

General information	
Academic subject	<b><i>Integrated Course Environmental Restoration Module: Waste Management</i></b>
Degree course	<b><i>Agricultural and Environmental Science (SAAT)</i></b>
Academic Year	<b><i>II</i></b>
European Credit Transfer and Accumulation System (ECTS)	<b><i>3 ECTS</i></b>
Language	<b><i>Italian</i></b> <b><i>Didactic material in English will be given to foreign students if requested</i></b>
Academic calendar (starting and ending date)	<b><i>I semester</i></b>
Attendance	<b><i>Optional attendance</i></b>

Professor/ Lecturer	
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Virtual headquarters	<b><i>TEAMS code for tutoring activities: z061s8i</i></b>
Tutoring (time and day)	<b><i>by appointment set by e-mail</i></b>

Syllabus	
Learning Objectives	<b><i>Provide theoretical principles and applicative skills in the management of wastewater in the rural area to reduce environmental impact problems mainly linked to the risks of water / air / soil pollution related to waste disposal.</i></b>
Course prerequisites	<b><i>Knowledge of principles for surface, volume and power calculation. Knowledge of principles of sustainability: soil, air and water conservation.</i></b>
Contents	<ul style="list-style-type: none"> <li>• <b><i>The issues of the wastewater management in the land.</i></b></li> <li>• <b><i>Composition and chemical characterization of wastewater from different sources to be disposed of.</i></b></li> <li>• <b><i>Techniques of liquid/solid separation of wastewater; mixing, storage, anaerobic and aerobic digestion; manure use for crop production.</i></b></li> <li>• <b><i>Constructed wetlands systems for wastewater treatment.</i></b></li> <li>• <b><i>Odor in wastewater treatments</i></b></li> </ul>
Books and bibliography	<ul style="list-style-type: none"> <li>• <b><i>Notes of the lectures and tables distributed during the course</i></b></li> <li>• <b><i>C.R.P.A.-Centro Ricerche Produzioni Animali (1993) "Handbook for the management and the use for crop production of animal waste". Regione Emilia-Romagna, Italy. In Italian</i></b></li> </ul>
Additional materials	

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
<b><i>75</i></b>	<b><i>16</i></b>	<b><i>14</i></b>	<b><i>45</i></b>
<b><i>ECTS</i></b>			

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<b>Teaching strategy</b>			
		<p><i>The teacher will use PowerPoint presentations.</i></p> <p><i>During COVID 19 health emergency, teaching is provided in blended learning mode (mixed: frontal and distance teaching).</i></p>	
<b>Expected learning outcomes</b>			
Knowledge and understanding on:		<ul style="list-style-type: none"> <li>• <i>Knowledge and understanding of structures and materials used for wastewater management</i></li> <li>• <i>Knowledge and understanding of technological equipment used in wastewater management</i></li> <li>• <i>Understanding of the environmental impact of wastewater</i></li> </ul>	
Applying knowledge and understanding on:		<ul style="list-style-type: none"> <li>• <i>Capacity to identify the most suitable structures and material used in wastewater management systems as a function of the wastewater typology</i></li> <li>• <i>Capacity to identify the technical characteristics of the technological equipment according to the wastewater typology</i></li> </ul>	
Soft skills		<p><b>Making informed judgments and choices</b></p> <ul style="list-style-type: none"> <li>• <i>Ability to plan an integrated sustainable design of a wastewater management system in relation to the choice of the structures, materials and equipment considering production efficiency</i></li> <li>• <i>Ability to analyze all possible environmental hazards that can be produced from all the productive activities within wastewater management systems</i></li> </ul> <p><b>Communicating knowledge and understanding</b></p> <ul style="list-style-type: none"> <li>• <i>Ability to use informatics (drawing, simulation, graphic representation, and so on)</i></li> </ul> <p><b>Capacities to continue learning</b></p> <ul style="list-style-type: none"> <li>• <i>Ability to continue learning by consulting books, papers and computerized catalogs</i></li> </ul>	

<b>Assessment and feedback</b>	
Methods of assessment	<p><i>A project for a wastewater management and reuse system is assigned. The elaboration of the project can be individual or in group and takes place during lessons.</i></p> <p><i>For students attending the course there will be a partial exam after the first part of the course. This partial exam consists of an oral test on the subjects developed during the hours of lecture and exercise. The outcome of this test contributes to the evaluation of the examination of profit and is valid for one academic year. The test is passed with a vote of at least 18/30.</i></p> <p><i>The exam consists of an oral exam on the topics developed during the course. During the oral exam the project on a wastewater management and reuse</i></p>

	<p><i>system will be a topic of discussion. The test is passed with a vote of at least 18/30.</i></p> <p><i>For students who have stood the first part of the exam, the final vote is expressed by the average of the votes obtained in the two oral tests.</i></p> <p><i>For foreign, the exam can be done in English</i></p>
Evaluation criteria	<p><b>Knowledge and understanding</b></p> <ul style="list-style-type: none"> <li>○ Knowledge and understanding skills of wastewater management</li> <li>○ Knowledge and understanding skills of the structures and construction materials used for wastewater management</li> <li>○ Knowledge and understanding skills of technological systems for wastewater management</li> </ul> <p><b>Applying knowledge and understanding</b></p> <ul style="list-style-type: none"> <li>○ Designing a rural building using AUTOCAD by choosing the different structural elements ability to apply the knowledge gained in wastewater management by identifying the structures and technical characteristics of the technological equipment to minimize the environmental impact on air, soil and water</li> </ul> <p><b>Autonomy of judgment</b></p> <ul style="list-style-type: none"> <li>○ Ability to propose sustainable solutions in wastewater management as a function of the different required applications</li> <li>○ Ability to integrate knowledge gained in different areas</li> </ul> <p><b>Communication skills</b></p> <ul style="list-style-type: none"> <li>○ Ability to communicate clearly and without ambiguity the knowledge and the ratio to specialists and non-specialists</li> </ul> <p><b>Capacities to continue learning</b></p> <ul style="list-style-type: none"> <li>○ Ability to learn and deepen in a self-directed and autonomous way</li> </ul>
Criteria for assessment and attribution of the final mark	<p><i>Ability to present knowledge in a technical way and to apply it.</i></p> <p><i>The mark is expressed out of thirty, the exam is passed with a mark of at least 18/30.</i></p>
<b>Additional information</b>	