



Urban Planning and Environmental Management

Course description sheet

Basic information

Field of study Remote Sensing and Geo Informatics	Didactic cycle 2026/2027
Major All	Course code DRSGIS.II4.15500.26
Organisational unit Faculty of Geo-Data Science, Geodesy, and Environmental Engineering	Lecture languages English
Study level Second-cycle studies	Mandatoriness Obligatory
Form of study Full-time studies	Block Core Modules
Profile General academic	Course related to scientific research Yes
Course coordinator	Antoni Rzonca, Natalia Borowiec
Lecturer	Antoni Rzonca, Natalia Borowiec
Period Semester 3	Method of verification of the learning outcomes Exam
	Activities and hours Lectures: 30 Workshop classes: 120
	Number of ECTS credits 12

Goals

C1	To carry out a transition work, the purpose of which is to perform scientific research work on the processing of geospatial data for 3D modelling with its application to urban planning and their evaluation and impact on the environment.
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Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge - Student knows and understands:			
W1	advanced knowledge of photogrammetry and laser scanning	RSGI2A_W01, RSGI2A_W04	Test, Examination, Preparation and conduct of scientific research
W2	advanced knowledge of point cloud generation methods	RSGI2A_W04	Test, Examination, Preparation and conduct of scientific research
W3	advanced knowledge of 3D modelling	RSGI2A_W04	Test, Examination, Preparation and conduct of scientific research
W4	knowledge of urban planning	RSGI2A_W03	Test, Examination, Preparation and conduct of scientific research
Skills - Student can:			
U1	apply photogrammetric and laser scanning knowledge in practice	RSGI2A_U04	Project, Preparation and conduct of scientific research
U2	use photogrammetric and laser scanning data to 3D modelling and urban planning	RSGI2A_U03	Project, Preparation and conduct of scientific research
U3	perform advanced modelling processes for urban objects	RSGI2A_U03	Project, Preparation and conduct of scientific research
Social competences - Student is ready to:			
K1	intentionally select data for 3D modelling	RSGI2A_K02	Project, Preparation and conduct of scientific research
K2	solve problems of application of geospatial data for urban planning	RSGI2A_K01	Project, Preparation and conduct of scientific research

Program content ensuring the achievement of the learning outcomes prescribed to the module

Using point clouds from different sources to build 3D models; methods for developing 3D models; conducting spatial analysis to check the spatial and social relations of a new object with the surrounding.

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lectures	30
Workshop classes	120

Preparation for classes	80
Realization of independently performed tasks	70
Examination or final test/colloquium	2
Contact hours	5
Student workload	Hours 307
Workload involving teacher	Hours 150

* hour means 45 minutes

Program content

No.	Program content	Course's learning outcomes	Activities
1.	Within the block of classes, the student practically acquires knowledge and skills of the process of urban planning starting from conception of the planned object up to its 3D presentation in existing surrounding. Student selects a part of city space and he or she prepares the conception of its changing by new object insertion. He or she acquires 3D data and plans to capture additional data by photogrammetry and laser scanning (terrestrial or aerial). 3D background model is generated and applied to planning of a new object. The spatial analyses are proceeded by the student to check the spatial and social relations of the new object to the surrounding. The class ends with a project defense.	W1, W2, W3, W4, U1, U2, U3, K1, K2	Lectures, Workshop classes

Extended information/Additional elements

Teaching methods and techniques :

Classes supported by e-learning tools conducted in UPEL, BigBlueButton or MS Teams environment., Lectures, Discussion, E-learning, Case study, Group work

Activities	Methods of verification	Credit conditions
Lectures	Test, Examination	A positive grade on the exam and on the workshops
Workshop	Project, Preparation and conduct of scientific research	

Additional info

According to the terms of study of AGH.

Conditions and the manner of completing each form of classes, including the rules of making

retakes, as well as the conditions for admission to the exam

Credit of the lecture - on the basis of a positive mark of the exam. Credit of the project - on the basis of attendance at classes and a positive evaluation of the individual project report. A student may proceed to a resit twice.

Method of determining the final grade

Final grade = average of exam and workshop assignments.

Manner and mode of making up for the backlog caused by a student justified absence from classes

Compensating for the backlog caused by absence: depending on the classes subject - self-realisation of exercises with the help of individual consultations with the instructor.

Prerequisites and additional requirements

Basics of photogrammetry, laser scanner

Rules of participation in given classes, indicating whether student presence at the lecture is obligatory

Lectures are optional, verification of the knowledge during the exam as part of the transitional work passing. Workshops are mandatory. Credit is based on student's activity.

Literature

Obligatory

1. Shan J., Toth Ch. K., 2009. Topographic laser ranging and scanning. Principles and Processing. CRC Press. Boca Raton, London, New York 2009.
2. Philipp Meixner and Franz Leberl - "3-Dimensional Building Details from Aerial Photography for Internet Maps", <https://doi.org/10.3390/rs3040721>

Optional

1. Karl Kraus - "Photogrammetry. Geometry from images and Laser Scans". 2nd Edition, de Gruyter, 2007

Scientific research and publications

Research

1. Grant Dziekański „Wykrywanie obiektów antropogenicznych i ich modelowanie w oparciu o chmury punktów uzyskane techniką lidarową i fotogrametryczną” 2012r.

Publications

1. Using LiDAR system as a data source for agricultural land boundaries / Natalia BOROWIEC, Urszula MARMOL // Remote Sensing [Dokument elektroniczny]. — Czasopismo elektroniczne ; ISSN 2072-4292. — 2022 vol. 14 iss. 4 art. no. 1048, s. 1-17. — Wymagania systemowe: Adobe Reader. — Bibliogr. s. 15-17, Abstr.. — Publikacja dostępna online od: 2022-02-21. — tekst: <https://www.mdpi.com/2072-4292/14/4/1048/pdf>
2. Wykorzystanie operacji na chmurze punktów we wspomaganiu analizy transportu ponadnormatywnego — The use of points cloud processing in supporting oversize transport analysis / Natalia BOROWIEC, Anna Pulak // Autobusy : technika, eksploatacja, systemy transportowe ; ISSN 1509-5878. — 2018 vol. 19 nr 6 dod.: CD, s. 804-811. — Wymagania systemowe: Adobe Reader. — Bibliogr. s. 811. — Publikacja dostępna online od: 2018-06-20. — tekst: <http://ojs.inw-spatium.pl/index.php/Autobusy/article/view/262/203>
3. Digital documentation of heritage objects on non-developable surfaces / Antoni RZONCA, Elżbieta PASTUCHA, Stanisław SZOMBARA // W: Geomatics 2018 : archives of geomatics : Baltic Geodetic Congress : Olsztyn, Poland 21-23 June 2018 : book of abstracts / ed. Mateusz Ciski. — Olsztyn : Uni-versity of Warmia and Mazury in Olsztyn. Faculty of Geodesy, Geospatial and Civil Engineering, 2018. — ISBN: 978-83-947357-7-7. — S. 59. — Bibliogr. s. 59
4. Integration of thermal and RGB data obtained by means of a drone for interdisciplinary inventory / Joanna Paziewska, Antoni RZONCA // Energies [Dokument elektroniczny]. — Czasopismo elektroniczne ; ISSN 1996-1073. — 2022 vol. 15

- iss. 14 art. no. 4971, s. 1-18. — Wymagania systemowe: Adobe Reader. — Bibliogr. s. 16-18, Abstr.. — Publikacja dostępna online od: 2022-07-07. — tekst: <https://www.mdpi.com/1996-1073/15/14/4971/pdf?version=1657188775>
5. Inwentaryzacja obiektu metodą gęstego matchingu — Inventory of the object by dense matching method / Karolina Pargieła, Antoni RZONCA // W: Nauka, badania i doniesienia naukowe 2018 [Dokument elektroniczny] : nauki techniczne i ścisłe / red. Tobiasz Wysoczański ; oprac. mat. Katarzyna Dereń. — Wersja do Windows. — Dane tekstowe. — Świebodzice : Idea Knowledge Future, 2018. — ISBN (całość kolekcji) 978-83-945311-4-0. — e-ISBN: 978-83-945311-6-4. — S. 207-218. — Wymagania systemowe: Adobe Reader. — Tryb dostępu: <http://www.konferencja-eureka.pl/assets/docs/nauki-techniczne-i-scisle.pdf> [2018-05-09]. — Bibliogr. s. 217-218, Streszcz., Summ.
6. An analysis of the spatial and temporal changes on the Jakobshavn Glacier (Greenland) using re-mote sensing data / Katarzyna Olszewska, Natalia BOROWIEC // Geology, Geophysics & Environment / Akademia Górniczo-Hutnicza im. Stanisława Staszica w Krakowie ; ISSN 2299-8004. — Tytuł poprz.: Geologia : kwartalnik Akademii Górniczo-Hutniczej im. Stanisława Staszica w Krakowie ; ISSN: 0138-0974. — 2021 — vol. 47 no. 4, s. 187-201. — Bibliogr. s. 200-201, Abstr. — Publikacja dostępna online od: 2021-12-28. — tekst źródłowy: <https://journals-1bg-1agh-1edu-1pl-1ftlf1r1000e4.wbg2.bg.agh.edu.pl/GEOLOGY/2021.47.4/geol.2021.47.4.187.pdf>

Learning outcomes prescribed to a field of study

Code	Content
RSGI2A_K01	is ready to resolve conflicts, negotiate, work in a team
RSGI2A_K02	is ready for creative time management, working under time pressure
RSGI2A_U03	is able to process geospatial data and automate data processing in an advanced manner
RSGI2A_U04	is able to use IT tools for spatial data processing
RSGI2A_W01	has a deep knowledge of mathematics in remote sensing data analysis
RSGI2A_W03	has a deep understanding of remote environmental data acquisition methods
RSGI2A_W04	has a deep understanding of methods, algorithms and automation of spatial data processing