General Information	
Academic subject	Precision Mechanization
Degree course	Agricultural, Environmental and Landscape Science
Curriculum	all
ECTS credits	6
Compulsory attendance	No
Language	Italian

Subject teacher	Name Surname	Mail address	SSD
	Simone Pascuzzi	simone.pascuzzi@uniba.it	AGR09

ECTS credits details			
Basic teaching activities	Agricultural, Forestry and Biosystem Engineering		

Class schedule	
Period	First semester
Year	2018-2019
Type of class	Lecture- workshops

Time management	
Hours	80
In-class study hours	50
Out-of-class study hours	34

Academic calendar	
Class begins	
Class ends	

Syllabus	
Prerequisites/requirements	
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)	*Knowledge and understanding* o Advanced knowledge of the main concepts pertinent to the precision mechanization and in details, remote sensing, global positioning systems, driving systems of the agricultural machines, variable tillage and variable dose sowing. *Applying knowledge and understanding* o Knowledge and ability to understand the up-to-date technologies on the market, which allow to advance a more sustainable agriculture in agronomic, environmental and economic terms. *Making informed judgements and choices* o Ability to evaluate and choose the technologies of the precision agriculture and their inclusion in the different farms, in agreement with the environment and the operators' health. *Communicating knowledge and understanding* o Ability to explain and motivate the choices made in the within an up-to-date agricultural mechanization.. *Capacities to continue learning* o Ability to learn the operation of different technologies

	available within precision agriculture, according to the knowledge gained during the course. The expected learning outcomes in terms of knowledge and abilities are reported in Annex A of the Academic Regulations (expressed through the European descriptors pertinent to the degree program)
Contents	**Introduction to precision mechanization.** Definition and evolution of precision farming **Remote sensing.** Physical and technological principles of remote sensing. Electromagnetic radiation. Remote sensing within the optical domain. The Lidar. Remote sensing within the thermal infrared. Monitoring of vegetation within the optical domain and the thermal infrared. NDVI index. **Remote driven aircraft systems.** Types. Visible, multispectral and hyperspectral sensors. Thermal sensors. Lidar. **Satellite positioning systems (GNSS).** The satellite constellations: Glonass, Galileo, Compass, Navstar-GPS. How GNSS works. Causes of signal error. Signal properties and types of correction. GPS in agriculture. Criteria for choosing a GNSS. **Driving systems applied to agricultural machinery.** Operating modes and types: assisted driving, semi-automatic driving, automatic driving. Navigation systems without GNSS. Slope correction. Automation using the ISOBUS protocol. **Production mapping systems.** Mapping of production for cereals. Sensors in the combine harvester. **Precision mechanization for soil management.** Strip tillage. Tillage operations based on maps and sensors. **Precision mechanization in sowing.** Seed dose variation. Sowing with variable depth. **Precision mechanization in viticulture.** Evolution of precision viticulture. Design and construction of the plant. Soil management operation. Canopy management. Grape differentiated harvesting.
Course program	
Bibliography	• R. Casa - Agricoltura di precisione. Edagricole, Bologna • M.Lazzari - F.Mazzetto Meccanica & Meccanizzazione dei processi produttivi agricoli. REDA, Torino 2016
Notes	The aforesaid texts are of reference, both for theoretical and practical aspects.
Teaching methods	The course topics will be explained through Power Point presentations.
Assessment methods (indicate at least the type written, oral, other)	The final exam consists of an oral test concerning the topics developed during the theoretical and practice lessons. The

	evaluation of the students' accomplishment is expressed by a vote of thirty. The exam is passed with a vote of at least 18/30. A first class degree can be attributed in the case of top vote (30/30). The oral examinations are public. The evaluation of the student's attainment is in agreement with pre-established criteria, as detailed in Annex A of the Academic Regulations for the Agricultural, Environmental and Landscape Science Degree Course.
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement there are.	*Knowledge and understanding* o The knowledge and understanding of the concepts concerning the precision mechanization explained during the Course will be the basic elements for the student's assessment.. *Applying knowledge and understanding* o An additional element of assessment will be the ability to understand the operative aspects of the up-to-date technologies concerning the precision mechanisation inside the agricultural motor machines and implements. *Making informed judgements and choices* o The ability to choose the aforesaid technologies on the market and their inclusion in the different farms, accordingly to the environment and the operators' health, will be another essential element of evaluation. *Communicating knowledge and understanding* o A further element of assessment will be the student's ability to explain and motivate the choices made in the field of agricultural precision mechanization. *Capacities to continue learning* o The ability to learn the operation of different technologies pertinent to the precision farming on the basis of the knowledge gained during the Course will finally highlight the highest level of learning.
Further information	