**Geoinformatics II**

**Code:** MK3GEO2S6SX17EN

**ECTS Credit Points:** 6 credits

**Evaluation:** exam

**Year, Semester:** 2nd year, 3rd semester

**Its prerequisite(s):** Geoinformatics I

**Further courses are built on it:** No

**Number of teaching hours/week**

Lecture: 4

Practice: 2

**Topics**:

Basics of geographic information systems. Application of GIS in technical and civil engineering practice. The concept of information systems. The role of location-based information. Information systems components and application. Process of data modelling. Geometric data reference systems. Data sources and data collection methods. Technical background of GIS systems, their operational development perspectives, and their realization problems. Database structures of geoinformatical systems, different database models, development tendency of database management systems. High and low level models of geometric and attribute data storage, theoretical basics and techniques of relational database management. Requirements against geoinformatical analysing systems. Graph-based analyses. Mathematical logic and fuzzy logic in analyses. Experts systems. Overlay and buffer operations.

Methods of height determinations, trigonometrical height determinations, levelling. Errors, types of errors, error propagation. Location definition with satellites. Using manual navigation GPS equipment. Basic concepts of space information technology. Space information systems (construction, characterization, models, applications). Construction surveys.

**Literature:**

*Compulsory:*

1. Christopher B. Jones (1997): Geographical information systems and computer cartography, ISBN: 0 582 04439 1
2. Paul A. Longley (2005): Geographical information systems and science, ISBN: 047087001X (pbk)

*Recommended:*

1. A. Bannister, S. Raymond, R Baker (1992): Surveying ISBN: 0-470-21845-2

**Schedule**

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| **1st week Registration week** |
| **2nd week:** **Lecture:** Basic definitions of the Geographical Information Systems. History of the GIS.**Practice:** GIS software, free solutions, system environment of OPENJump. | **3rd week:** **Lecture:** How GIS works**Practice:** Basic functions of OPENJump |
| **4th week:** **Lecture:** Building geodatabase / Geodatabase design principles.**Practice:** Raster and vector data in OPENJump | **5th week:** **Lecture:** Vector and raster spatial data models.**Practice:** Basic queries and analyses in OPENJump. Cartographic output in OPENJump, visualizing of the results |
| **6th week:** **Lecture:** Database planning. Establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)**Practice:** Case study: Green Infrastructure in OPENJump. Case study: “Logging” Project | **7th week:** **Lecture:** Using GIS in the daily engineering practice, case studies**Practice:** Student's presentations about their own project |
| **8th week: 1st drawing week / Short test** |  |
| **9th week:** **Lecture:** Methods off height determination**Practice:** Trigonometric heighting | **10th week:** **Lecture:** Levelling**Practice:** Measuring the front of a building |
| **11th week:** **Lecture:** Errors, types of errors**Practice:** Differential levelling with optical level | **12th week:** **Lecture:** Angles errors. **Practice:** Levelling with surveyor's digital level |
| **13th week:** **Lecture:** LIDAR. Laser scan.**Practice:** Processing levelling data - cross sections | **14th week:** **Lecture:** Construction surveys**Practice:** GNSS measuring - real time kinematic observations |
| **15th week: 2nd drawing week / End-term theoretical test/ qualifier practice** |

**Requirements**

Attendance at lectures is recommended, but not compulsory.

Participation at practice is compulsory. Students must attend the practices and may not miss more than three practice classes during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring a calculator to each practice. Active participation is evaluated by the teacher in every class. Active student’s participation should be required.

During the semester, there are two tests: the first one in the 8th week, and the end-term test in the 15th week. Only the end-term-test is compulsory.

On the 8th week the student may write a short (self-control) test about the subjects of the first 6 lectures and practices. The maximum reachable point is 10. There is no minimum limit, thus it is not repeatable and the students can’t rectify the result of this test.

On the 15th week the students have to write the theoretical test for maximum 90 points. The minimum requirement for the end-term tests is 45 points. If the score of the theoretical test is below 45, the student once can take a retake test on the next week.

During the semester, there is one qualifier practice in the 15th week.

Students have to complete the qualifier practice as scheduled on a minimum sufficient level.

The course ends in an **exam grade**. Based on the results of the 2 tests, students are offered an exam grade if the grade of the tests is at least satisfactory (3).The students can either accept or refuse the offered grades. If a student does not accept the grade offered by the lecturer, they should sit for a written exam during the examination period. Evaluation of the written exam (ESE) is according to the following table:

 **Score Grade**

 0 – 50 points: fail (1)

 51 – 61 points: pass (2)

 62 – 74 points: satisfactory (3)

 75 – 87 points: good (4)

 88 – 100 points: excellent (5)