

General information	
Academic subject	Sustainable clean soil strategies
Degree course	INNOVATION DEVELOPMENT IN AGRIFOOD SYSTEMS (IDEAS)
ECTS credits	3 ECTS (2 ECTS of Lectures + 1 ECTS of laboratory or field classes)
Compulsory attendance	No
Teaching language	english

Subject teacher	Name Surname	Mail address
	<b>Matteo Spagnuolo</b>	matteo.spagnuolo@uniba.it

ECTS credits details	
	2 ECTS Lectures
	1 ECTS Laboratory or field classes

Class schedule	
Period	I semester
Course year	First
Type of class	Lectures, 2 ECTS (16 hours) Laboratory and field classroom 1 ECTS (14 hours)

Time management	
Hours	75
In-class study hours	30 (16 Lectures + 14 Lab & field classes)
Out-of-class study hours	45

Academic calendar	
Class begins	October 18 <sup>th</sup> , 2021
Class ends	January 28 <sup>th</sup> , 2022

Syllabus	
Prerequisites/requirements	
Expected learning outcomes	<p><b><i>Knowledge and understanding</i></b></p> <ul style="list-style-type: none"> <li>○ Knowledge about the chemical, biochemical, and biological properties of rhizosphere.</li> <li>○ Knowledge on the sustainable use of fertilizers for plant nutrition.</li> <li>○ Knowledge on the physiological properties and sustainable application of biostimulants.</li> <li>○ Knowledge on the main innovative and sustainable techniques for soil mitigation and remediation</li> </ul> <p><b><i>Applying knowledge and understanding</i></b></p> <ul style="list-style-type: none"> <li>○ The student will acquire the competence for a sustainable use of fertilizers for improving the crop nutrition</li> <li>○ Ability to apply biostimulants for optimizing crop nutrition and protection by abiotic diseases.</li> <li>○ Ability to apply the knowledge about the bioremediation and phytoremediation in contaminated soils.</li> </ul> <p><b><i>Making informed judgements and choices</i></b></p> <ul style="list-style-type: none"> <li>○ Analytical and problem solving skills to independently analyze different technical situations in terms of sustainable use of fertilizers and biostimulants</li> <li>○ Analytical and problem solving skills to independently propose different bio-based clean-up strategies for soil remediation</li> </ul> <p><b><i>Communicating knowledge and understanding</i></b></p>

	<ul style="list-style-type: none"> <li>○ Ability to relate to other subjects of the course in a multidisciplinary way on technical, human and ethical issues.</li> </ul> <p><b>Capacities to continue learning</b></p> <ul style="list-style-type: none"> <li>○ Ability to use cognitive tools such as the information technology (IT) for the continuing self-education.</li> </ul>
Contents	<ul style="list-style-type: none"> <li>○ The importance of the rhizosphere in the nutrient cycle of elements;</li> <li>○ Role of mineral elements in the plant physiology;</li> <li>○ Innovative techniques for the assessment of soil fertility and plant nutrient status;</li> <li>○ Crop nutrition in organic farming and sustainable farming systems;</li> <li>○ Biostimulants: classification, physiological properties and application in sustainable agriculture;</li> <li>○ Diffuse and point source pollution in agricultural soils: innovative mitigations and bio-based remediation approaches.</li> </ul>

<b>Cours program</b>	
Reference books	<ul style="list-style-type: none"> <li>○ Lecture notes and other educational materials distributed during the classes (also made available online)</li> </ul>
Notes	
Teaching methods	<p>The lectures will be given with the aid of Power Point presentations, video clips, educational tour in open fields, seminars held by consultants.</p> <p>Lecture notes and educational supplies will be provided by means of a mailing list or online platforms (i.e.: MSTeams, Dropbox, Google Drive...)</p>
Evaluation methods	<p>The exam consists of an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures in the classroom and in the laboratory/open field.</p> <p>Students attending at the lectures may have a middle-term preliminary exam, consisting of an oral test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for 1 year.</p>
Evaluation criteria	<p><b>Knowledge and understanding</b></p> <ul style="list-style-type: none"> <li>○ Good knowledge about the crop nutrition in organic and sustainable farming systems.</li> <li>○ Knowledge about the role of biostimulants for improving the quality of the products and the reduction of the use of fertilizers and pesticides.</li> <li>○ Knowledge on the main innovative and sustainable techniques for soil mitigation and remediation</li> </ul> <p><b>Applying knowledge and understanding</b></p> <ul style="list-style-type: none"> <li>○ Ability to suggest the most innovative and sustainable techniques for reducing the use of fertilizers and reduce</li> </ul>

	<p>soil contamination to reach a zero pollution plant-soil system.</p> <p><b><i>Making informed judgements and choices</i></b></p> <ul style="list-style-type: none"> <li>○ Good analytical and problem solving skills to analyze independently different technical situations in terms of sustainable use of fertilizers and biostimulants and for cleaning up polluted soils.</li> </ul> <p><b><i>Communicating knowledge and understanding</i></b></p> <ul style="list-style-type: none"> <li>○ Good ability to relate to other subjects in a multidisciplinary way on technical, human and ethical issues.</li> </ul> <p><b><i>Capacities to continue learning</i></b></p> <ul style="list-style-type: none"> <li>○ Ability to use cognitive tools such as the information technology (IT) for the continuing self-education</li> </ul>
Tutorial activity - Office hours	Monday-Friday upon e-mail request