

<b>General Information</b>	
Academic subject	Soil Chemistry and Pedology
Degree course	Agricultural Sciences and Technologies (STA)
Curriculum	
ECTS credits	6
Compulsory attendance	No
Language	Italian

<b>Subject teacher</b>	Name Surname	Mail address	SSD
	Gennaro Brunetti	gennaro.brunetti@uniba.it	AGR/13

<b>ECTS credits details</b>			
Basic teaching activities	Lectures (4)	Practical (2)	

<b>Class schedule</b>	
Period	I semester
Year	2019/2020
Type of class	Lecture - Practical

<b>Time management</b>	
Hours	150
In-class study hours	60
Out-of-class study hours	90

<b>Academic calendar</b>	
Class begins	02/10/2019
Class ends	16/01/2020

<b>Syllabus</b>	
Prerequisites/requirements	The "Chemistry" examination is preparatory for the "Soil Chemistry and Pedology" examination
Expected learning outcomes	<ul style="list-style-type: none"> <li>• <i>Knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Knowledge and understanding of the basic aspects of soil chemistry and pedology and the soil classification</li> </ul> </li> <li>• <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ The basic knowledge will help the student to manage the soil fertility to improve the quality of soils.</li> </ul> </li> <li>• <i>Making informed judgements and choices</i> <ul style="list-style-type: none"> <li>○ Ability of identifying and solving the problems of anomalous soils.</li> </ul> </li> <li>• <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Ability of verbalizing by a rigorous and clear language</li> </ul> </li> <li>• <i>Capacities to continue learning</i> <ul style="list-style-type: none"> <li>○ Ability of updating the knowledge about the soil chemistry and geology</li> </ul> </li> </ul> <p>The results of the expected learning, in term of knowledge and ability, are listed in the Annex A of the Didactic Regulation of the Bachelor Degree Course (expressed by the European descriptors of the study title).</p>
<b>Course program</b>	
Contents	<p>Introduction, programme, objectives and general definitions and concepts. Soil-plant-water-atmosphere interrelations. Pedogenesis: processes, agents and factors in the formation and evolution of soils. Primary and secondary minerals. Silicates. Chemical potential of ions. Soil profile and horizons. Soil classifications.</p> <p>Soil physical properties: texture, structure, density, porosity, heat,</p>

	<p>temperature.</p> <p>Soil gaseous phase. Gas exchange processes. Air dissolved in water.</p> <p>Inorganic solid (mineral) components of soil. Crystalline and amorphous minerals. Crystallinity order, crystal cell. Structural ions. Coordination number. Tetrahedral and octahedral units and sheets. Gibbsite, goethite, soil fillosilicates: structures, formulas, properties. Isomorphism and charge.</p> <p>Soil organic components: Biomass and humus. Organic carbon cycles in soil. Sources and transformation processes of soil organic matter: mineralization, humification, carbonification. Turnover times. Non-humic and humic compounds. Composition, structure and chemical properties of humic and fulvic acids and humin. Functions of soil organic matter.</p> <p>Cation exchange process and characteristics. Cation exchange capacity. Cations affinity. Models of double layer. Isotherms and equations of cation exchange. Selectivity coefficients. Dilution effects.</p> <p>Anion adsorption: Anion in soils. Physical (electrostatic) adsorption: Factors and mechanisms. Chemical (ligand exchange) processes. Reaction scheme. Adsorption of phosphates: kinetics, isotherms and dissolution and precipitation mechanisms. Molecular retention processes and mechanisms.</p> <p>Soil pH and reaction. Soil pH-buffering capacity and buffering systems. Acidity forms in soil. Soil titration curves. Acidic soils: causes and factors of soil acidification, nature of soil acidity, the role and effects of Al on soil acidity and on plants. Correction of acidic soils.</p> <p>Redox potential of soil. Electron acceptors and donors in soil. The role of oxygen and organic matter. Submerged soils: properties and processes. Rice cropped soils.</p> <p>The liquid phase of soil. Water potential in soil. Water retention curves. Effects of texture.</p> <p>Alomorphic soils. Origin of salts in soil. Classification: saline and sodic soils, properties. Effects of sodium on soil and salts on plants. Restoration of saline and sodic soils.</p> <p>Chemical quality of irrigation waters, hazards and problems related to salinity, sodicity and presence of pollutants. Electrical conductivity, SAR, toxic ions. Leaching factor, tollerance/sensitivity of crops to salinity. Wastewaters used for irrigation: problems and solutions.</p> <p>Fertilizers. Organic amendments. Composting process, phases, factors and controlling parameters. Quality parameters of composts.</p> <p>Soil pollution/contamination by heavy metals and pesticide residues: sources, processes, factors and effects, persistence and toxicity. Acid rain contamination of soil: sources, causes and effects.</p>
Bibliography	<ul style="list-style-type: none"> <li>• P. Sequi (Coord.), Fondamenti di Chimica del Suolo, Patròn Editore, Bologna 2005.</li> </ul>

	<ul style="list-style-type: none"> <li>• Oss. Naz. Pedologico e Qualità del Suolo, M.I.R.A.A.F., Metodi Ufficiali di Analisi Chimica del suolo, Roma, 1994.</li> </ul>
Notes	The notes of the lectures integrate the contents of bibliography
Teaching methods	Lectures will be held using PowerPoint slide shows and exercises using the blackboard with involvement of the students
Assessment methods	<p>Only the students enrolled in the academic year during which this module is offered, can have an intermediary exam during the teaching period of module. The result of this intermediary exam remains valid for the whole academic year and concurs to the final evaluation of the student.</p> <p>The intermediary exam will be given on the subjects treated during the lessons and the practical activities as reported in the Didactic Regulation of Management and conservation of the agro-forest environment (art. 9) and syllabus (annex A) and which is correlated to the actual teaching period. The evaluation of the intermediary exam is expressed in thirtieths.</p> <p>At the end of the module teaching period, the students, who passed positively the intermediary exam, can give the final exam concerning on the subjects treated during the lessons and the practical activities since the intermediary exam, as reported in the Didactic Regulation, and which is correlated to the actual teaching period.</p> <p>Students who did not pass or give the intermediary exam will be examined on the whole subjects treated during the lessons and the practical activities as reported in the Didactic Regulation, and which is correlated to the actual teaching period.</p> <p>The intermediary and the final exams consist of an oral examination. The evaluation of the student is based on criteria previously fixed such as reported in the Didactic.</p> <p>The exam for foreign students can be given in English according to the above reported modalities.</p>
Evaluation criteria	<ul style="list-style-type: none"> <li>• <i>Knowledge and comprehension ability</i> <ul style="list-style-type: none"> <li>○ The student will get the knowledge on the role of soil in the agro-forest systems and on soil conservation and protection from the various factors of degradation</li> </ul> </li> <li>• <i>Knowledge and applied comprehension ability</i> <ul style="list-style-type: none"> <li>○ Description of the main components of soils and comprehension of their effects on the soil physical and chemical features.</li> </ul> </li> <li>• <i>Autonomy of judgement</i> <ul style="list-style-type: none"> <li>○ Provide reasonable hypotheses regarding the detection of anomalous soil conditions and remediation operations needed to restore them.</li> </ul> </li> <li>• <i>Abilità comunicative</i> <ul style="list-style-type: none"> <li>○ Descrivere e illustrare in modo esaustivo, con appropriatezza nei termini, con ricchezza di esempi e con collegamenti gli aspetti di base che caratterizzano la fertilità chimica e chimico-fisica dei suoli</li> </ul> </li> <li>• <i>Communication skills</i> <ul style="list-style-type: none"> <li>○ Exhaustive description and illustration, with appropriateness of term, richness of examples and correlation the basic aspects that characterize the chemical and Physico-chemical- fertility of the soils</li> </ul> </li> <li>• <i>Learning ability</i> <ul style="list-style-type: none"> <li>○ Adaptation of the basic cognitive tools acquired during the module in order to explain and solve numerous applied problems and diversified case studies</li> </ul> </li> </ul>
Further information	<p>Official visiting hours:</p> <p>All days by previous agreement.</p>

