercises, that (1) needs to be completed on the PC (skills test) and (2) of which the main results are reported in the form of a written exam. This exam takes place during the last scheduled practical exercise at the end of the semester.

Calculation of the examination mark

The overall mark for the course is calculated based on two parts: a theoretical exam (40%, written examination) and a practical exam (55%, written examination; 5%, participation).
If the student obtains less than 10/20 on the practical exam, he/she cannot pass for the course. In case the overall score would be 10 or more on 20, this will be reduced to 9/20.
If the student doesn't pass for the course in the first session, but succesfully passed the theoretical exam, he/she can pass on these marks to the 2nd session and only need(s) to repeat the practical exam.