COURSE DESCRIPTION CARD - SYLLABUS

Course name
Geographic information systems [S1Trans1>SIG]

Course

Field of study
Transport

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

KNOWLEDGE: The student has basic knowledge of information technology provided in the program of the first-cycle studies. SKILLS: The student is able to use modern electronic communication tools at a basic level, uses office applications. SOCIAL COMPETENCES: The student is aware of the globalization and intensification of information processing and exchange in social and economic life.

Course objective

Acquainting with the problems and existing IT solutions in the field of geographic information systems. Developing the ability to optimize the use of technology and computer tools, taking into account the effectiveness of the created solutions, economic aspects and design assumptions.

Course-related learning outcomes

Knowledge:
The student has ordered and theoretically founded general knowledge in the field of key issues of technology and detailed knowledge in the field of selected issues in this discipline of transport engineering.
The student knows the basic techniques, methods and tools used in the process of solving tasks in the

field of transport, mainly of an engineering nature engineering.

Skills:
The student is able, when formulating and solving tasks in the field of transport, to apply appropriately selected methods, including analytical, simulation or experimental methods.
The student has the ability to formulate tasks in the field of transport engineering and their implementation using at least one of the popular tools.

Social competences:
The student understands that in technology, knowledge and skills very quickly become obsolete.
The student can think and act in an entrepreneurial way, incl. finding commercial applications for the created system, taking into account not only business benefits, but also social benefits of the conducted activity.
The student is aware of the social role of a technical university graduate, in particular, he/she understands the need to formulate and transfer to the society, in an appropriate style, information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the transport engineer profession.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: assessment of the student activity during lectures and final exam in the form of a test of choice (from 5 to 15 questions/tasks, min. 50%)
Laboratory classes: final test (1 to 2 tasks to be completed, min. 50%)

Programme content

1. The essence of geographic information systems.
2. Object mapping.
3. Geographic data extraction.
4. Spatial data analysis.
5. Mapping errors of topographic objects.
6. Legal regulations in geographic information systems.
7. Mapping representations.
8. Combining data in geographic information systems.
9. Use of geographical data in transport and logistics.

Course topics

Lectures:
1. Introduction to GIS, historical overview.
2. Raster and vector data, 0, 1 2 and 3 dimensional elements,
3. Digital and paper map, measurements of the earth: latitude and longitude, projections and coordinates, measuring latitude and longitude.
4. GIS software, geographic data modelling, CAD data models, raster data model, vector data model, object data model.
5. Geographic data modelling in practice.
6. Data collection (data collection process, primary geographic data extraction, raster data extraction, vector data extraction, secondary geographic data extraction), attribute capture.
7. Creation and maintenance of GIS databases.
8 Cartography, geovisualisation.
9. Spatial data analysis, spatial analysis and inference, spatial modelling with GIS.
10. GIS management, Decision making with GIS (in logistics and transport).

Laboratory:
1. Basic operations on datasets using QGIS. Storage.
2. File storage standards in QGIS.
3. Use of analysis tools in QGIS, Euclidean metric of file storage in QGIS.
4. Selected analysis tools in QGIS using external data.
5. Acquisition of GIS data from various sources.

Teaching methods

Lecturer: multimedia presentation and discussion.
Laboratory classes: activation methods (case studies), didactic discussion

Bibliography

Basic
Bielecka E.: Systemy informacji geograficznej: teoria i zastosowania. Wydawnictwo Polsko-Japońskiej Wyższej Szkoły Technik Komputerowych, Warszawa 2006.
Iwańczak B.: QGIS 2.14.3. Tworzenie i analiza map. Wydawnictwo Helion, wydanie II, Warszawa 2016.
Jan Van Sickle: Ebasic GIS Coordinates Wydawnictwo CRC Press, wydanie III, 2017.
Longley P.A., Goodchild M.F., Maguuire D.J., Rhimd D.W.: GIS. Teoria i praktyka. Wydawnictwo Naukowe PWN, Warszawa 2006.
Szczepanek Robert, Zmuda-Trzebiatowski P.: 3.12 QGIS. Wstęp do QGIS - samouczek Politechnika Poznańska, Poznań 2020. www.dts.put.poznan.pl
Additional
Jian Guo Liu, Philippa J. Mason: Image Processing and GIS for Remote Sensing: Techniques and Applications Wydawnictwo Wiley Blackwell, wydanie II, 2016.
Kwiecień J.: Systemy informacji geograficznej - podstawy. Wydawnictwa Uczelniane ATR w Bydgoszczy, Bydgoszcz 2004
Shashi Shekhar, Shashi Shekhar, Hui Xiong: Encyclopedia of GIS Wydawnictwo Springer, wydanie II, 2017

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	2,00