University of Silesia in Katowice

1.	Field of study	Geography
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2019/2020 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

Module: Unmanned aerial vehicle: environmental applications - advanced level

Module code: 04-GF-S2-1110

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
04-GF-S2-1110_1	The student has an advanced knowledge of the Unmanned Aerial Vehicle (UAV), thermal and multispectral photogrammetry, their practical application and limitation while using them in the science and industry.	KGG2_U04 KGG2_W02	3 4
04-GF-S2-1110_2	The student is able to plan and implement the flight mission keeping the rules of the safety and legal regulations. The student is able to analyze and interpret collected spatial data and formulate appropriate conclusions based on them.	KGG2_K02 KGG2_U01 KGG2_U03 KGG2_U05	2 2 4 3

3. Module description

Description	The module is extending issues related to the Unmanned Aerial Vehicles with advanced tools and research techniques. It will enable students to get acquainted with the characteristics of large flying platforms, proper preparation for measurement session, managing parallel registration of several sensors and the implementation of photogrammetry tools. Particular emphasis will be placed on the applicability of thermal and multispectral sensors. The collected material will be used for spatial analysis on performed true/false color compositions, calculating environmental indicators (including NDVI), creating thematic maps (thermal, chlorophyll, others).
Prerequisites	Credit for the course: Unmanned Aerial Vehicle – basic methods of acquiring and analysing (04-GG2-1105).

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
04-GF-	Written test	Verification of knowledge acquired by the student during lectures and studying recommended	04-GF-S2-1110_1

S2-1110_w_1		bibliography.	
04-GF-S2-1110_w_2	Project	Verification of knowledge and skills based on studies carried out during the classes.	04-GF-S2-1110_2

5. Forms of teaching							
code	form of teaching			required hours of student's own work			assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
04-GF-S2-1110_fs_1	lecture	Lecture on the advanced level of the UAV, measurement techniques and law regulations.	10	Work with the recommended literature of the subject.	15	04-GF-S2-1110_w_1
04-GF-S2-1110_fs_2	laboratory classes	Performing by the student work related to the implementation of the projects including measurement sessions, data processing and presentation, analysis of the outputs referred to selected environmental issues.	30	Development of a flight plan, preparation of a UAV for the flight, implementation of safety procedures, participation in measurements, data analysis and preparation of a report including discussion of results and conclusions.	45	04-GF-S2-1110_w_2