ICT IN AGRICULTURE

Basic data of the subject	
Academic Unit:	Faculty of Life and Environmental Sciences
Course title:	ICT in agriculture
Study program:	Agribusiness Management
Level:	Master (MSc)
Course status:	Elective (E)
Study year:	1 year / 2 semester
Number of hours per week:	2 + 1
Credit value – ECTS:	5 ECTS
Time / location:	To be announced
Lecturer:	Prof. Asoc. Dr. Arsim Susuri
Contact details:	arsim.susuri@uni-prizren.com; +383 44 254 183
Course description:	The course provides knowledge on the basic principles of the ICT application in agriculture. The course will cover Global Positioning Systems (GPS), Geographic Information Systems (GIS), remote sensing, data acquisition, mapping, variable rate applications and the economics of precision agricultural technologies.
Course objectives:	The main objective of this course is to provide students with knowledge of ICT application in agriculture; identify and use appropriate hardware and software tools; gain experience in developing and interpreting descriptive maps; use data effectively in management decisions; and develop an understanding of precision farming applications in other countries.
Learning outcomes:	Upon completion of this course, students will be able to: ▪ Develop an understanding of the use of global positioning systems and their use in precision agriculture. Students will learn how to use GPS devices and integrate results with the use of appropriate software programs. ▪ Develop an understanding of pre-processing measured field data to create maps to display the variability of field parameters such as soil nutrients and electrical conductivity, yield, moisture content, pH and altitude. ▪ Develop an understanding of using ArcVIEW GIS software to develop descriptive maps. ArcCatalog, ArcMap and ArcToolbox modules will be used frequently during this course and students will become proficient using these tools. ▪ Interpret descriptive maps and be able to develop a variable application rate management strategy. ▪ Develop an understanding of precision agricultural technologies and their applications in other countries.

Contribution on student load (must correspond with learning outcomes)			
Activity	**Hours**	**Days/week**	**Total**
Lectures	2	12	24

Exercise theoretical/laboratory	1	12	12
Practice work	2	3	6
Contact with lecturer/consultations	1	15	15
Field exercises	2	3	6
Mid-terms, seminars	2	1	2
Homework	1	11	11
Individual time spent studying (at the library or home)	2	12	24
Final preparation for the exam	2	10	20
Time spent in evaluation (tests, quiz, final exam)	2	1	2
Projects, presentations, etc.	3	1	3
Total			**125 hours (5 ECTS)**
Teaching methods:	Lectures, exercises, discussions, consultations, course projects, homework, midterm exam (colloquium), exams		
Evaluation methods:	▪ Regular and active attendance: 10%, ▪ Midterm exam (colloquium): 20%, ▪ Course project: 10%, ▪ Final exam: 60%.		
Literature			
Basic Literature:	Daniel R. Ess, Mark T. Morgan (2010): The Precision-Farming Guide for Agriculturists (Agricultural Primer), Moline III: Deere & Co. Heege, H.J. (2013): Precision in Crop Farming - Site-specific Concepts and Sensing Methods. Springer Dordrecht Heidelberg New York London.		
Additional Literature:	Søren Marcus Pedersen, Kim Martin Lind (2017): Precision Agriculture: Technology and Economic Perspectives, Springer.		

Designed study plan:		
Week	**Lectures**	**Exercises**
First week:	Syllabus overview, introduction to ICT application in agriculture.	Lab 1: Basic Statistics
Second week:	GPS, NAVSTAR, receivers, Position determination-Trilateration,	Lab 2: GPS receiver interface to a computer

Third week:	Accuracy of GPS, Precision vs Accuracy, basic statistics, RTK, NMEA Protocol and NMEA standard sentences.	Lab 3: GPS NMEA code - DNR Garmin – Garmin Mapsource
Fourth week:	Coordinate systems, Map projections, Introduction to GIS, GIS components, GIS in Precision Agriculture	Lab 4: ArcMap Area calculation
Fifth week:	Yield monitoring basics, system components, yield calculation. Yield monitoring systems	Lab 5: Yield files, moisture files, querry
Sixth week:	Yield monitoring and measurement systems for alternative crops. Soil sampling and analyses, mapping	Lab 6: Yield map and estimating yield.
Seventh week:	Soil electrical conductivity (EM38 and Veris). Remote sensing (Electromagnetic spectrum, Spectral reluctance).	Lab 7: Fertilizer recommendation map.
Eighth week:	Intermediate examination (test)	Lab 8: Variable rate maps - Other mapping software (SMS).
Ninth week:	Remote sensing (Thermal response, reflectance, NDVI). Productivity and management zones (shape, size, boundaries).	Lab 9: Discussion of Semester Projects
Tenth week:	GPS guidance applications. Precision Agriculture Economics.	Lab 10: P+K recommendation lab-ArcMap-MapCalc.
Eleventh week:	Precision Agriculture Environmental impact. GIS Applications - Examples: Forestry and tree crops.	Lab 11: GIS applications in Agriculture - Example
Twelfth week:	GIS Applications - Examples: Soil salinity. GIS Applications - Examples: On the go soil strength sensing.	Lab 12: GIS applications in Agriculture - Example
Thirteenth week:	Work on semester projects	Work on semester projects
Fourteenth week:	Semester project presentations.	Semester project presentations.
Fifteenth week:	Final examination (test)	Presentation of the course projects.

Academic policies and rules of conduct:

- Students should be aware of and respect the institution and Code of ethics.
- Students should respect the schedule of lectures, and exercises and be attentive.
- It is mandatory to possess and presents a student ID card in the mid-terms and exam,
- During the compilation of course projects, students must adhere to the instructions given by the professor.
- During the exam is forbidden the use of mobile phones.