Syllabus
Course description

Course title	**RURAL TECHNOLOGY SYSTEMS**
Course code	47010
Scientific sector	AGR/09 – Meccanica Agraria (Farm Machinery)
Degree	Environmental Management of Mountain Areas
Semester	2
Year	/
Academic year	2018/19
Credits	6
Modular	No

Total lecturing hours	36
Total lab hours	-
Total exercise hours	24
Attendance	Recommended
Prerequisites	A previous course of *Basic Physics* is strongly recommended
Course page	https://next.unibz.it/en/faculties/sciencetechnology/master-environmental-management-mountain-areas/course-offering/

Specific educational objectives	This is a characterizing course ("corso caratterizzante") of the Master Degree on Environmental Management of Mountain Areas dealing with those **Agricultural Engineering topics** that consider various aspects of the use of technologies for performing typical production processes in mountain environments.
	The most relevant technologies are here introduced through a multi-disciplinary approach that, besides the description of the features of the physical properties and construction details of the technology itself, analyses the main implications and impacts on energy performances and management implications.
	The student is gradually introduced to this integrated approach starting from the comprehension of the physical behavior of a technology within a process, up to its management practice through an enterprise information system.
	By the end of the course, students are expected to be able to:
	• know the main features of the machines to be used for the process management in mountain areas;
	• carry out the basic procedures for selecting and

	planning the use of machines related to arable, livestock and forestry systems in mountain areas;
	• evaluate the technical, operational and economic performances of given technology system;
	• perform an investment analysis for alternative machinery sets;
	• identify both weak- and strength-points of any mechanization solution, with emphasis to safety issues.

Lecturer	Fabrizio Mazzetto, *Building K, Office K206,0471/017180,* *fabrizio.mazzetto@unibz.it*
Scientific sector of the lecturer	AGR/09 – Meccanica Agraria (Farm Machinery)
Teaching language	English
Office hours	Upon arrangement by e-mail
Teaching assistant (if any)	-
Office hours	-
List of topics covered	**MOUNTAIN ENERGY SISTEMS** – Introduction to Energy: sources, requirements, consumption, degree of use. Energy sources FOR and FROM agri-environmental enterprises. Types of energy. Energy conversions and power generators. Endothermic engines: load and fuel consumption. Thermal and electric generators, co-generators. Agricultural and forestry tractors: construction types, tractor-implement coupling, dynamic power balance and related performances.
	MOUNTAIN TECHNOLOGY SYSTEMS – Enterprise Ontology: resources, materials and actions. Mountain farming systems. Standard processes and scheduling. Planned and executed activities. Arable, grassland and livestock farming systems; forestry systems. Agricultural tasks: soil tillage, fertilization and phyto-sanitary treatments with environmental related problems. Grassland and livestock tasks: haymaking, forage harvesting and conservation, milking in dairy cow/goat livestock systems. Forestry tasks: cutting trees and timber extraction operations, chipping. Transport tasks: logistic and energy consumption, overview on mountain transport systems. Ergonomics and safety in mountain production systems.
	ENTERPRISE INFORMATION SYSTEMS – Concept of "raw data" and "information". Information life cycle. Ontology of farm information systems: data collection, data processing, data evaluation, use of information. Monitoring activities, automation, traceability and process certification. Objectives of data analysis: production

	performances and decision/management support systems. Operational performances: estimations of work times, work organization and scheduling, concepts of workrate and workability. Economic performances: exercise costs of agricultural and forestry processes. Tractor and implement sizing.
Teaching format	This is a lecture-lab course in which topics are presented by the Professor. Practical activities (lab classes and field excursions) are led by the Professor eventually assisted by an expert of the sector invited on demand. Slides pdf-presentations will be available in the course reserve collection database of the Faculty. Additional materials related to both proposed and solved exercises and articles on specific topics will be provided by the teacher, directly.

Learning outcomes	**Knowledge and understanding** on farm machinery use in mountain areas, with related aspects on safety, work organization and energy impacts; understanding of how integrate the use of machines within an enterprise information systems to support mountain farmers in their operational, management and strategic decisions.
	Applying knowledge and understanding in the planning, selection and use of farm machinery in mountain areas; capability of performing autonomous evaluations on selection/use of farm machines in various environmental and production contexts.
	Making judgments through the choice of the most appropriate parameters for appreciating the most relevant aspects of the performance of a rural technology system. Capability of presenting such an evaluation in a written report.
	Communication skills to present topics and issues relative to any rural technology system for mountain areas with pertinent and adequate technical terminology
	Learning skills to deepen and update the knowledge acquired during the course seeking relevant information on scientific and technical literature

Assessment	The assessment of students' outcomes will be carried out through: i) a final written exams featuring applied exercises; ii) the presentation and discussion of a final report dealing with practical management/strategic problems in a rural technology system to be proposed by the student; iii) an oral discussion on theoretical topics covered during the course.
Assessment language	English

Evaluation criteria and criteria for awarding marks	The final mark will be assigned as follows: final written exam (30%), report discussion (30%), final oral discussion (40%). It will not be possible to pass the exam if one of the three assessment is insufficient. Marks will be assigned based on correctness and clarity of answers, mastery of the technical language, capability to establish relationships between different topics.

Required readings	Witney B., Choosing and using farm machines, Longman Scientific & Technical, 1988
Supplementary readings	• Lazzari M., Mazzetto F. Meccanica e Meccanizzazione dei Processi Produttivi Agricoli. Reda Ed., 2016 • Culpin c. Farm machinery. Hesperidess Press, 2008 • Goering C.E., Hansen A.C. Engine and tractor power. ASABE Ed., 2004 • Marquez L., Tractores Agricolas: tecnologia y utilizacion. B&H Editores, 2012. • Pellizzi G., Bodria L., Piccarolo P. Meccanica e meccanizzazione agricola (Vol. I and II). EdAgricole – il Sole 24 ore, 2007