GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2020-2021

Land Information Systems (I002774)

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	Study time	Contact hrs
5.0	150 h	50.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	English	Gent	lecture	12.5 h
			seminar: practical PC room classes	22.5 h
			group work	12.5 h
			demonstration	2.5 h

Lecturers in academic year 2020-2021

Dondeyne, Stefaan	WE12	staff member
Verdoodt, Ann	LA20	lecturer-in-charge
Sleutel, Steven	LA20	co-lecturer

Offered in the following programmes in 2020-2021	crdts	offering
Master of Science in Physical Land Resources (main subject Land Resources Engineering)	5	A
International Master of Science in Soils and Global Change (main subject Physical Land Resources and Global Change)	5	A
International Master of Science in Soils and Global Change (main subject Soil Biogeochemistry and Global Change)	5	A
Master of Science in Physical Land Resources (main subject Soil Science)	5	A
Exchange Programme in Bioscience Engineering: Land and Forest management (master's level)	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

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

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)

Practical exercises

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
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, group work, lecture, seminar: practical PC room classes

Extra information on the teaching methods

The theoretical lessons are lectures with some demonstrations.
Practical exercises consist of supervised practicum and demonstration in a PC-class using QGIS as well as a coached integrative group work.
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, assignment, skills test

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

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 three parts: a theoretical exam (35%, written examination), a practical exam (35%, skills test and written exam) and the group work (25% on the submitted maps and report, 5% on participation).
If the student doesn't pass for the course in the first session, but succesfully passed one of the three exam components, he/she can pass on these marks to the 2nd session and only need(s) to repeat the component on which he/she failed.