



## YSB 660E UNMANNED AERIAL SYSTEMS IN EARTH SCIENCES

### COURSE DESCRIPTION:

The course will cover basic topics including legal guidelines and regulations in the Unmanned Air Systems, as well as practical field applications and data processing experience in earth sciences. The major goal of this course is to teach necessary details to plan and carry out a safe and successful UAV flight in geological outdoor environments. The course provides an introduction to the Unmanned Aerial System from the geospatial perspective which includes but is not limited to:

- Sensors and platforms;
- Remote sensing applications;
- Operational requirements of the UAS;
- Data processing softwares;
- Generation of digital data products such as point cloud, orthophoto and digital surface model;
- Current rules and regulations for operating an UAS in our country;
- The place of UAS in earth sciences and applications

### LEARNING OUTCOMES:

#### Upon completion of this course, students will be able to:

- Understand main concepts that define Unmanned Aerial Systems.
- Identify UAS components.
- Design a UAS-based flight mission.
- Learn UAS-based image processing techniques.
- Recognize potential applications of the UAS for GIS operations.
- Produce geospatial products such as ortho photos and digital surface models.
- Advise users on the rules and regulations on operating an UAS.

### ASSESSMENT:

<b>Literature Review and Presentation</b>	<b>25%</b>
<b>Lab. Exam</b>	<b>40%</b>
<b>Final Exam</b>	<b>35%</b>

- **Lab. Exam:** Practical experience is the most important way to learn 3D modeling and digital image processing hence completing the lab assignment is essential to succeeding in the class. The lab assignment will consist of exercises designed and provided by the instructor.
- **Literature Review and Presentation:** Review and critique 2 articles (by different authors) in the GIS/RS-UAV journal literature which deal with the same topic (e.g., analyzing the same or similar phenomena, or using the same analysis procedure). Each student will give a brief presentation (~20min.) about it to the class.
- **Final Exam:** The exam will consist of both short answer-type and hermeneutical questions.

### REQUIRED TEXTBOOKS AND MATERIALS:

- Özcan, O., Demir, B., Akay, S. (2019). İnsansız Hava Araçları ve Yer Bilimleri, II.baskı, 173 sf., ISBN: 978-605-288-755-4.
- Carrivick, J.L., Smith, M.W., Quincey, D.J., (2016). Structure from Motion in the Geosciences; Wiley-Blackwell: Oxford, UK,; p. 208.
- Ruzikova K. and Inspektor T., (2015) Surface Models for Geosciences. Springer International Publishing, Switzerland, XXII, 308 ISBN: 978-3-319-18406-7

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