Course Unit Descriptor

Study Programme: Precision agriculture	
Course Unit Title: Application of sensors in Soil science	
Course Unit Code: 19.PRP010	
Name of Lecturer(s): Dr Vladimir Ćirić, assiciate professor	
Type and Level of Studies: Graduate academic studies	
Course Status (compulsory/elective): elective	
Semester (winter/summer): summer	
Language of instruction: english	
Mode of course unit delivery (face-to-face/distance learning): face-to-face	
Number of ECTS Allocated: 5	
Prerequisites: /	

Course Aims:

The introduction of this course aims to familiarize students with modern and effective principles of sensor application in soil science. The professional-applicative part of the course aims to train students to use data obtained by reading from individual sensors and, based on that, determine the spatial variability of soil properties. In this way, students acquire the basic knowledge to optimize agrotechnical operations based on the soil and increase the effectiveness in crop production, i.e. to apply the concept of precision agriculture. Such performance would train personnel, who could make a great contribution to the development of the Internet of Things (IoT) in the field of agronomy

Learning Outcomes:

The student will acquire basic knowledge about the possibilities of using remote and proximal reading of soil properties through sensors. Student will be able to apply the data obtained by sensor readings in space and time, both in soil science and crop production. Also, he will be trained to use statistical tools to connect the values read by the sensors with the soil properties and thus significantly contribute to the development and implementation of precision agriculture in our environment. A special outcome is the ability of the student to provide consulting services in agriculture based on the interpretation of the results obtained from sensor readings. Sensor readings provide soil information at different spatial scales, helping to better understand the soil's potential for food, fiber, climate change adaptation and environmental quality

Syllabus:

Theory

Importance of soil for agriculture. Soil properties. Soil types. Types of soil sensors. Remote and close reading of soil properties with sensors. Soil monitoring with sensors. Variability of soil in space. Soil zoning. Application of sensors in soil science and agriculture. Internet of Things (IoT) in the field of soil science and agriculture.

Practice

Practical work with soil data obtained from sensors or reading from the sensors themselves. Processing of obtained data with statistical tools. Designing readings from sensors in space and determining soil variability. Determination of management zone and sampling schedule. Creation of fertility maps. Independent solving of specific problems (case study). Seminary work

Required Reading:

1. Soil Survey Division Staff. Soil survey manual. United States Department of Agriculture, 1993.

2. Александар Р.Ђорђевић, Свјетлана Б. Радмановић: Педологија. Пољопривредни факултет, Београд 2016.

3. Горан Ј. Дугалић, Бошко А. Гајић: Педологија , Универзитет у Крагујевцу, Агрономски факултет, Чачак, 2013

4. Rossel, Raphael A. Viscarra, Alex B. McBratney, and Budiman Minasny, eds.: Proximal soil sensing. Springer Science & Business Media, 2010.

5. Dwevedi, A., Kumar, P., Kumar, P., Kumar, Y., Sharma, Y. K., & Kayastha, A. M. (2017). Soil sensors: detailed insight into research updates, significance, and future prospects. In New Pesticides and Soil Sensors (pp. 561-594)

Weekly Contact Hours:	Lectures: 30	Practical work: 30

Teaching Methods:

Theoretical teaching through lectures and video presentations, and practical teaching through work on the computer or in the field.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	Final exam	points
Active class participation	10	written exam	20
Practical work	20	oral exam	30
Preliminary exam(s)		…….	
Seminar(s)	20		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.