

Thesis topics 2019/2020

ID	Soil_Ecology_01	⁽³⁾ Curr. F&E, MEDfOR
Preliminary title (main topic)	Soil organic carbon stock assessment of forests from the Mediterranean area using the LUCAS soil database.	
Supervisor/s	Prof. Tommaso Chiti (email: tommaso.chiti@unitus.it)	
Short description of the objectives and methods	The main objective is to provide an assessment of the soil organic carbon stored in the topsoil of different types of Mediterranean forests. LUCAS is a freely available soil carbon database, which included data from different soils surveys from 2009 to 2018. The candidate should calculate the stock based on the parameters provided by the LUCAS database and stratify the DB based on the different soil and forest types.	
Preferred curricular requisite	Background on forestry with a good ability in data elaboration.	
Location/s of the experimental activities	<i>The work will be performed at the desk in an office</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date 01/03/2020	⁽²⁾ End date 30/06/2020
Notes		
<p>(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout</p> <p>(2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing</p> <p>(3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI</p>		

Thesis topics 2019/2020

ID	SoilPollMonit-T1-19	⁽³⁾ Curr. UGI
Preliminary title (main topic)	Monitoring of soil pollution using an advanced sensing device	
Supervisor/s	Prof. Fabrizio De Cesare (email: decesare@unitus.it)	
Short description of the objectives and methods	The monitoring device employed in this thesis is a complex sensing system composed of a series of functional (nanomaterial-based in case) units created and arranged on purpose and aimed at detecting various volatile pollutants as both single toxic contaminants and mixtures. Pollutants will be measured at first as standards and then in soil samples using distinct approaches.	
Preferred curricular requisite	Soil Chemistry, Environmental Chemistry	
Location/s of the experimental activities	<ul style="list-style-type: none"> • Laboratory of Biochemistry and Sensing Analyses of Soil - University of Tuscia (Viterbo) • Institute of Atmospheric Pollution Research (IIA) - National Research Council (CNR), Area della Ricerca di Montelibretti (Monterotondo - Rome) 	
Intensive experimental activities (full-time)	⁽¹⁾ Start date January 2020	⁽²⁾ End date June 2020 or 2021
Notes (1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout (2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing. The duration of each suggested thesis might be tuned based on students' availability. Accordingly, the experimental plans and targets of the theses could be adjusted on purpose: short-term vs. long-term targets, number of parameters to test (e.g. number of pollutants, number of nanomaterials, etc.). (3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI		

Thesis topics 2019/2020

ID	SoilPollMonit-T1-20	⁽³⁾ Curr. UGI
Preliminary title (main topic)	Development of nanomaterial-based tools for polluted soil and wastewater cleaning	
Supervisor/s	Prof. Fabrizio De Cesare (email: decesare@unitus.it)	
Short description of the objectives and methods	Development of nanomaterials suitable to decontaminate soils and/or water sources (e.g. wastewaters). Nanomaterials will be used to create filters, membranes or other fabrics. Nanomaterials will be set up to immobilise enzymes, encapsulate microorganisms or act as catalysts, or combinations. Nanomaterials as pristine materials (single polymers) or composites (combinations of them) will be considered.	
Preferred curricular requisite	Enzymology, Microbiology, Organic and Inorganic Chemistry, Environmental Chemistry	
Location/s of the experimental activities	<ul style="list-style-type: none"> • Laboratory of Biochemistry and Sensing Analyses of Soil - University of Tuscia (Viterbo) • Institute of Atmospheric Pollution Research (IIA) - National Research Council (CNR), Area della Ricerca di Montelibretti (Monterotondo - Rome) 	
Intensive experimental activities (full-time)	⁽¹⁾ Start date January 2020	⁽²⁾ End date June 2020 or 2021
Notes (1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout (2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing. The duration of each suggested thesis might be tuned based on students' availability. Accordingly, the experimental plans and targets of the theses could be adjusted on purpose: short-term vs. long-term targets, number of parameters to test (e.g. number of pollutants, number of nanomaterials, etc.). (3) specify the course curriculum for which is offered: F&E; MEDFOR; UGI		

Thesis topics 2019/2020

ID	<i>Es:</i> MICROMET_01	⁽³⁾ Curr. Es. F&E, MEDfOR
Preliminary title (main topic)	Eddy covariance footprint analysis using high resolution Remote Sensing data	
Supervisor/s	Prof. Dario Papale (email: darpap@unitus.it)	
Short description of the objectives and methods	The Eddy covariance technique allows to measure Net Ecosystem Exchange (NEE) of CO ₂ between terrestrial ecosystems and atmosphere over an area of approximately 500 meters or radius around the measurement point. Using models to estimate the footprint (where the measured fluxes are coming from) and high resolution remote sensing data it will be tested the possibility to link ecological properties to specific plant communities identified from the RS data.	
Preferred curricular requisite	<i>Remote sensing. The student will have to learn a programming language.</i>	
Location/s of the experimental activities	<i>none</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date Flexible, beginning of 2020	⁽²⁾ End date 2020 or 2021, 6 months after start
Notes		
<p>(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout</p> <p>(2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing</p> <p>(3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI</p>		

Thesis topics 2019/2020

ID	<i>Es: Landscape Architecture Lab</i>	⁽³⁾ Curr. UGI
Preliminary title (main topic)	Urban Green Blue Infrastructure for People and the Environment	
Supervisor/s	Prof. Maria Beatrice Andreucci (email: mbeatrice.andreucci@uniroma1.it) Prof. Paolo De Angelis (email: pda@unitus.it);	
Short description of the objectives and methods	<p>Urban areas are characterised by a high human density and a large proportion of sealed surfaces. Physically they are intensively built, often resulting in a fabric of dense street canyons and a lack of open ventilated spaces. Also inherent to the urban environment is the high volume of anthropogenic activity, including building construction, vehicular traffic, space heating and cooling, and a wide variety of industrial activities. It is important to recognise the city as an ecosystem, as it reminds citizens, planners, landscape architects and decision makers that urban inhabitants ultimately depend on the essential ecosystem services (ES) Green Blue Infrastructure (UGI) provides.</p> <p>On the basis of the approach summarised above, the objectives of the multidisciplinary research work, leading to a Master thesis, are to investigate how UGI can effectively contribute to human health and well-being through a vast array of benefits attributable to the human interaction with urban nature. While conventional urban green management has tended to be primarily aimed at enhancing amenity values and ‘beautification’, recently there has been a growing emphasis on the provision of ‘nature-based solutions’ to environmental, social and economic integrated problems, and this includes ES relating to microclimatic comfort regulation, pollution mitigation, carbon sequestration, stormwater attenuation, energy conservation, provisioning of goods and other services.</p> <p>Applied research methods include international literature review, case studies analysis, digital tools’ application (ENVI-MET, Ecotect, etc.), and research through design.</p> <p>Expected results include but are not limited to: case studies repositories; mapping and evaluation of ecosystems services and UGI benefits; original proposition of UGI planning and design at different scales.</p>	
Preferred curricular requisite	<i>Students are expected to have developed interests and knowledge on: Phyto technologies for remediation and improvement of the urban environment; Urban forestry and silviculture; Landscape Architecture; Landscape Ecology.</i>	
Location/s of the experimental activities	<i>Viterbo, Rome, Moscow</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date January 2020	⁽²⁾ End date July 2020
Notes		
<p>(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout</p> <p>(2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing</p> <p>(3) specify the course curriculum for which is offered</p>		

Thesis topics 2019/2020

ID	IRET_01	⁽³⁾ Curr. F&E, MEDfOR
Preliminary title (main topic)	Fires quantitative parameters for a proper characterization of a Mediterranean forest in relation to the fire occurrence	
Supervisor/s	Prof. Gabriele Guidolotti (gabriele.guidolotti@cnr.it)	
Short description of the objectives and methods	1) ecosystem fuel load and fuel quality by mean of in situ measurements; 2) level of topographic complexity as one of the principal factors affecting microclimatic conditions; 3) ecosystem characterization in terms of plant specific composition and abundance; 4) morphological traits of the vegetation such as: surface/volume ratio, rooting depth and re-sprouting capacity; 5) biomass and dead-mass amounts and their spatial distributions	
Preferred curricular requisite	<i>Forest ecology, Forest management and planning</i>	
Location/s of the experimental activities	<i>The experimental area of Gorgoglione (PZ, Italy) and the laboratories of CNR IRET Porano (Tr, Italy)</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date April 2020	⁽²⁾ End date September 2020
Notes		
(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout (2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing (3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI		

Thesis topics 2019/2020

ID	IRET_02	⁽³⁾ Curr. F&E, MEDfOR
Preliminary title (main topic)	Physiological responses of Mediterranean vegetation to tropospheric ozone pollution: from trees to grasses	
Supervisor/s	Prof. Paolo De Angelis (pda@unitus.it) Co-supervisor: Dr. Olga Gavrichkova , CNR-IRET (olga.gavrichkova@cnr.it)	
Short description of the objectives and methods	<p>Tropospheric ozone is an important secondary air pollutant and a greenhouse gas. Pollution by ozone is increasing worldwide with Mediterranean area being one of the hotspots.</p> <p>The aim of the study is to characterize the physiological response of Mediterranean vegetation, already adapted to sustain harsh conditions and oxidative stresses, to current and future levels of ozone. Target ozone concentrations are provided by free-air O₃ exposure facility available in CNR campus of Sesto Fiorentino, Italy (Paoletti et al., 2017).</p> <p>In this study we will consider three levels of ozone stress: ambient, x 1.5- times and x 2-times ambient. Two Mediterranean tree species, <i>Pinus halepensis</i> and <i>Pinus pinea</i> were treated with 3 levels of ozone during the growing season 2019. In 2020 it is planned to perform a similar ozone-exposure experiment already on herbaceous species. The methodological approach will involve:</p> <ol style="list-style-type: none"> 1. Characterization of photosynthetic machinery and eventual constraints by means of stable isotopes of C in pines and grasses (winter 2020-summer 2020) 2. In situ measurements of gas exchange: C uptake and emissions, C balance (spring-summer 2020) 3. Characterization of metabolism of carbohydrates in pines and grasses (winter 2020-summer 2020) 4. Microbial-plant-ozone interactions in pines and grasses <p>The candidate can opt for some of the proposed methodological approaches in respect to proper experience and interest.</p>	
Preferred curricular requisite	<i>Forest/Plant ecophysiology, Forest/Plant biotechnology</i>	
Location/s of the experimental activities	<i>Laboratories of Porano (CNR-IRET), Lab. Forest Ecophysiology DIBAF. Sampling and gas measurements in Sesto Fiorentino (summer 2020)</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date January 2020	⁽²⁾ End date October 2020
Notes		
<p>(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout</p> <p>(2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing</p> <p>(3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI</p>		

Thesis topics 2019/2020

ID	IRET_03	⁽³⁾ Curr. F&E
Preliminary title (main topic)	Primary producers and decomposers in High Arctic Tundra: state and implications for C balance	
Supervisor/s	Prof. Paolo De Angelis (pda@unitus.it) Co-supervisor: Dr. Angela Augusti , CNR-IRET, (email: angela.augusti@cnr.it)	
Short description of the objectives and methods	<p>Climate changes are greatly amplified in circumpolar regions. Warming accelerates soil organic C decomposition and release of GHG into the atmosphere while stimulation of terrestrial carbon sinks (vegetation and soil) can offset this global warming effect. Future changes of the C balance in Arctic remain one of the primary uncertainties in the C-cycle-climate models. The aim of this work is to study the functioning of dominant plant communities of High Arctic Tundra in terms of C allocation between above- and below-ground pools and fluxes (samples already available). Effects of big grazer on the state of vegetation and soil decomposers will be assessed by sampling plants and soil in grazed and fenced plots in Ny-Alesund, Svalbard in 2020.</p> <p>Methods:</p> <p>Compound-specific analyses on plant material</p> <p>Soil incubation and biochemical characterization</p> <p>Carbon Stable Isotope analyses</p>	
Preferred curricular requisite	<i>Forest/Plant ecophysiology, Forest/Plant ecology</i>	
Location/s of the experimental activities	<i>Laboratories of Porano (CNR-IRET), Lab. Forest Ecophysiology DIBAF</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date January 2020	⁽²⁾ End date October 2020
Notes		
<p>(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout</p> <p>(2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing</p> <p>(3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI</p>		

Thesis topics 2019/2020

ID	Soil_Chem&Biochem_01	⁽³⁾ Curr. F&E, MEDfOR
Preliminary title (main topic)	Stoichiometric enzyme activity in relation to humic substances properties in forest soils	
Supervisor/s	Prof. Sara Marinari (marinari@unitus.it)	
Short description of the objectives and methods	<p>Extracellular enzymes mediate the degradation, transformation and mineralization of soil organic matter. The activity of cellulases, phosphatases and other hydrolases has received extensive study and, in many cases, stoichiometric relationships and responses to disturbances are well established. In contrast, phenol oxidase and peroxidase activities, which are often uncorrelated with hydrolase activities, have been measured in only a small subset of soil enzyme studies. These enzymes are expressed for a variety of purposes including ontogeny, defense and the acquisition of carbon and nitrogen. Through excretion or lysis, these enzymes enter the environment where their aggregate activity mediates key ecosystem functions of lignin degradation, humification, carbon mineralization and dissolved organic carbon export. Phenol oxidases and peroxidases are less stable in the environment than extracellular hydrolases, especially when associated with organic particles. Activities are also affected, positively and negatively, by interaction with mineral surfaces. In this study the effect of different forest cover and management on stoichiometric enzyme activity will be assessed in order to study the microbial functions led to the amount of humic substances and their properties.</p>	
Preferred curricular requisite	<i>Soil quality monitoring</i>	
Location/s of the experimental activities	<i>Soil Chemistry and Biochemistry</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date January 2020	⁽²⁾ End date December 2020
Notes (1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout (2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing (3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI		

Thesis topics 2019/2020

ID	Soil_Chem&Biochem_02	⁽³⁾ Curr. F&E, MEDfOR
Preliminary title (main topic)	Recovery of soil quality in an abandoned quarry after amendment with a microbial consortium and basalt rock dust	
Supervisor/s	Prof. M. Cristina Moscatelli (mcm@unitus.it) Prof. S. Marinari (marinari@unitus.it)	
Short description of the objectives and methods	<p>The research activity is focused on the application of an agronomic system, composed of a microbial consortium combined to basalt rock dust, to recover soil quality in highly degraded soils.</p> <p>Soils of the quarry will be collected before and after the addition of the mixture. Physical-chemical and biological indicators will be determined to assess soil quality.</p>	
Preferred curricular requisite	<ul style="list-style-type: none"> • <i>Knowledge of basic indicators of soil quality, mainly bioindicators</i> • <i>Practical activity in a chemistry laboratory</i> • <i>Capacity to perform data processing, elaboration and statistical analysis</i> • <i>Capacity to write an academic text in proper English</i> 	
Location/s of the experimental activities	<i>Laboratory of Chemistry and Biochemistry, DIBAF</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date February 1 st , 2020	⁽²⁾ End date June/July 2020
Notes (1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout (2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing (3) specify the course curriculum for which is offered		

Thesis topics 2019/2020

ID	Forest economics and policy_01	⁽³⁾ Curr. F&E, MEDfOR
Preliminary title (main topic)	Analysis of tools for protecting forests	
Supervisor/s	Prof. Francesco Carbone (fcarbone@unitus.it)	
Short description of the objectives and methods	Objective: identify the tools used for protecting forest and evaluate their efficiency Method: interviews to forest stakeholders and dataset analysis	
Preferred curricular requisite	<i>Forest management</i> <i>Forest economics</i> <i>Forest policy</i>	
Location/s of the experimental activities	-----	
Intensive experimental activities (full-time)	⁽¹⁾ Start date January 2020	⁽²⁾ End date September 2020
Notes		
<p>(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout</p> <p>(2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing</p> <p>(3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI</p>		

Thesis topics 2019/2020

ID	MecHydroLab_01	⁽³⁾ Curr. UGI
Preliminary title (main topic)	POP-Rain: citizen rainfall observation	
Supervisor/s	Prof. Salvatore Grimaldi (Salvatore.grimaldi@unitus.it)	
Short description of the objectives and methods	The aim is to develop the POP-Rain App using the iOS system and to analyse observation collected in the last period by the citizen pool.	
Preferred curricular requisite	<i>Hydrology</i>	
Location/s of the experimental activities	<i>MecHydroLab offices</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date March 2020	⁽²⁾ End date June 2020
Notes		
<p>(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout</p> <p>(2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing</p> <p>(3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI</p>		

Thesis topics 2019/2020

ID	MecHydroLab_02	⁽³⁾ Curr. F&E, MEDfOR, UGI
Preliminary title (main topic)	Rainfall-runoff analysis using Cape Fear experimental data	
Supervisor/s	Prof. Salvatore Grimaldi (Salvatore.grimaldi@unitus.it)	
Short description of the objectives and methods	The aim is to collect and analyse experimental data obtained on the semi-natural hillslope named Cape Fear..	
Preferred curricular requisite	<i>Hydrology</i>	
Location/s of the experimental activities	<i>MecHydroLab offices & University Experimental Farm</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date March 2020	⁽²⁾ End date June 2020
Notes		
<p>(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout</p> <p>(2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing</p> <p>(3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI</p>		

Thesis topics 2019/2020

ID	MecHydroLab_03	⁽³⁾ Curr. F&E, MEDfOR
Preliminary title (main topic)	Rainfall-runoff investigation on an experimental watershed	
Supervisor/s	Prof. Salvatore Grimaldi (Salvatore.grimaldi@unitus.it)	
Short description of the objectives and methods	The aim is to monitor rainfall-runoff transformation at Montecalvello watershed	
Preferred curricular requisite	<i>Hydrology</i>	
Location/s of the experimental activities	<i>MecHydroLab offices & Montecalvello experimental watershed</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date March 2020	⁽²⁾ End date June 2020
Notes		
<p>(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout</p> <p>(2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing</p> <p>(3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI</p>		

Thesis topics 2019/2020

ID	Economics & chemistry_01	⁽³⁾ Curr. F&E, MEDfOR
Preliminary title (main topic)	Market value of chestnut carbon stock	
Supervisor/s	Prof. Francesco Carbone (email: fcarbone@unitus.it) Prof.ssa Sara Marinari (email: marinari@unitus.it)	
Short description of the objectives and methods	Quantification of carbon stock of San Martino chestnut forest. Carbon stock will be define considering different stem ages and forest management, including timber production. Market analysis of carbon market price.	
Preferred curricular requisite	<i>Chemistry</i> <i>Forest management</i> <i>Silviculture</i> <i>Forest economics</i>	
Location/s of the experimental activities	<i>Chestnut forest located close to the University of Tuscia;</i> <i>Soil Chemistry Lab</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date 01 January 2020	⁽²⁾ End date 30 September 2020
Notes		
(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout (2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing (3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI		

Thesis topics 2019/2020

ID	Urban green areas_01	⁽³⁾ Curr. UGI, MEDfOR
Preliminary title (main topic)	Accessibility of urban forests and green areas from newly built-up areas in European cities	
Supervisor/s	Prof. Anna Barbati (email: barbati.sisfor@unitus.it)	
Short description of the objectives and methods	<p>The number, spatial distribution and accessibility of forests and green areas are considered indicators of environmental quality in cities characterized by rapid growth rates of built-up environments. Patches of forests or green areas are regarded accessible if they can be reached within a 15 minutes' walk.</p> <p>The aim of the thesis is to quantify the proportion of the population living in new urban settlements that can benefit from accessible forest and green areas in a sample of European cities. The sample will be selected in order to contain cities of different population sizes and characterized by differently shaped territorial contexts (rural-urban land cover). The European Urban Atlas open-source geodatabase will be used as input data, in order to map city land cover, including the target classes of forests or green areas, and to identify new urban settlements built-up between 2006 and 2012. All urban residential polygons will be assigned with population data provided by GEOSTAT for the year 2011. The network analysis tools will be used to analyse accessibility of the target classes by people living in new urban settlements.</p>	
Preferred curricular requisite	<i>No specific requisite, but basic skills for processing, query and analysing vector data in GIS software.</i>	
Location/s of the experimental activities	<i>SISFOR Lab</i>	
Intensive experimental activities (full-time)	⁽¹⁾ Start date March 2020	⁽²⁾ End date June 2020
Notes		
<p>(1) before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout</p> <p>(2) after the end of data collection, the student should reserve at least one month to finalise the thesis writing</p> <p>(3) specify the course curriculum for which is offered: F&E; MEDfOR; UGI</p>		