



Course title: **Unmanned Aerial Vehicles**

ECTS credit allocation (and other scores): 4.0

Semester: spring

Level of study: ISCED-7- long-cycle programmes (EQF-7)

Branch of science: Engineering and technology

Language: English

Number of hours per semester: 45

Course coordinator/ Department and e-mail: dr inż. Karol Szuniewicz / Institute of Building Engineering
karol.szuniewicz@uwm.edu.pl

Type of classes: classes

Substantive content

CLASSES: Practical classes include the preparation and operation of unmanned aerial vehicles (UAVs), as well as the ability to work with sensors mounted on UAV platforms that enable the acquisition of geoinformation. Students learn to plan and carry out flight missions performed within Low-Altitude Photogrammetry. The exercises also cover processing the acquired data, generating photogrammetric products, and applying them in geoinformatics.

LECTURES: Lecture classes provide students with a comprehensive theoretical foundation in the field of unmanned aerial vehicles (UAVs) and their use in geoinformation. The lectures introduce UAV classifications, principles of construction, and the operation of onboard systems and sensors used for acquiring spatial data. Students learn the fundamentals of aviation law, including regulations governing UAV flights, operational safety, and mission planning requirements. The course presents the methodology of Low-Altitude Photogrammetry, explaining how flight parameters, sensor characteristics, and environmental factors influence data quality. Attention is also given to photogrammetric processing workflows, the generation of geospatial products, and their applications in modern geoinformatics and spatial data analysis.

Learning purpose: The aim of the course is to prepare students for the safe and professional use of UAVs in the acquisition and processing of spatial data. Students gain knowledge about the construction, operating principles, and regulations related to UAVs, as well as skills in planning and carrying out photogrammetric missions and processing data for geoinformatics purposes. On completion of the study programme the graduate will gain:

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Knowledge: Knows and understands development trends and the most important new achievements in the field of unmanned aerial vehicles.

Skills: Can plan and conduct experiments, including measurements and computer simulations, interpret results, and draw conclusions using unmanned aerial vehicles.

Social Competencies: Is willing to cooperate and work in a team, assuming various roles.

Basic literature:

Stöcker, C., Bennett, R., Nex, F., Gerke, M., & Zevenbergen, J. (2017). Review of the current state of UAV regulations. (Shadiev & Yi, 2023; Stöcker et al., 2017) In *Remote Sensing* (Vol. 9, Issue 5). <https://doi.org/10.3390/rs9050459>

Shadiev, R., & Yi, S. (2023). A systematic review of UAV applications to education. In *Interactive Learning Environments* (Vol. 31, Issue 10). <https://doi.org/10.1080/10494820.2022.2028858>



Colomina, I., Molina, P. (2014). Unmanned aerial systems for photogrammetry and remote sensing: A review. ISPRS Journal

Nex, F., Remondino, F. (2014). *UAV for 3D mapping applications: a review.*

The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 49

Student's independent work: 51