



MSc - Forestry and Environmental Sciences

DIBAF - DEPARTMENT FOR INNOVATION IN BIOLOGICAL, AGRO-FOOD AND FOREST SYSTEMS

3-Curricula: Forest & Environment, Mediterranean Forestry and Natural Resources Management – MEDfOR, Management and design of Urban Green Infrastructures - UGI

Thesis 2018/19

General notes

The preparation of the final dissertation is particularly central in the MSc programme course. It allows the students to make the most out of the expertise acquired during the MSc, using a problem-solving approach and carrying out their own case studies.

For each thesis at least one supervisor must be nominated using the procedures you will find on the course web page:

<http://www.unitus.it/en/dipartimento/dibaf/tesi/articolo/info-in-inglese-sulle-procedure>

The thesis is a write original document prepared by the MSc student as final exam of his career. The format must be agreed with the supervisor, following the general standard used for scientific publications. The general introduction should include a detailed analysis of the international scientific literature and a clear definition of the objectives of the work. A methodological description, including the statistical analyses of the data, must be included in the core text of the thesis, while detailed data-set or other source of information / methodologies can be included as Annex section.

The results must be presented according to the international standard commonly used in the specific sector of science, while the discussion should analyse the results in comparison with other relevant studies published in qualified journal/database (peer review approach).

Before the intensive experimental activities, the student should start to analyse the literature and to define the objectives and the experimental layout. After the end of data collection, the student should reserve at least one month to finalise the thesis writing.

The thesis will be evaluated by a department commission (seven members), during the public session for the final discussion.

At least one month before the selected date for the final discussion, the candidate sends a complete draft of the thesis to a reviewer nominated by the Director of the Department. The reviewer could suggest changes and corrections, to be considered in the final version. The reviewer will send his evaluation to the commission.

Following the list of the available theses for the year 2018/19 is reported. The list is also available at the link:

<http://www.unitus.it/en/dipartimento/dibaf/tesi/articolo/lista-delle-tesi-disponibili-201819>

Students may suggest different research topics to the supervisor, which will evaluate the suitability (equipment, logistic, budget).

ID	Micromet_RS_02		
Preliminary title	Link between vegetation indexes and NEE interannual variability		
Supervisor/s	Prof. Dario Papale (email: darpap@unitus.it)		
Short description of the objectives and methods	Net Ecosystem Exchange (NEE) of CO2 between terrestrial ecosystems and atmosphere are recorded in more than 200 station globally at high time resolution. The analysis will be focussed on linking the variability of the NEE with vegetation information derived from remotely sensed data, in particular from MODIS.		
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>		
Start month	flexible	End month	6 months after start

ID	Micromet_RS_03		
Preliminary title	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 CO2 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>		
Start month	flexible	End month	6-8 months after start

ID	SoilPollMonit-T1-19		
Preliminary title	Development of nanomaterial-based sensing probes for monitoring soil pollution		
Supervisor/s	FABRIZIO DE CESARE (decesare@unitus.it)		
Short description of the objectives and methods	Development of a sensing device (probe) to be used for monitoring soil pollution. The probe will be of two possible types, depending on which kind of pollutant must be detected and monitored: i) to be used at various soil depth; ii) to be used at soil surface. The probe will employ sensors based on nanomaterials and might be of hybrid-type, to measure distinct parameters (e.g. inorganic, organic, biological, biochemical)		
Preferred curricular requisite	Soil Chemistry, Organic and/or 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) 		
Start month ¹	January 2019	End month	June 2019

¹ The duration of each suggested thesis can be tuned according to students' availability to work on that. 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 (and then few vs. several sensors), number of materials to test, laboratory vs. field/environmental tests, etc.

ID	SoilPollMonit-T2-19		
Preliminary title	Development of nanomaterial-based sensors and sensing tools for monitoring gases and biogenic VOCs		
Supervisor/s	FABRIZIO DE CESARE (decesare@unitus.it)		
Short description of the objectives and methods	Development of a nanomaterial-based sensors or sensing devices to be used for monitoring gases and volatile organic compounds (VOCs) in the outer atmosphere and in soil. Gases and VOCs related to pollutants and their dynamics in the two ecosystems will be mainly considered		
Preferred curricular requisite	Soil Biology, Soil Biochemistry, Soil Chemistry, Organic and Inorganic Chemistry, Environmental Chemistry		
Location/s of the experimental activities	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)		
Start month ²	January 2019	End month*	June 2098

ID	SoilPollMonit-T3-19		
Preliminary title	Development of nanomaterial-based tools for soil and wastewater cleaning from pollutants		
Supervisor/s	FABRIZIO DE CESARE (decesare@unitus.it)		

^{2,3} The duration of each suggested thesis can be tuned according to students' availability to work on that. 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 (and then few vs. several sensors), number of materials to test, laboratory vs. field/environmental tests, etc.

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	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)		
Start month ³	January 2019	End month*	June 2019

ID	MSQ - Monitoring soil quality
Preliminary title	Effects of photovoltaic panels (solar parks) on soil quality
Supervisor/s	Prof. M. Cristina Moscatelli (mcm@unitus.it) Prof. Sara Marinari (marinari@unitus.it)
Short description of the objectives and methods	The aim of the research is the assessment of the impact of photovoltaic panels on soil quality. Assessment of seasonal changes on soil chemical and biological properties due to microclimate modifications and changes of vegetation cover.
Preferred curricular requisite	<i>Soil Science</i>

Location/s of the experimental activities	<i>Soil Chemistry and Biochemistry</i>		
Start month	February 2019	End month	July 2019

ID	Ped_02		
Preliminary title	EVIDENCES OF A PALEOSOL IN THE LIVING LANDSCAPE OF CIVITA DI BAGNOREGIO (ITALY)		
Supervisor/s	Prof. Sara Marinari (marinari@unitus.it) Prof. M. Cristina Moscatelli (mcm@unitus.it)		
Short description of the objectives and methods	<p>A paleosol has been identified in an area of great natural interest for its geomorphologic and naturalistic aspects between the municipalities of Bagnoregio and Castiglione in Teverina (northern Lazio, bordering Umbria).</p> <p>A previous study allowed a first description of its chemical and biological properties. The research proposed with this thesis aims to deepen the description of its mineralogical and microbiological properties including the possibility to compare the results obtained with another paleosol recently identified in the same area.</p>		
Preferred curricular requisite	Soil science		
Location/s of the experimental activities	Laboratory of soil chemistry and biochemistry		
Start month	February 2019	End month	July 2019

ID	EnvStats_01 & 02 (up two peoples coordinated)		
Preliminary title	The evaluation of human well-being and psychological benefits gained by visiting urban green areas Exploring the relationships between forest stand structure, perceived benefits gained by visitors to urban forests in Moscow		
Supervisor/s	Prof. Luca Secondi (email: secondi@unitus.it)		
Short description of the objectives and methods	<p>Forests are widely recognized as important landscape elements which contribute to human health and wellbeing. They provide benefits derived from direct and indirect experiences of contact with nature by reducing psychological and physical stress, thus creating positive feelings and facilitating the recovery of psychological resources. In order to establish or manage forests for recreational purposes, it is essential to know which forest stand structure features and indicators are linked to actual or perceived psychological restoration. The aims of the proposed thesis are to evaluate the association between individual factors, forest stand structure attributes and self-reported physical-psychological benefits obtained when visiting urban and peri-urban forests.</p> <p>Data gathering will be carried out by questionnaires fulfilled in situ by people visiting the studied areas. Forest stand structure will be evaluated by field surveys. Further activities can concern comparisons of the results obtained in Russian and Italian case studies.</p>		
Preferred curricular requisite	<i>Background on forest ecology and silviculture, tree measurements, economy, statistics and GIS</i>		
Location/s of the experimental activities	<i>RUDN (Moscow) and DIBAF (Viterbo)</i>		
Start month	January 2019	End month	June/September 2019

ID	EcoPhys_01		
Preliminary title	Techno-soils to reduce pollution transfer and to increase C-sequestration in urban storm water green infrastructures		
Supervisor/s	Prof. Paolo De Angelis (email: pda@unitus.it)		
Short description of the objectives and methods	<p>The main objective of the thesis is to test the use of biochar, in combination with other organo-mineral substrates, to improve the pollution removal of urban storm water tree filtration systems.</p> <p>Replicated mesocosms will be filled with different substrate mixtures and planted with tree species suitable for urban environment.</p> <p>The comparative analysis among the different tree-substrate types will span from plant ecophysiology and C-sequestration, to pollution removal and uptake.</p> <p>The selection of the species and the implementation of the experimental facility will be part of the thesis work.</p>		
Preferred curricular requisite	<i>Background on biology, chemistry, physics, soil biochemistry, plant/forest ecophysiology,</i>		
Location/s of the experimental activities	<i>Lab and campus greenhouse</i>		
Start month	January 2019	End month	September 2019

ID	EcoPhys_02		
Preliminary title	Phytoremediation of As contaminated soils		

Supervisor/s	Prof. Paolo De Angelis (email: pda@unitus.it)		
Short description of the objectives and methods	<p>The main objective of the thesis is to analyse the plant induced arsenic mobility in a comparative mesocosms experiment.</p> <p>Replicated mesocosms will be filled with two contrasting As contaminated soils and planted with species adapted to different environmental constraints: salinity and waterlogging.</p> <p>The comparative analysis among the different plant-substrate types will span from plant ecophysiology to pollution removal and uptake.</p>		
Preferred curricular requisite	<i>Background on biology, chemistry, physics, soil biochemistry, plant/forest ecophysiology,</i>		
Location/s of the experimental activities	<i>Lab and campus greenhouse</i>		
Start month	January 2019	End month	September 2019

ID	EcoPhys_03		
Preliminary title	Comparative analysis of salinity tolerance in <i>Tamarix</i> spp		
Supervisor/s	Prof. Paolo De Angelis (email: pda@unitus.it)		
Short description of the objectives and methods	<p>The main objective of the thesis is to analyse the salinity tolerance in different provenances of <i>Tamarix</i> spp., available in the EcoPhysLab in-vivo collection.</p> <p><i>Tamarix</i> cuttings will be grown in pots maintained at different water salinity concentrations, in a replicated experimental design. Interactions with seasonal drought will be also assessed.</p> <p>The comparative analysis among the different provenances and species will span from plant growth and</p>		

	development to plant metabolism.		
Preferred curricular requisite	<i>Background on biology, chemistry, physics, soil biochemistry, plant/forest ecophysiology,</i>		
Location/s of the experimental activities	<i>Lab and campus greenhouse</i>		
Start month	January 2019	End month	September 2019

ID	MecHydroLab_01		
Preliminary title	POP-Rain: citizen rainfall observation		
Supervisor/s	Prof. Salvatore Grimaldi (email: 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>		
Start month	March 2019	End month	July 2019

ID	MecHydroLab_02		
Preliminary title	Rainfall-runoff analysis using Cape Fear experimental data		
Supervisor/s	Prof. Salvatore Grimaldi (email: 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 and Azienda Agraria</i>		
Start month	March 2019	End month	July 2019

ID	MecHydroLab_03		
Preliminary title	Image analysis of objects with simulated rainfall and fog conditions		
Supervisor/s	Prof. Salvatore Grimaldi (email: Salvatore.grimaldi@unitus.it)		
Short description of the objectives and methods	The aim is to verify if image analysis algorithm are able to detect objects in adverse conditions given by simulating fog and rainfall.		
Preferred curricular requisite	<i>Hydrology.</i>		

Location/s of the experimental activities	<i>MecHydroLab offices</i>		
Start month	March 2019	End month	July 2019

ID	Forest economics & policy_01		
Preliminary title (main topic)	Forest policy analysis of national case study		
Supervisor/s	Prof. Francesco Carbone (email: fcarbone@unitus.it)		
Short description of the objectives and methods	<p>Over the last decades, forest policy has become an important topic on the international institutions agenda in order to define an effective forestry strategy to contribute to the various global challenges. The implementation of these strategies, however, passes through the adoption of the national forest policy.</p> <p>Thesis analyses a national/regional forest policy case study with the aim to identify: the interconnections with international forest policies, the process of policy formation, the administrative step for the adoption, the implementation and monitoring and reporting activities</p> <p>From the methodological point of view, a dedicated questionnaire must be developed, and it will be submitted to institutions and stakeholders.</p>		
Preferred curricular requisite	<i>Forest economic and policy</i>		
Location/s of the experimental activities	<i>Economics Lab</i>		
Intensive experimental activities (full-time)	Start date ⁽¹⁾ January 2019	End date ⁽²⁾ September 2019	

ID	Forest economics & policy_02	
Preliminary title (main topic)	Forest decline: the role of economics and institution	
Supervisor/s	Prof. Francesco Carbone (email: fcarbone@unitus.it)	
Short description of the objectives and methods	<p>Forest degradation is now daily on the agenda of international and national institutions. Vast is the literature and documents published on the subject that enter in detail above all in the biotic and abiotic source of degradation processes analysis.</p> <p>Economic and institutional aspects are under investigation in the thesis. Their study is aimed at understanding their modalities and mechanisms of actions.</p> <p>The study is based on the analysis of the literature, the study of reporting on the state of the forests, the analysis of case studies and the submission of questionnaires dedicated to the stakeholders.</p>	
Preferred curricular requisite	<i>Forest management; forest disease</i>	
Location/s of the experimental activities		
Intensive experimental activities (full-time)	Start date ⁽¹⁾ January 2019	End date ⁽²⁾ 2019

ID	FTC_02	
Preliminary title (main topic)	Perspectives of <i>Populus</i> spp. balsam and bud extracts rich in polyphenols as anti-bacterial agents	
Supervisor/s	Prof. Maurizio Sabatti (email: sabatti@unitus.it)	

Short description of the objectives and methods	The aim of the proposed research is to compare phenolic compounds obtained from vegetative bud extracts and balsam of different poplar species (<i>Populus nigra</i> , <i>Populus deltoides</i> , <i>Populus trichocarpa</i> , <i>ecc.</i>). The chemical characterization of their single phenolic components will be done in view of possible uses of these extracts in the pharmaceutical sector.	
Preferred curricular requisite	<i>Degree in agriculture, forestry, pharmacology</i>	
Location/s of the experimental activities	<i>Silviculture lab and poplar germplasm collection at the University farm</i>	
Intensive experimental activities (full-time)	Start date January 2019	End date July 2019

ID	Forest genetics_Forest Biotech_01 (ASSIGNED)
Preliminary title (main topic)	Genetic characterization and conservation of ancient genomes of <i>Platanus orientalis</i> L. from historical villas of Central Italy
Supervisor/s	Prof. Mario Ciaffi/Prof. Elena Kuzminsky (email: ciaffi@unitus.it , elkuz@unitus.it)

Short description of the objectives and methods	<p>Objectives:</p> <p>Collecting of historical information and survey on the current state of the gardens of historical villas of Central Italy characterized by the presence of multi-century plane trees.</p> <p>Taxonomic identification of the single individuals and characterization of their genetic variability by using suitable molecular markers.</p> <p>Vegetative propagation of those ancient genomes of <i>Platanus orientalis</i> L., planted in XVI and XVII centuries.</p>	
Preferred curricular requisite	-	
Location/s of the experimental activities	<p><i>Lab. of Plant molecular genetics (Prof. Ciaffi)</i></p> <p><i>Lab. of In vitro culture (Prof. Kuzminsky)</i></p>	
Intensive experimental activities (full-time)	<p>Start date</p> <p>February 2018</p>	<p>End date</p> <p>August 2018</p>

ID	Forest Biotech_02 (ASSIGNED)
Preliminary title (main topic)	<i>In vitro</i> characterization of veteran <i>Platanus orientalis</i> L. plants (Central Italy) under stress conditions induced by heavy metals
Supervisor/s	Prof. Elena Kuzminsky / Prof. Elena Di Mattia (email: elkuz@unitus.it)

Short description of the objectives and methods	<p>Objectives: Assessment in soilless systems of plant responses to heavy metals contamination, with special emphasis to in vivo “PGPR” phytostimulation of plane trees.</p> <p>Methods: Micropropagation, Leonard pot, bacterization with PGPR.</p>	
Preferred curricular requisite	-	
Location/s of the experimental activities	<p><i>Lab. of In vitro culture (Prof. Kuzminsky)</i></p> <p><i>Lab. 232A Microbiology (Prof. Di Mattia)</i></p>	
Intensive experimental activities (full-time)	<p>Start date ⁽¹⁾</p> <p>March 2018</p>	<p>End date ⁽²⁾</p> <p>August 2018</p>