FOR COURSES BASED ON A SEMESTER ORGANIZATION
First semester: October 1st, 2013 to January 25th, 2014
Second semester: March 3rd, 2014 to June 14th, 2014

FOR COURSES BASED ON A TRIMESTER ORGANIZATION
First trimester: October 1st, 2013 to December 7th, 2013
Third trimester: April 7th, 2014 to June 21th, 2014
COURSES IN FOREST AND ENVIRONMENTAL SCIENCES, ENVIRONMENTAL TECHNOLOGY AND LOCAL DEVELOPMENT

The courses belong to three different master programs: Forest and Environmental Sciences, Science and Technology for the Environment and Territory, and Local Development.

The courses in Forest and Environmental Sciences taking part on 3 Erasmus Mundus master programs: MEDfOR, SUFONAMA and SUTROFOR. Please click on the courses listed alphabetically in the Index section to find the course descriptions. To avoid lecture overlapping for the students, it is recommended to choose courses from the same program.

FES - MASTER COURSE IN FOREST AND ENVIRONMENTAL SCIENCES

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<td><a href="mailto:marco.borga@unipd.it">marco.borga@unipd.it</a></td>
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For additional information about Medfor: http://www.medfor.eu/
SUFONAMA - ERASMUS MUNDUS MASTER COURSE IN SUSTAINABLE FOREST AND NATURE MANAGEMENT. SPECIALISATION IN MOUNTAIN FORESTRY AND WATERSHED MANAGEMENT

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<td>Management of mountain forests and logging systems</td>
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For additional information about SUFONAMA: http://www.sufonama.net/

SUTROFOR - ERASMUS MUNDUS MASTER COURSE IN SUSTAINABLE TROPICAL FORESTRY. SPECIALISATION IN RESPONSIBLE TROPICAL FORESTRY AND TRADE

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For additional information about SUTROFOR: http://www.sutrofor.net/
## Local Development - Interdepartmental Master Course

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For additional information please control the Faculty of educational sciences: www.unipd.it/local-development-0 and http://www.em-stede.eu/

## Science and Technology for the Environment and Territory - Interdepartmental Master Course

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For additional information please control the Faculty of educational sciences: http://www.unipd.it/scienze-e-tecnologie-lambiente-e-il-territorio

## Courses in Agriculture and Biotechnology

The courses in the field of Agriculture and Biotechnology belong to different master programs: Forestry and Environmental Sciences, Agricultural Science and Technology and Food Biotechnology.

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COURSES IN FOOD SCIENCE, GASTRONOMY AND FOOD SERVICE

The course program in the field of Food Science, Gastronomy and Food Service belong to different master programs: mainly to the interdepartmental Bachelor program in Science and Culture of Gastronomy and Food service and the Master program in Animal Science and Technology.

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<td>1°</td>
<td>8</td>
<td><a href="mailto:antonella.dallezotte@unipd.it">antonella.dallezotte@unipd.it</a></td>
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<td>Business plan</td>
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<td><a href="mailto:andrea.menini@unipd.it">andrea.menini@unipd.it</a></td>
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COURSES IN ANIMAL SCIENCE AND VETERINARY MEDICINE

The course program in the field of Animal Science and Veterinary Medicine belong to the Master course in Animal Science and Technology as well as to the One-cycle-degree course in Veterinary Medicine.

<table>
<thead>
<tr>
<th>Code</th>
<th>Subjects</th>
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<td><a href="mailto:valentina.zappulli@unipd.it">valentina.zappulli@unipd.it</a></td>
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Expected learning outcomes
Acquire knowledge on husbandry techniques and the potential problem leading to metabolic disorders and reduce reproduction performances and the implementation of husbandry techniques maximizing farm profitability and prevention of health and reproduction problem.

Prerequisites
Feeding and Nutrition and Ethology

Programme

Beef cattle: the meat market in Italy and Europe and future production perspective. Production techniques in relation of the stocker type. Production goals. Feeding of fattening beef and meat quality.


Goats: Managing dairy goats

Teaching organization
The course is taught with lectures using slides. During lectures, problems are formulated and solved together. A rapid evaluation of the students’ understanding is tested using clickers. Ration formulation is practiced at the computer lab using a spreadsheet supplied by the instructor.

The course is organized as follows:
- teaching activity: 47 hours
- exercises: 3 hours (repeated 3 times)
- the course is completed with activities planned within the practical training (“tirocinio”) that the student must perform him/herself (hands on) under the supervision of an instructor.

References
Dairy
Hoard’s Dairyman http://www.hoards.com/
Penn State Extention http://extension.psu.edu/animals/dairy
Univ of Wisconsin http://www.uwex.edu/ces/dairynutrition/ http://milkquality.wisc.edu/
http://dairymgt.uwex.edu/tools.php
Cornell University
http://www.anisci.cornell.edu/prodairy/

Beef
http://www.extension.org/beef_cattle
http://beef.unl.edu/
http://www.iowabeefcenter.org/
http://www.anisci.colostate.edu/beef/swine
http://www.usporkcenter.org/default.aspx#
UV5ySZO7NLd
Iowa Pork Industry Center www.ipic.iastate.edu
North Carolina State University Swine Husbandry
http://mark.asci.ncsu.edu/
Ohio Pork Industry Center http://porkinfo.osu.edu/
University of Nebraska Pork Central http://porkcentral.unl.edu/
Illini Pork Net http://www.livestocktrail.uiuc.edu/porknet/
 Purdue Pork Page http://www.ces.purdue.edu/pork/
University of Minnesota Swine Extension http://www.extension.umn.edu/swine/

Remarks
The course is a module and as thus part of an integrated course. The integrated course is
Zootecnica speciale and the module name in Italian Tecniche di allevamento. This course can not be registered, after the examination the student will get an certification about the course result. Class attendance mandatory!

ANTHROPOLOGY OF FOOD

Language: English
Teaching period: 3rd Year - 1st Semester
Lecturer: Michela Zago
Credits: 6 ECTS

Expected learning outcomes
Students will acquire the critical skills and knowledge to analyze the food behaviours in relation to the cultural contexts, according to the methodology of history of religions and anthropology. They will identify and problematize the basic connection between food and identity which emerges from ethnographic, literary and cinematographic documents.

Prerequisites
None.

Programme
According to the historico-religious and anthropological perspective, the course focuses on food behaviours from antiquity to the contemporary world, with special attention to: the taxonomies, interdictions and choices of food in relation to cultural and religious models; the relationship between human and divine food and between food and social body; food as a constitutive element of the creation and reproduction of local, regional and national identities; the notion of sense and “the anatomy of the senses”.

Teaching organization
Lectures. Workshop.

Examination methods
Oral examination. The evaluation of the preparation of the student will be based on the comprehension of the topics, on the acquisition of the concepts and methodologies proposed and the ability to apply them independently.
Expected learning outcomes
The course aims at introducing students to the use of geophysical techniques for environmental application. Methods will be discussed that can provide high-resolution information with penetration of the order up to a few hundred metres underground. With a view to a more complete and authentic understanding of the capabilities and limitations of the proposed methods, students will be given a general introduction to Geophysical Exploration techniques, including issues of data acquisition, processing, inversion and interpretation of results. Upon completion of this course students should have acquired a critical capacity of comparing strengths and weaknesses of each method, and of geophysical methods with respect to other methods, as well as a general understanding of what methods can be used for what purposes, and in what ways.

Prerequisites
Essential prerequisites include: basics of mathematics and physics

Programme
The course will be composed of two parts: part 1: introduction to exploration geophysics, will introduce the general concepts of Geophysics applied with particular regard to:
- physical principles of the main electrical, electromagnetic, seismic, magnetic and gravimetric methods
- concepts of resolution and penetration
- general definition of geophysical inversion
- basic concepts about data acquisition of the
main methodologies
Part 2: exploration methods for environmental purposes. The methods that will be discussed are:
- traditional and tomographic geo-electrics, particularly with special regard to hydrological and hydrogeological applications
- spectral induced polarisation with applications to identify contaminants in the subsurface
- low frequency electromagnetic methods for contaminated site exploration and identification of structures in the first meters of the subsoil
- GPR and its potential applications to stratigraphy, engineering, hydrology, with a particular focus on processing and interpretation
- advanced high-resolution seismics for structural and stratigraphic definition of the top tens to hundreds of metres
- seismic refraction and surface waves seismic engineering and their geotechnical applications
- seismic, radar and geoelectrical cross-hole geophysical methods
- well logs and their environmental and hydrological applications.
For all methods special attention will be given to their applications, with examples from literature and from the experience of the lecturer. Demonstration will be given of the main methods methods, followed by processing, inversion and interpretation of laboratory data.

Teaching organization
Class lectures. Practical demonstrations in the field and in the laboratory.

Examination methods
Oral examination including also the discussion of a scientific paper to be chosen among the ones previously distributed to students
The following will be evaluated:
- ability to expose a scientific paper relevant to the subject
- ability to critical analysis of the presented methods
- ability to link possible methods to specific applications
- ability to physical-mathematical reasoning

References
**Biomass and Bioenergy**

**Language:** English  
**Teaching period:** 2nd Year - 1st Semester  
**Lecturer:** Mario Malagoli  
**Credits:** 6 ECTS

**Expected learning outcomes**  
The aim of the course is to provide knowledge on the utilization of biomass as source of energy, on biomass recycling, and on the main energy conversion processes.

**Prerequisites**  
English CEF- B2 level

**Programme**  
4 credit: Biological conversion. Fermentation. Anaerobic digestion. Biofuels. Composting
5 credit: Excursions: Field chipping systems, Biodiesel production factory, Biogas production
6 credit: Excursions: Biomass heating power plant, Composting process.

**Teaching organization**  
Lectures: 32 hours. Field exercises: 16 hours.

**Examination methods**  
Oral test with open questions.

**Remark**  
Course is organized for Master students in Agricultural Science and Technology, and available for all Erasmus students.

**Business Plan**

**Language:** English  
**Teaching period:** 3rd Year - 2nd Semester  
**Lecturer:** andrea.menini@unipd.it  
**Credits:** 6 ECTS

**Expected learning outcomes**  
The basic goal of this class is to provide each student with the opportunity to formulate and implement a business idea in food service through the realization of a comprehensive document that could attract banks, venture capitalists, business partners, employees, managers and stakeholders in general. This course focuses on the proactive writing of an effective business plan; in addition, through a pair-evaluation system, this class also highlights students’ competence in evaluating a detailed business proposal. Accordingly, the objective of this course is to encourage the development of teamwork skills, but also to improve students’ ability to underline potential weak points and latent inconsistencies of a business proposal.

**Prerequisites**  
Specific knowledge:  
- industry analysis  
- strategy  
- accounting  
- cost accounting  

**Generic competences:**  
- work with others  
- work with information  
- work with technology (word-excel-powerpoint or similar)  
- learning to learn

**Programme**  
Market analysis  
Demand analysis  
Pricing  
The operational plan
Economic analysis
Financial analysis

Teaching organization
LESSONS: Tools for business planning
LAVORI DI GRUPPO: Summarize and communicate the business idea and expected results

Examination methods
Develop a business plan and presenting it. Presentation of the business idea and its feasibility. Industry and market analysis. Economic and financial evaluation

References

CLIMATE CHANGE AND TROPICAL FORESTRY: MONITORING AND POLICY
Language: English
Teaching period: 2nd Year - 1st Semester
Lecturer: Laura Secco
Credits: 6 ECTS

Expected learning outcomes
The student will: understand climate change risks; familiarize with basic concepts of mitigation and adaptation; familiarize with role of forests in addressing climate change issues; understand the Post Kyoto Protocol; understand REDD+ mechanisms and governance; get an overview of voluntary and regional initiatives for the reduction and compensation of GHGs; understand trends, critical aspects and limits of the innovative and experimental voluntary carbon markets; comprehend the importance of shared and credible standards; be able to identify different types of standards; understand best practices and limitation in forest carbon projects.

Divided into 2 groups and 2 case-studies (SUTROFOR students focused on tropical forests; SUFONAMA students focused on temperate forests): learn how to organize forest carbon projects; define important aspects for the auditing process; learn how to quantify net GHGs removals; acquire skills for project offset development.

Prerequisites
A basic forest background is advisable.

Programme
The course is divided into 5 compulsory e-Modules, each of them lasting for 2 weeks consecutively. The Modules are the following:
• e-Module 1: “Starting up! Are you climate friendly?”, which includes 4 e-lessons (1. Log in into the Moodle platform and answer to the welcome letter; 2. Get familiar with the course structure and e-modules contents; 3. Calculate
your own carbon footprint!; 4. Have you ever seen deforestation of forest degradation?);
• e-Module 2: “The climate issues”, which includes 3 e-lessons (1. IPCC forecasts; 2. Community based resilience; 3. Strategies to react);
• e-Module 5a: “Carbon accounting and project cycle (SUTROFOR)”, with 4 e-lessons (1. Project and baseline scenario; 2. Carbon pools and emission sources; 3. Project Design Document development; 4. Project validation and verification); based on tropical forests case-studies;
• e-Module 5b: “Carbon accounting and project cycle (SUFONAMA)”, with 4 e-lessons (1. Project and baseline scenario; 2. Carbon pools and emission sources; 3. Project Design Document development; 4. Project validation and verification); based on temperate forests case-studies.

Teaching organization
E-learning lesson: 48 ore. Class attendance is compulsory. In order to pass the course, the student must complete at least 80% of the e-Modules

Examination methods
The evaluation is based on three components:
1. Completion of e-Modules (80% of final score); 2. Final written examination (15% of final score); 3. Fully completion of all e-Modules (5% of final score). The course is made of 5 compulsory e-Modules, and each Module is made of a number of e-lessons ranging from 3 to 4. To pass the course you must complete at least 80% of the e-Modules (4 out of 5 e-Modules). Evaluation methods (choose one or more boxes)
An e-Module is complete when at least 75% of the e-lessons are completed (at least from 2 to 3 e-lessons are completed). An e-lesson is completed when all the following conditions are met: a) the student posts at least one message which is addressing the task within the defined deadlines; b) the student adds new contents/perspectives to the discussion; c) the student's posts contribute and stimulate a dynamic discussion (hence the students are expected to address contributions of fellows concerning the posts).

Written: the final examination consists on a written assignment (max 1,500 words – tables, figures, appendices and references excluded) that has to be posted by students in a final, dedicated course week

IT test
Assessment of the level of active participation into the various e-lessons

Not Ongoing examinations.

References
The UNFCCC and Kyoto Protocol; Project Design Documents on selected case-studies; web-sites, youtube videos and scientific readings suggested for each single e-lesson.
Expected learning outcomes
Students are expected to learn the basics of management of the reproductive cycle and how to identify and treat the most common diseases of food animals (ruminants and swine) and horses. Furthermore, they will be expected to know how to a) monitor and control the reproductive cycle of bitches, queens, ferrets and other exotic and wild species, b) perform artificial insemination and diagnose and treat the most common diseases of the reproductive tract of dogs, cats and exotics animal species.

Prerequisites
Students are expected to have a sound understanding of anatomy and physiology of gonadal function as well as of physiology of the reproductive cycle of all domestic species as well as of exotic companion and wild animals. Having successfully passed the final exam of the course of Obstetrics and Pathology of Reproduction is to be considered a mandatory requirement.

Programme
RUMINANTS: Clinical exam of the reproductive tract, Heat detection, Artificial insemination, Vaginal and uterine prolapse, Reproduction in buffaloes, Reproduction in small ruminants
HORSE: Management of transition phase, Artificial insemination, Fertilization, early development and placental formation, Management of twin embryos, Embryonic death in mares, The prefoaling period, Parturition and dystocia, Retained placenta, Abortion due to infection, placentitis, Uterine cultures, cytology and biopsy, Biotechnologies in animal reproduction
SMALL ANIMALS: Pregnancy and pseudopregnancy, Parturition and pediatrics – puerperal diseases
The problem pregnancy, Infertility in the bitch and queen, Practical use of reproductive hormones, Vaginal prolapsed, Urinary incontinence, Mammary tumors, Neutering yes or no? And if yes, how and when? Practical aspects of male reproduction, Cryptorchidism
Prostatic diseases in the dog, Reproduction in wild and exotic species

Teaching organization
(clinic)
lectures = 56 hours
practical = 10 hours
lab = 16 hours
(food safety)
lectures = 40 hours
practical = 10 hours
The Course is completed by an obligatory practical hands-on training to be done personally by the student, in groups of <5 students, under the supervision of a teacher.

Examination methods
Practical, written and oral examination at the end of the course. Students will be evaluated relative to their theoretical knowledge but also with regard to their ability to solve the most common practical problems encountered in daily clinical practice (which will be dealt with in class).

References
A set of Class Notes (written by all teachers of the Reproduction group in 2008) is available for download, which features a great deal of theoretical information useful also for the course of Obstetrics and Pathology of Reproduction (although the Class Notes alone are not sufficient to pass the exam) Furthermore, students will be provided with all the .pdf files of each lectures
Slides used for lessons are available on Moodle platform (https://elearning.unipd.it/scuolaamv/).
- Youngquist RS, Threlfall WR, Current

Remarks
Subtitle of the course is Reproduction in small animals, horses, food animals and exotic pets.

ENVIRONMENTAL AND SOCIAL RESPONSIBILITY IN LOCAL DEVELOPMENT PROCESS

Language: English
Teaching period: 2nd Year - 1st Semester
Lecturer: Elena Pisani
Credits: 6 ECTS

Expected learning outcomes
The course aims to strength knowledge skills and to develop analytical and operational capabilities in relation to local development planning, by adopting social and environmental responsibility approaches.

Remarks
Integrated course together with Project planning and evaluation (6 ECTS) belongs to the Master degree in Local Development
ENVIRONMENTAL ECONOMICS FOR TROPICAL FOREST RESOURCES

Language: English
Teaching period: 2nd Year - 1st Semester
Lecturer: paola.gatto@unipd.it
Credits: 6 ECTS

Expected learning outcomes
Competences acquired through the course
The course aims at developing knowledge and competences on the role and potentialities of forests goods and services at different institutional scales: international, national and local. Timber, wood, and non wood products and forest ecosystem services will be considered according to the drivers in place in the different geo-political and economic areas of the world, eg tropical, Mediterranean and mountainous areas. Emphasis is given to situations in which forest resources represent livelihood means for rural populations.
The course is based on the main theories, concepts and approaches of development and environmental economics and makes reference to the core concepts of environmental sustainability and social responsibility in the management of forest resources

Prerequisites
Students must have a background in basic economics. The following concepts are particularly relevant: functioning of the market mechanism, reasons for market failure, theory of public goods, market imperfections linked to costs of exchange

Programme
1. Course introduction
2. Market and trade for timber products: characteristics and drivers (1.5 ECTS)
3. Situation of forest resources and of timber products at the international scale
4. General features of timber markets and trade Barriers to trade
5. Illegality in the timber trade
   Class work
6. 3. Forest dependence and livelihood: fuelwood and NWFPs (1.5 ECTS)
    Concepts of poverty and how to measure them
    What is environmental income and how it is measured
    Value chain analysis
    Class work
7. 4. Forest services: Payments for Ecosystem Services (PES) and other Market-based tools (3 ECTS)
   Theoretical background from institutional economics: property rights theory/property regimes (insights in commons theory from Ostrom)
   PES basic concepts – PES typologies and examples
   Class work
   Designing and applying PES
   PES case studies in the field of water, Carbon, biodiversity and recreation/amenity
   Class work

Teaching organization
The main topics are presented through lectures (ppt presentations). However, learning methods encompass also exercises and class work, which will be performed for each module. Class work includes use of online data bank, data processing, individual case-study analysis followed by discussion

Examination methods
The final mark is made up of three components according to the following:
40%: individual project work (guidelines and deadlines will be provided)
40% oral exam
10% participation
Assessment criteria
Individual project work: Relevance (connection with course topics), good conceptual framework, absence of relevant conceptual errors, overall consistency and coordination, matching of objectives with conclusions, presence of detailed literature review, awareness of problems and critical approach, accuracy in quotations
Oral exam: knowledge of the topics, capacity
Expected learning outcomes
The course will introduce the fundamental concepts of the mineralogy and the crystal chemistry of Earth's crust materials, as a base to characterize and interpret natural and anthropogenic processes having environmental implications. The aim is to illustrate through several case-studies the complexity of the environmental problems from the point of view of the analytical and instrumental approach, the understanding of the physico-chemical mechanisms, and the interpretative methodologies of the processes.

Prerequisites
Basic chemistry and chemical thermodynamics. Essentials of mineralogy and geology.

Programme
Natural solid materials: basic concepts of mineralogy and crystal-chemistry.
Natural processes. Introduction on the distribution of the chemical elements on the Earth's crust, on the geological processes, on the geochemical cycles. Processes and fluid-solid interactions at the mineral surfaces.
Experimental techniques to study materials surfaces.
Case studies:
(1) Hazardous minerals in nature and in working places: asbestos, free silica. Environmental monitoring, assessment, mineral quantification, disposal.
(2) Microporous minerals: clays, zeolites. Crystal structure, crystal chemistry, absorption properties, ionic exchange properties, catalysis.
Their use in environmental, agricultural, and industrial applications.

(3) Mineral dust. Origin, characterization. Implications for the palaeoclimatic and environmental reconstructions of the investigations of mineral dust entrapped in polar ice and ocean sediments.


(5) Binders and cements. Their use in history and in present societies as building materials. Environmental applications in solidification and inertization processes of wastes and polluted soils.

(6) Rare Earth Elements. REE cycle and natural resources. Their role in technological products, recovery from e-waste.

**Teaching organization**

Lectures on the course contents.

A few lectures on hot topics will be delivered by specialists invited from other institutions.

Practical laboratory on X-ray powder diffraction: data collection and diffraction data analysis.

Direct discussion and interaction with the students concerning the topic they selected for the final presentation. Personalized literature survey.

**Examination methods**

The examination will include:

(1) a mid-term presentation by the student. Topic: fundamentals of an analytical technique selected with the teacher, with pertinent environmental applications.

(2) a final student's seminar on a specific environmental topic selected among those discussed during the course. The seminar will be based on specific readings and discussions with the teacher.

(3) A final oral colloquium on the student's presentation and the course programme. The following will be assessed:

- comprehension ability and critical attitude of the student during the lectures
- understanding of technical concepts and analytical protocols during the mid-term presentation
- comprehension ability of the scientific literature, presentation ability, critical attitude during the final presentation

**References**

The lecture notes are available on line (in English): http://www.geoscienze.unipd.it/studenti/artioli/HTC/index.html

The material is completed by the scientific literature relative to the topics selected by the students for their final presentation.

The students are invited to peruse the monographic issues of the "Elements" magazine, available on line: http://www.elementsmagazine.org/index.htm


Expected learning outcomes
The course aims at giving students an understanding of the tight linkages between the forms and the physical and ecological processes occurring in mountain rivers, as well as a knowledge of what drives the variety of natural and human-induced river morphologies both at the reach- and at the basin-scale. Students will learn how to assess the integrity and functionality of stream ecosystems and to design effective stream restoration projects in mountain catchments, along with the evaluation of their positive and negative environmental impacts.

Prerequisites
Basics in forest hydrology

Programme
5° credit: Erosive forms in the landscape. The mechanisms of erosion and their linkages with catchment morphology and environmental conditions. The Universal Soil Loss Equation: USLE. Applications.

Teaching organization
Class: 32 h. Laboratory (informatic room n. 2040, 2° floor Tesaf): 16 h.

Examination methods

References
- Slides presented during the lectures and circulated by the teacher.

Remarks
Part of Mountain fluvial morphology and stream restoration of Sufonama.
FOREST AND HILLSLOPE HYDROLOGY

Language: English  
Teaching period: 1st Year - 1st Semester  
Lecturer: marco.borga@unipd.it  
Credits: 6 ECTS

Expected learning outcomes
This course will provide an introduction to physical hydrology and geomorphology of forested watersheds with an emphasis on managing forest resources and the effects of forest management activities on runoff generation and evapo-transpiration processes. Quantitative models will be presented with focus on the water budget, the amount and timing of water yield, stormflow generation and evapo-transpiration fluxes.

Prerequisites
None.

Programme
The objective of this module is to provide a multidisciplinary examination of the terrestrial component of the hydrologic cycle. Quantitative analysis of the watershed; river network and its spatial organization. (1CFU) Quantitative analysis of precipitation/interception, energy balance; evapotranspiration/soil moisture; snow accumulation and melt. Role of vegetation in the hydrological cycle. Links between the hydrologic cycle and the biogeochemical cycle. (1CFU) Quantitative analysis of infiltration/soil water; runoff processes; groundwater. Hydrologic measurements: precipitation, temperature, evaporation, discharge data. Spatial and temporal representativeness of hydrologic data. (1CFU) Mathematical modelling of the hydrologic cycle: estimation of the precipitation and evaporation fluxes; infiltration and runoff formation modelling. Examination of the impact of land use change on flood formation. Computer modelling of flood events. (1CFU) Modelling of hydrologic cycle and analysis of impact of forest cover on water yield and runoff regime. Summary of international experimentation. Forest resources management and their effects on the hydrologic cycle and on water resources. (1CFU) Evapotranspiration fluxes. Physics of evaporation: mass transfer and latent-heat transfer. The energy balance. The transpiration process. Potential and actual evapotranspiration. (1CFU)

Teaching organization
The course uses three learning processes: frontal lectures (24 h); common exercitations (8 h); field activity (8 h).

Examination methods
Written report (1/3), written examination (1/3), oral examination (1/3)

References
Indications on the teacher office hours and the learning material will be reported on the course web site at: https://elearning.unipd.it/scuolaamv/ (Moodle Platform of the School)
- EAGLESON P.S., Ecohydrology – Darwinian Expression of Vegetation Form and Function. - Cambridge University, 2002

Remarks
The course is the same for Forest and Environmental Sciences (FES) and MEDfOR.
Expected learning outcomes
This course introduces you to:
• the meaning of climate in a broad time scale perspective
• the role of different factors in regulating the climate
• what is climate change
• the different tools and approaches to study climate change
• the effect of climate change on forests and ecosystems

Prerequisites
No prerequisites are requested (attendance to the course of Ecology is advisable)

Programme
1. The atmosphere
2. Long-term cycles
3. Short-term cycles
4. Climate forcing
5. Proxi data
6. Tree-rings
7. Tree rings and climate
8. Forest disturbances
9. Forest disturbances and tree-rings
10. Recent climate change
11. Climate change effects
12. Energy and mass balance within forest ecosystems
14. The role of forests managements.
15. Acclimation of species and ecosystems to climate change

The climate system: i) the athmoshere, structure, composition, dynamics; ii) the other components

Causes of climate change: i) external and internal mechanisms; ii) time scales of changes
Defining the climate: i) instrumental vs proxi data; ii) Measurements vs reconstructions
Tracking the changes: i) paleo and contemporary climate changes; ii) climate models and future changes
Assessing the effects: i) physiological mechanisms; ii) acclimation; monitoring and managements

Teaching organization
Front lectures: 32 hours, Exercises in aula: 8 hours Field exercises: 24 hours.

Examination methods
Oral exam, test multiple choice and open questions

References
A selection of papers from scientific journals

Remarks
The same course FES and MEDfOR (Course name for MEDfOR: Global change and forests), but lectures for MEDfOR students will stop after 6 ECTS.
Expected learning outcomes

Landscape ecology is primarily interested in how spatial heterogeneity affects ecological processes and forestry has immense potential to alter landscapes and biodiversity conservation. Therefore, the course aims at encouraging students to expand the scale at which solutions for forest landscape management are sought. By the end of this course, students will acquire: (1) a knowledge of the fundamentals of landscapes ecology, (2) a familiarity with the relationship between landscape ecology and forest management, and (3) an overview of tools and techniques for spatial description, analysis, and synthesis. Moreover, they will be able to:
- approach the management of forest landscapes considering its effects on spatial heterogeneity;
- use tools and techniques for spatial description, analysis, and synthesis;
- apply the basic techniques of forest organization at landscape-level;
- describe the site conditions, woodland and pastoral communities, past history of use, stand structure and development of a forest and regulate its sustained yield, considering landscape-level implications.

Prerequisites

It is recommended that all students participating in the module possess science skills and prerequisite knowledge of ecology, forest botany, forest mensuration and general silviculture. However, during the course, essential reviews of forest botany and general silviculture will be provided.

Programme

Basic ecological principles dealing with landscape structure (components of the landscape and their linkages and configurations), function (quantities of flows of energy, materials, and species within and among landscape elements), and change (alteration in the structure and function of the ecological mosaic over time). This examination will be conducted in the context of forest management and forest organization objectives. Tools and methodologies used for spatial analysis and description will be examined in the laboratory.

Elements of forest organization: the normal forest and its attributes, the growing stock, the distribution of stand development stages, the sustained yield.

Forest fragmentation: overall habitat loss and habitat configuration. Related practices, depending on the relative importance of each component. Fragmentation studies and forest management practices. Landscape effects on species habitat use. Patch dynamics and forest landscape projection models. Relationships between different forest management scenarios and different landscape patterns. Emulating natural disturbance regimes: an emerging approach for sustainable forest management, opportunities and criticisms.

A multi-day field trip to a landscape mosaic with forests and other intermixed land uses will be organised in which a revision of the arguments of the indoor lectures with a practical approach will be proposed. Laboratory training, including data collection in the field. The forest working plan. Forest description. Division of area. Maps and tables. Determination of method of treatment. Examples of stand and forest landscape management for the provision of different functions in coppices, high forests and complex landscape mosaics. Example of a forest working plan.

Teaching organization

The teaching include: indoor and outdoor lectures and GIS laboratories. The indoor
lectures make use of digital presentations and videos. Moreover, several scientific papers which deal with landscape fragmentation and its configuration are discussed. The field excursions take place in mountain Mediterranean and prealpine environments and include the use of tools for the habitat description and training in observational skills. The GIS lab covers the handling and analysis of the data collected in the field.

**Examination methods**

The final test is written and comprises two sections: a) twelve multiple choice questions in which only one answer is correct (max 6 marks); b) two open questions (max 22 marks in total). The student is invited to bring along and submit a hard copy of a final report at the start of the test. The final report includes the results of the field experience and of the GIS lab. This report is worth maximum 2 marks plus the laude. The report is optional but, without it, the student could only achieve a maximum 28 marks. The students who will not participate to the field trip lack the field experience that helped the other students to understand the contents of both the topic "forest organization and forest landscape management“ and to relate the maps produced in the GIS (Geographical Information System) lab to their field experience. However, the students who could not participate in the fieldwork can submit the final report anyway.

Multiple choice questions: 0.5 marks for each correct answer.

Open questions (max 22 marks in total):

a) knowledge of relevant theoretical and conceptual frameworks; b) ability to apply theoretical/conceptual understandings to a given question; c) ability to structure and organise material in a time constrained situation/environment; d) ability to present ideas/opinions coherently with reference to models and frameworks as appropriate.

Final report (max 2 marks and laude): clarity, completeness and coherence with the field and with the GIS lab experiences.

**References**

The teaching material is entirely uploaded to the institutional Moodle platform. It includes: the presentations, GIS tutorials, glossaries, instructions and further learning material. Consultation hours: c/o teacher’s office (Agripolis, I stecca, III floor), Wednesday 4.30-5.30 pm (after the lesson).


**Remarks**

The same course of 8 CFU for FES and MEDfOR students. The course is elective course for MEDfOR students.
FOREST OPERATIONS

Language: English
Teaching period: 1st Year - 2nd Semester
Lecturer: Raffaele Cavalli
Credits: 6 ECTS

Expected learning outcomes
The student will develop an attitude in planning and implementing complex harvesting operations that maximize economic returns and minimize environmental impact, with particular reference to the Mediterranean forests. The course is based on biological, physical and engineering sciences, with analysis of harvesting systems for economic efficiency and site protection, and planning and scheduling of harvest and transportation systems.

Prerequisites
None

Programme
Forestry wood products; forestry wood supplying chains: forest work features; safety and health in forest work. Cutting operations: guiding principles and recommended practices in tree felling, trimming and crosscutting; risk assessment and protection of forestry workers. Ground-based extraction operations: guiding principles and recommended practices (extraction with chutes, extraction with ground-skidding, extraction with forwarder). Aerial extraction operations: guiding principles and recommended practices (extraction with cable systems; extraction with helicopter). Off-road transport: guiding principles and recommended practices (transport with trailer and forwarder). Material handling and on-road transportation: guiding principles and recommended practices (loading and unloading with crane and transport with truck).

Teaching organization
Lectures: 32 hours. Field exercises: 16 hours. 3 – Days Forest field trip to Ossiach (Austria) 17 – 19 March 2014

Examination methods
The examination consists in a PowerPoint presentation of an intervention in a forest area chosen by the student. Main elements of the presentation are: description of the area and of the forest, definition of the wood product obtainable by the forest exploitation, analysis of the road network, identification of the forest exploitation system, performance of the forest exploitation system, analysis of the environmental impacts connected to the intervention. The presentation time is 20 minutes. The completeness of the presentation, the rational of the technical solutions adopted, the clearness of the exposition are evaluated.

References
At the end of each lecture a pdf copy of the presentation is provided. The lecturing material is available at https://elearning.unipd.it/scuolaamv/ (Moodle Platform of the Agriculture and Veterinary Medicine School)
The teacher receives students in his own office (Dept. TESAF, building 1, third floor, room 075) by appointment via e-mail
http://www.fao.org/docrep/v6530e/v6530e00.htm

Remarks
3 ECTS of the course belong to Wood harvesting and transportation systems of FES.
**FOREST PATHOLOGY AND WOOD ALTERATIONS**

Language: English  
Teaching period: 1st Year - 2nd Semester  
Lecturer: Lucio Montecchio  
Credits: 6 ECTS  

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**Expected learning outcomes**

The student will deepen his knowledge in forest pathology and diseases management. Ecologic and economic value of the main forest diseases in nurseries, plantations and forest will be presented. The main diseases will be deepen during laboratory and field trips analysing the biological cycle of the parasite, symptoms and control systems.

**Prerequisites**

Forest botany and Silviculture.

**Programme**

2. Susceptibility and resistance. Epidemics.
3. Biological, chemical and legislative control. Main international and national legislative bases.
4. Main diseases in forest nurseries and management.
5. Main diseases of root systems and management.
7. Main diseases of leaves and management.

**Teaching organization**

Lectures: 16h. Field exercises: 24h. Laboratory: 8h.  
Field trip to Croatia.

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**Examination methods**

Final written exam: Understanding of the topics discussed during lectures and trips

**References**


**Remarks**

The same course of 6 CFU for FES/ MEDfOR. The course is elective course for MEDfOR students.
Expected learning outcomes
The course general objective is to reach a knowledge and understanding in the field of forest and forest-related policies to handle complexity, and formulate judgements on the decision taken by public and private actors related to the use of forests, with special reference to the mountain areas. The course is organised in 2 modules: the first is an introduction to forest policies and a comparative analysis of the main sectoral policies influencing the use of forest resources (this module is part of the SUFONAMA study programme), the second is aimed at presenting the actors and the contents of forest related policies implemented in Italy

Prerequisites
No prerequisites are requested (attendance to the course Forest economics in mountain areas is advisable)

Programme
1st Module
the aim of the module is to present and discuss the following topics:
(i) the policy process and the policy actors (both private and public), the coalitions, the conflict situations and the potentials of forest policies development and implementation, with special reference to the role of forests in mountain areas; the international normative framework (institutions, processes, hard and soft laws: UNPP, MCPFE, UN-FCCC and KP, CBD, FLEGT and FLEG, …);
(ii) “Shadow” forest policies: the rural development policies (and the EC Common Agriculture Policy), renewable energy policies, trade policies and environmental policies (with special reference to the Kyoto Protocol implementation).
2nd Module (for SFA students only): forest policies will be analysed with reference to the Italian context:
(iii) recent development if forest policies under the framework of rural development policies programmes;
(iv) forest institutions: the decentralization process and the new row of civil society in forest resources management.

Section (i): 1 ECTS; Section (ii): 2 ECTS
Section (iii): 1 ECTS; Section (iv): 2 ECTS

Teaching organization
Lectures: 32 hours. Exercise in aula:16 hours.

Examination methods
Written and oral, test with open questions

References
Teaching materials available at:
http://www.tesaf.unipd.it/pettenella/
FOREST POLICIES AND GOVERNANCE: MANAGING CONFLICTS

Language: English
Teaching period: 2nd Year - 1st Semester
Lecturer: Gerard Buttoud
Credits: 6 ECTS

Expected learning outcomes
The course deepens the concept of conflict management in tropical forest areas as territories. Conflicts are creative situation in which power relations are discussed with direct effects on territorial organization.

Programme
- Interests, rights, natural r-sources: cooperation and conflict;
- Participatory processes, mainly at sub-national and national scale;
- Conflict management approaches: prevention, negotiation, institution building;
- Collaborative and conflict managed policies building.

Teaching organization
Lectures: 16 hours. Exercises in aula: 16 hours.
Examination methods
Written exam, open questions, exercises

References
http://www.sutrofor.net/
http://www.tesaf.unipd.it/pettenella/Corsi/ConflictManagement/ConflictManagement.htm
http://elearning.unipd.it/moodle/agraria/course/view.php?id=3

GENOMICS AND BIOINFORMATICS

Language: English
Teaching period: 1st Year - 1st Semester
Lecturer: gianni.barcaccia@unipd.it
Credits: 10 ECTS

Expected learning outcomes
Genomics: acquire a theoretical and technical knowledge of genomics for the analysis of genome structure and gene function, with particular reference to agri-food species.
Bioinformatics: Acquire a general overview of the current bioinformatics tools used for biotechnological applications. Learn the use of the available main bioinformatic programs.

Prerequisites
Genomics: The student needs to know the basic aspects of formal genetics and especially of molecular genetics, with particular reference to genes as hereditary units that govern transcriptional and/or translational processes.
Bioinformatics: The student needs to know the main characteristics of DNA, RNA, amino acids, genes and genomes. Basic knowledge of personal computer.

Programme
Genomics:
Classroom teaching: Techniques for the sequencing of genomes; Genome analysis using RFLP and PCR-derived molecular markers; Genetic characterization by means of fingerprinting and genotyping; Study of gene expression through Northern blot hybridization, RT-PCR and Real-Time PCR; Analysis of the transcriptome: identification of ESTs by SSH and DD techniques, and Microarrays; Analysis of proteome through the construction of 2D-PAG maps; Study of the gene function by using T-RNA and RNAi lines, and over-expression.
Laboratory training: Activities related to DNA
isolation, amplification by PCR, restriction and sequencing.

Bioinformatics
Classroom teaching: Biological databases; alignments of nucleic acids and proteins, primer design, identification of patterns and functional motifs, phylogeny and molecular evolution, and the analysis of protein structure, prediction of secondary structures of RNA molecules; bioinformatic analysis of genomes.
Practical training: Use of programs related to the topics presented in the lectures.

Teaching organization
The course includes lectures in classroom and practical activities of genomics and bioinformatics, for a total of 80 hours.

Examination methods
Genomics: Students will deal with both a written test (in progress) and an oral examination (at the end of the course). The student will be evaluated on the basis of theoretical knowledge on structural and functional genomics, and the ability to use this knowledge to plan experiments of genomics applied to specific questions of the agro-food area.
Bioinformatics: Written examination of bioinformatics at the end of the course. The student will be evaluated on the basis of the knowledge and the ability to use the programs presented in class and to perform bioinformatic analyses.

References/ Remarks
The materials used for frontal lessons and practical activities (pdf files of presentations) of Genomics will be made available on request.
The material used for lessons (powerpoint slides) of Bioinformatics will be made available on the Moodle platform (https://elearning.unipd.it/scuolaamv/).
Gianni Barcaccia e Mario Falcinelli: Genetica e Genomica. Vol. 3 Genomica e Biotecnologie genetiche. 2006
Giorgio Valle et al. Introduzione alla bioinformatica. 2003

GLOBAL CHANGE AND FORESTS

Language: English
Teaching period: 1st Year - 2nd Semester
Lecturer: Marco Carrer
Credits: 6 ECTS

Expected learning outcomes
This course introduces you to:
• The meaning of climate in a broad time scale perspective
• the role of different factors in regulating the climate
• what is climate change
• the different tools and approaches to study climate change
• the effect of climate change on forests and ecosystems

Prerequisites
Ecology is advisable.

Programme
1. The atmosphere
2. Long-term cycles
3. Short-term cycles
4. Climate forcing
5. Proxi data
6. Tree-rings
7. Tree rings and climate
8. Forest disturbances
9. Forest disturbances and tree-rings
10. Recent climate change
11. Climate change effects
12. Energy and mass balance within forest ecosystems
14. The role of forests managements.
15. Acclimation of species and ecosystems to climate change

The climate system: i) the atmosphere, structure, composition, dynamics; ii) the other components
Causes of climate change: i) external and
internal mechanisms; ii) time scales of change
Defining the climate: i) instrumental vs proximate data; ii) Measurements vs reconstructions
Tracking the changes: i) paleo and contemporary climate changes; ii) climate models and future changes
Assessing the effects: i) physiological mechanisms; ii) acclimation; monitoring and managements

Teaching organization
Front lecture: 24 hours. Field exercises: 24 hours.

Examination methods
Oral examination. Test multiple choice. Written exam with open questions.

References
A selection of papers from scientific journals

Remarks
Part of Forest ecosystems and global change of the FES course.

GLOBAL HISTORY OF FOOD

Language: English
Teaching period: 3rd Year - 2nd Semester
Lecturer: salvatore.ciriacono@unipd.it
Credits: 6 ECTS

Expected learning outcomes
The students have to implement the history of food inside a broader perspective which includes the traffic of commodities through the continents, the role of the European expansion, the colonial politics, the economic cycles and theories, the fluctuations of the prices and capital investment around the world

Prerequisites
The students should be able, through their general cultural background of the previous years, to assimilate the general information and knowledge of the history of food and its development from the ancient times until today. They should also be able to implement this specific topic into a larger framework of general history, culture and economics.

Programme
Special attention will be given to the agronomical exchange between the Americas and Europe as consequence of the transatlantic links. The Asian tradition in the cultivation of many crops - rice in the first place - as well in the expansion of its kitchen will also be considered. Colonial produce as sugar, coffee, cacao will be analyzed as a fundamental chapter of the European “consumption revolution” during the Early Modern Times, opening a new era during which the expansion of the markets and the “globalization” of the taste characterized modern nutrition. The industrial preparation and conservation of food which started in the 19th century are today confronted with the discovery of the regional kitchen and new dimensions of food
consumption (e.g. slow food).

**Teaching organization**
The course will be given in English through a series of general classes and a certain number of Seminars. The students are requested to intervene directly with an individual essay on a particular topic.

**Examination methods**
The examination will be addressed in oral form and at individual level, although the preparation of a term paper can be addressed and presented in aggregate form. It will be appreciated a discussion in English, although not obligatory.

The fundamental requirement asked the student will have demonstrated the ability to connect their technological and scientific expertise of this degree program with a broader view of the historical events that underlie the changes in taste, the development of medical knowledge and strategies economic and food-related human world.

**References**
These insights will take place either through the use of electronic tools (power point) and through a constant dialogue with the students, dialectically called to respond to the lessons.

It is hoped a constant frequency, such as educational premises involve direct and regular. Jean-Louis Flandrin and Massimo Montanari. Food. A culinary history from antiquity to the present. New York. Penguin. 1999.


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**HUMAN RESOURCES MANAGEMENT**

**Language:** English  
**Teaching period:** 3rd Year - 2nd Semester  
**Lecturer:** not yet defined  
**Credits:** 8 ECTS

**Expected learning outcomes**
The course aims at introducing students with the concepts of organizational theory and design. Students will learn the practices to design organizations and the characteristics of the main organizational forms. The course also aims at providing students with the concepts and techniques of human resources management. Students will be engaged in learning through lectures and case studies. The course will provide the background necessary to manage organizations and human resources effectively in different contexts, with a specific focus on the food and beverage sector.

Students are expected to be able to design different types of organization by correctly identifying their degree of vertical and horizontal differentiation. He is also aware of all the aspects associated with the development of an organization and its peculiarities in terms of managing human resources.

**Prerequisites**
Business economy

**Programme**
The course tackles two strictly related subjects: organizational theory and design and human resources management. *Contents: As concerns organizational theory and design, the contents follow:  
Organization and Organizational Effectiveness  
Stakeholders, Managers, and Ethics:  
Managing in a Changing Global Environment  
Basic Challenges of Organizational Design  
Designing Organizational Structure: Authority and Control*
Designing Organizational Structure: 
Specialization and Coordination 
Creating and Managing Organizational Culture 
Organizational Design and Strategy in a 
Changing Global Environment 
Organizational Design, Competences, and 
Technology 
Types and Forms of Organizational Change 
As concerns human resources management, 
the contents follow: 
Human Resources Management and Human capital 
Motivation in work organizations 
HRM competency-based 
Job market and recruitment 
Selecting human resources: strategy, tools and targets 
Organizational needs and training 
Work analysis and job design 
Assessing human resources 
Teaching organization 
Lectures 56 hours. Esercitazione: 8 hours. 
Examination methods 
Written and oral, open questions. 

References 
Jones G.R., 2007, Organizational Theory, 
Design, and Change, fifth edition, Pearson Education 

Expected learning outcomes 
The aim of the course is to provide students with basic knowledge of insect ecology, with particular interest for the species causing epidemics in the forest. The insect-plant relationships and the tritrophic relationships with the natural enemies will be explored. Possible applications to the integrated pest management of key species in forest ecosystems will be considered. The role of insects in forest biodiversity will be addressed.

Prerequisites 
Basic knowledge of entomology, especially insect physiology and behaviour 
Basic knowledge of major forest insect guilds and species 

Programme 
Insect abundance and distribution: species-area relationships. Diversity of forest insects in relation to tree species, feeding guilds, and to the history of forest stands. 
Ecological factors affecting the populations of forest insects. Effects of climate and temperature, including climate change. 
Mechanisms of resistance developed by the host plants and adaptations of the insects. 
Role of competition and of natural enemies in population regulation. 
Principles of integrated pest managements based on the knowledge of the insect ecology. Prevention, direct and indirect control,

Teaching organization
Lectures: 32 hours. Field exercises: 8 hours. Laboratory work: 8 hours.

Examination methods
The exam will consist of a written report on the laboratory/field activity done during the course as well as of a written test composed by 10 questions on general subjects. An example of the latter will be made available to students on the Moodle platform of the School at https://elearning.unipd.it/scuolaamv/login/index.php. The assessment of the student will be carried out based on the general understanding of both theoretical and practical subjects.

References

Remarks
The same course FES/ MEDfOR.

INTEGRATED WATERSHED MANAGEMENT
Language: English
Teaching period: 1st Year - 2nd Semester
Lecturer: paolo.tarolli@unipd.it
Credits: 6 ECTS

Expected learning outcomes
The course aims at giving students an understanding on the main topics related to integrated watershed management with particular attention to alpine regions. Students will learn about the effects related to climate and land use change in high populated mountainous areas. Students will learn how to use the main environmental data in GIS, with particular attention to those data related to hydrogeomorphological processes (erosion, landslides, floods). This in support to strategies and decisions related to land use planning and hydrogeological risk mitigation.

Prerequisites
Forest hydrology, Sustainable erosion control and stream restoration in mountain basins.

Programme
1CFU: introduction to integrated watershed management, land-use change, hydrogeological risk, landslide and flood impact, EU directives
1CFU: scale concept and survey techniques
2CFU: topographic and climatic derived information (Lab)
2CFU: landslide and flood modeling (Lab)

Contents:
Introduction to Integrated Watershed Management (IWM)
1) Definition of integrated watershed management
Watershed as: problem domain, framework for integration
Watershed approach: benefits
Watershed management
Watershed assessment
Watershed planning  
2) GIS for IWM  
Climate change, landuse change, hydrogeological risk, landslide and flood impact  
2) Hydrologic cycle  
Overview  
Climate change: changing of rainfall rates in the Alpine regions, how a growing number of intense and localized thunderstorm events occurred in the last decades is related to a dramatically increasing number of flash floods and debris flow events  
The role of topography in climate regimes Land use change  
3) Risk and risk mitigation  
Risk of landsliding and flooding  
Definition and characteristics of landslides and floods; Hydrogeological risk: definition of risk, hydrogeological risk in mountains regions, landslide and flood impact in mountain areas; Risk assessment; Hazard and vulnerability; Risk mapping;  
4) Future strategic directions  
EU directives, solutions, real time alerts. Landslide and flood control: structural measures  
Engineering solution (some examples). Landslide and flood control: non-structural measures  
Scale concept and survey techniques  
1) Scale  
From small scale to regional scale  
The role of small and regional scale analysis for watershed management and risk mitigation (topography and rainfall analysis)  
2) Survey techniques  
Remotely sensed technologies for earth surface analysis and environmental planning  
TLS (Terrestrial Laser Scanner), airborne LiDAR (Light Detection and Ranging), InSAR (Interferometric Synthetic Aperture Radar), SRTM, ASTER  
Topographic and climatic derived informations  
1) Use of topographic informations  
Basin parameterization  
Data interpolation  
DTM, DSM

Topographic attributes: slope, aspect, curvature, flow direction, roughness index.  
2) Use of climatic informations  
Meteorological station; Rainfall data; Rainfall interpolation; Radar meteorology  
Landslide and flood modeling  
1) Landslide  
Empirical, statistical, and topographically based landslide models  
Steady-State Shallow Landslide Stability models  
Critical rainfall  
Rainfall threshold for landslide initiation  
2) Rainfall-runoff modelling  
Land management and runoff control  
Effects of land use as decrease in storage potential, growth of flood peak, and decrease in time-to peak of a hydrograph.  
Calibration and validation of a model  
3) Landslide and flood now casting and fourscasting

Teaching organization
Lectures: 16h. Laboratory: 32 hours.

Examination methods
The students will be required to prepare a written technical report on at least one of case study presented during the course. The report and the project count 1/3 of the final marking. A written examination will count for another 1/3, and, finally, an oral examination will assign the remaining 1/3 of the mark.

References
  - Scientific articles  
Remarks  The same course FES/ MEDfOR. The course is elective course for MEDfOR students.
ITALIAN FOOD CUISINE AND DIETS

Language: English
Teaching period: 3rd Year - 1st Semester
Lecturer: giovanni.bittante@unipd.it
Credits: 8 ECTS

Expected learning outcomes
The student will participate to seminars and lectures on technological, ecological, economical, managerial and cultural aspects of gastronomy and food service. Special attention will be reserved to typical foods, Italian cuisine and Mediterranean diet. The student will receive information on food chains and on organization of activity through seminars and meeting with managers, entrepreneurs and technicians. Some technical visits and participation to scientific and technical meeting will be organized.

Prerequisites
To have attended to the first two years of the course.

Programme
1st credit General – ecological – approach to feeding and nutrition.
2nd credit Historical evolution of relationships between agriculture, pastoralism and human nutrition.
3rd credit Seminars on culture of food and cuisine.
4th credit Meeting and seminars with entrepreneurs, managers and technicians from industries and their associations.
5th credit Traditional foods, Diets and Cuisines.
6th credit Practical activities and bibliographic search.
7th credit Technical visits.
8th credit Information and training on stage and final evaluation.

Teaching organization
Lectures: 36 h
Exercises: 12 h
technical visits: 8 h
Laboratory activity: 8 h.

Examination methods
The final exam will be oral/written. The evaluation will be based on the ability of the student to analyze and evaluate a complex problem relative to gastronomy and food service field.

References
Articles, presentations and e-book will be available on the Moodle platform.
ITALIAN LANGUAGE LAB

Expected learning outcomes
Depend on the language level.

Prerequisites
None. Students have to do a placement test in order to be registered for their individual level of Italian.

Programme
The courses cover levels A1 to C2 of the Council of Europe’s Common European Framework of Reference for Languages.

Teaching organization
The course is organized from 5th – 26th of September 2013. Students have to register on: http://www.cla.unipd.it/ctest-firstpage/corsi/italiano-per-stranieri/italian-language-courses/

Examination methods
The final exam will prove the language ability in understanding (listening and writing), writing and speaking abilities. Students have to be present at least for 70% of the classes to be admitted to the final examination.

References
Students enrolled in Italian language courses can use the multimedia materials for autonomous study for free. These are available: from the Language Centre Multimedia Library (Mediateca); in the computer laboratories in Palazzo Malcura; on the Language Centre’s didactic website www.CLAWEB.unipd.it

Remarks
The course is obligatory for all Medfor 1st year students.

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JOINT WINTER SCHOOL

Expected learning outcomes
Mediterranean Forestry: the asymmetric impact of Global Change on the Mediterranean Forests

The Winter School was designed to promote students and scholars mobility and to foster an integrative view of Mediterranean forestry and to promote communication and multidisciplinary exchange between all participants. It will further provide an opportunity for the participation of non-educational actors - e.g. forest owners organizations, forest consulting firms, central and local public administrations, forest industries, local development organizations to strengthen the links between MEDfor and the Mediterranean forestry community.

Prerequisites
None.

Programme
See medfor web page: http://www.medfor.eu/uv/first-year

Teaching organization
The Winter School will take place in Palencia from 20th of January to 14th of February 2014.

Remarks
Costs for Accomodation, Food, Travel. Medfor students with Scholarship from the EU (Cat. A+B) will be reimbursed for the travel costs. For Erasmus students: if will be proofed if Erasmus students can participate.
**LIVESTOCK BIODIVERSITY AND ANIMAL FOOD SAFETY**

Language: English  
Teaching period: 2nd Year - 1st Semester  
Lecturer: martino.cassandro@unipd.it  
Credits: 8 ECTS

**Expected learning outcomes**
Acquire the techniques of management and conservation of animal genetic resources, by comparing them with those of animal genetic improvement in livestock production. Recognize and characterize, with modern approaches (genomic and proteomic analysis), livestock species and breeds. Knowing how to define a program conservation and enhancement of animal species with limited diffusion. Being able to estimate the degree of risk of extinction of animal genetic resources. Knowing how to assess the added value of animal genetic resources associated with their products to the environment and the territory.

**Prerequisites**
Knowledge of: basic elements of Anatomy and physiology of animals in livestock production. Any preparatory lessons (recommended): organic chemistry, animal biology

**Programme**
1 CFU: Animal Biodiversity  
2 CFU: Livestock Biodiversity  
3 CFU: Livestock species to bring into the Ark  
4 CFU: Strategies and conservation schemes  
5 CFU: Measures of genetic diversity and uniqueness  
6 CFU: Molecular markers  
7 CFU: Case studies  
8 CFU: Exercises and visits

**Teaching organization**
Lectures, exercise in the classroom, guided tours in conservation centers, online self-assessment tests, laboratory exercises genomics.

**Examination methods**
Written, oral on request. Final assessment will weigh 80%, while the remaining 20% according to the following activities: group relations (homeworks), participation in exercises, visits and laboratory activities.

**References**
MANAGEMENT AND TREATMENT IN MOUNTAIN AND MEDITERRANEAN FORESTS

Language: English
Teaching period: 1st Year - 1st Semester
Lecturer: Mario Pividori
Credits: 6 ECTS

Expected learning outcomes
Aim of the course is to deliver knowledge about working and silvicultural techniques to apply on the different forest realities in two critical and weak environments (ecologically and physically) like the mountain and the mediterranean areas, focusing on italian Alps and litoranean forests and on their specific functions.

Prerequisites
None. General and special silviculture

Programme
1° CFU: Basics of silviculture: silvicultural systems, coppice, high forest, thinnings, applied silviculture in mountain forest types.
2° CFU: mountain forest restoring: techniques, planning and realization of artificial afforestation.
3° CFU: applied silviculture in litoranean mediterranean forests: mediterranean pines stands, ever green oak stands, mediterranean bush.
4° CFU: Field work: coppice and high forest management.
5° CFU: Field work: High mountain artificial afforestation.
6° CFU: Field work: litoranean Veneto forests.

Teaching organization
First half of the course will be held in class than the practical excursions will be on the field in mountain and subalpine site for both main silvicultural systems coppice and high forest. 3 days forest excursion to dolomite mountains.

Examination methods
Written and oral test. Knowledge of environmental and functional factors which define the choice of the sylvicultural system in and mountain environment

References
The lecturing material is available at https://elearning.unipd.it/scuolaamv/ (Moodle Platform of the Agriculture and Veterinary Medicine School)
The teachers receive student in their own offices (Dept. TESAF, building 1, third floor, rooms 009, 031, 075) by appointment via e-mail

Remarks
Course is linked to the Sufonama course in Management of mountain forests and logging systems. Sufonama students are participating for 3 ECTS.
MANAGEMENT OF MOUNTAIN FORESTS AND LOGGING SYSTEMS

Language: English
Teaching period: 2nd Year - 1st Semester
Lecturer: mario.pividori@unipd.it
raffaele.cavalli@unipd.it
Credits: 10 ECTS

Prerequisites
Basic knowledge of forest ecology, silviculture and dendrometry.

Programme
After an analysis of the main environmental and anthropic factors influencing the mountain environment, the course focuses on the different ecological and silvicultural techniques of analysis and management which can be applied in mountain forests. Hereafter, cable crane planning (field survey, calculation and dimensioning of the structural parts, line configuration) and examples of silviculture in Veneto region are shown and discussed. For more information: http://www.sufonama.eu/Universities/Padova/Second_year/Module_2.aspx

Teaching organization
First half of the course will be held in class than the practical excursions will be on the filed in mountain and subalpine site for both main silvicultural systems coppice and high forest. 3 day forest excursion to dolomite mountains in October
Forest excursion to Ossiach from 12 – 17 January 2014

Examination methods
Written report and oral discussion. Knowledge of environmental and functional factors which define the choice of the silvicultural system in and mountain environment

References
The lecturing material is available at https://elearning.unipd.it/scuolaamv/ (Moodle Platform of the Agriculture and Veterinary Medicine School)
The teachers receive student in their own offices (Dept. TESAF, building 1, third floor, rooms 009, 031, 075) by appointment via e-mail

Remarks
Course is part of the Medfor course in Management and treatment in mountain and Mediterranean forests and in Structure and dynamic of mountain and Mediterranean forests.
Expected learning outcomes
Aim of the course is to give basic principles of meat science and basic knowledge on the utilization of meat differently cured and processed as food. The principal factors that determine and influence the quality of meat products and the productive processes involved will be described and discussed. The basic meat processing procedures of bovine, pig, poultry, rabbit and alternative species will be analyzed. The course aims also to deepen on the principal instrumental and sensory techniques to evaluate the meat quality.

Prerequisites
Animal feeding and nutrition, Animal breeding, Animal management.

Programme
2nd credit: Factors that influence the post mortem variation and the resulting meat quality.
3rd credit: Variables that define the meat quality. Physical, chemical and sensory techniques for evaluating the meat quality.
5th credit: Principles of meat processing.
6th credit: Processes and ingredients in manufacturing a variety of meat products. EU food quality certification and quality schemes-guaranteeing quality.
7th credit: General information on poultry
breeds and hybrids, and productive systems used to obtain meat and meat products. Poultry meat products’ processing and quality evaluation.

8th credit: Rabbit farming for meat production. Rabbit meat quality. The yield and nutritional value of meat from alternative species (ungulates, camelidae, rodents, ratites, and reptiles)

**Teaching organization**
In-class lectures: 40 hours
In-class training: 8 hours
In-field training: 16 hours

**Examination methods**
written exam at the official exams timetable.
The student learning will be evaluated by multiple choice questions on the topics taught

**References**
Slides used during the learning activity will be distributed along the course and available at Moodle: https://elearning.unipd.it/scuolaamv/.
Scheduled students’ reception time: every day upon appointment

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**MOUNTAIN FLUVIAL MORPHOLOGY AND STREAM RESTORATION**

Language: English
Teaching period: 2nd Year - 1st Semester
Lecturer: vincenzo.dagostino@unipd.it
marioaristide.lenzi@unipd.it
Credits: 8 ECTS

**Expected learning outcomes**
Part I. The course aims at giving students an understanding of the tight linkages between the forms and the physical and ecological processes occurring in mountain rivers, as well as a knowledge of what drives the variety of natural and human-induced river morphologies both at the reach- and at the basin-scale.

Students will learn how to assess the integrity and functionality of stream ecosystems and to design effective stream restoration projects in mountain catchments, along with the evaluation of their positive and negative environmental impacts

Part II. The goal of the course is the understanding of the erosion processes in mountain and hilly catchments and the knowledge of sustainable measures to reestablish slopes stability, and to control torrential processes and sediment dynamics along the drainage network. Students will learn how to plan the mountain basin management through the integration between structural and not structural actions. The available criteria will be presented under a forest engineering perspective with mhours emphasis on soil reinforcement with vegetation and river morphology restoration through replication of natural river morphology. The theory will be corroborated by exemplificative cases from basins of the Italian Alps.

**Prerequisites**
Part I. None. Part II. Forest hydrology.

**Programme**
4 ECTS taught by Prof. Mario A. Lenzi as
follows:

4 ECTS taught by Prof. Vincenzo D'Agostino as follows:
Erosive forms in the landscape. Rill, interrill and gully erosion. The mechanisms of erosion and their linkages with catchment morphology and environmental conditions.
1 ECTS - Erosion control in open channel flows. River training works. The river-morphological approach for stream stabilization. Field trip (1 ECTS).

Teaching organization
Lectures (50%). Practical exercises and applications(35%). Discussion on case studies with practioners working for soil conservation services (15%).

Examination methods
Oral examination, written examination, final report (4 ECTS, Prof. Lenzi).
Written exam with open questions plus a presentation and discussion of a technical report to the teacher (4 ECTS, Prof. D'Agostino).

References
Part I.
- Slides presented during the lectures and circulated by the teacher.
Part II.
- Slides presented during the lectures.

Remarks
The same course FES and Sufonama.
**PLANT DEVELOPMENTAL BIOLOGY**

Language: English  
Teaching period: 1st Year - 1st Semester  
Lecturer: not yet defined  
Credits: 8 ECTS

**Expected learning outcomes**
Molecular basis controlling plant growth and development with major emphasis on internal and environmental signals

**Programme**
Plant hormones: biological activity, biosynthesis, metabolism, transport and mode of action. Light, temperature and gravity as factors affecting plant morphogenesis. The plant ontogenetic cycle: seed germination, seedling growth, juvenility, phase transition, flower development, fertilization, seed and fruit development, plant senescence and abscission.

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**PROJECT PLANNING AND EVALUATION**

Language: English  
Teaching period: 2nd Year - 1st Semester  
Lecturer: Elena Pisani  
Credits: 6 ECTS

**Expected learning outcomes**
The course aims to strength knowledge skills and to develop analytical and operational capabilities in relation to local development planning, by adopting social and environmental responsibility approaches.

**Remarks**
Integrated course Local development planning with social responsibility (12 ECTS) together with Environmental and social responsibility in local development process.
RESEARCH AND PROJECT DEVELOPMENT METHODOLOGY: APPLICATION

Language: English
Teaching period: 1st Year - 1st Semester
Lecturer: Davide Pettenella
Credits: 4 ECTS

Expected learning outcomes
The aim is to give students theoretical and practical knowledge on how to deal with the steps along a research development process, from the research design to the research finalization and communication of results. Special exercises are devoted to use international databases for literature review and writing research synopsis and final reports. The course is also aimed at students-teachers collaborative learning outputs, being offered by means of e-learning tools.

Prerequisites
None

Programme
2. Thesis development and structure: How to carry out the literature review, How to access and use AIRE (the portal of the University of Padova to access the scientific literature - thousands of journals available full text) and other important forestry databases, How to organize the bibliography, Technical writing: how to structure and write the thesis, How to publish a scientific paper.
3. Presentation of the research results: Tips for exam preparation, Tips for a professional presentation.

Teaching organization
e-learning: 32 hours

Examination methods
Students pro-active participation up to a minimum of 75% of the E-tivities organized during the e-learning module. A written report based on e-working groups has to be prepared and submitted for passing the final examination. Internal examiner.

References
See Information provided on the Moodle platform.

Remarks
The course is obligatory for Medfor 1st year students.
Expected learning outcomes
This is a hands-on introductory class in applied statistics. Students will be introduced to and practice with key statistical methods for data analysis. By the time they take this course most students have already encountered many of those methods in other classes. Even so, no prior knowledge of statistics is required. The treatment will be based on examples, focus on application, and dispense with the technical details. We stress an understanding of the basic ideas and concepts, and also point out limitations of the methods. At all stages, emphasis will be placed on interpreting and reporting the results clearly. The course is comprised of several computer sessions during which students will be introduced to and practice with the freely available statistical language R. Like many other subjects, statistics is learned best when you work with the material. Four homework assignments will be handed out in class during the course and made available through the course website. Usually, you will be given one week to work on each problem set (however the due date will be specified on each assignment). The coursework consists of 4 problem sets, a midterm and a final exam: 30% of the grade will be determined by homework, 30% by the midterm exam, 35% by the final exam, and 5% by class attendance.

Prerequisites
None

Programme
Topics covered in the statistics module of this course include: descriptive statistics and visual display of information, basic probability theory refresher, data transformations, statistical inference, simple and multiple linear regression, logistic regression and basic time series analysis.

Teaching organization
Lectures: 32 hours. Exercises: 16 hours.

Examination methods
Written exam and exercises

Remarks
The same course for SUTROFOR, SUFONAMA, MEDFOR (2nd year).
SOCIAL RESPONSIBILITY BY PUBLIC AND PRIVATE ORGANIZATIONS

Expected learning outcomes
The aim of the course is to give students a broad view on the foundations and tools of responsible management of forest resources and the related trade and production activities.

Prerequisites
No one

Programme
After discussing some general concepts related to the responsible behaviour of private and public organisations, the course will present an overview of the tools implemented in the field of Corporate Social Responsibility and the main foundations and level of commitments in CSR in the forestry sector.

Main contents of the course are the following ones:
(i) Marketing development path, concepts and definition of CSR and government ethics in forestry (1 ECTS)
(ii) Private, public and partnership tools to support CSR (3 ECTS)
(iii) Foundations of CSR and different level of commitments in CSR (2 ECTS)

Teaching organization
Frontal teaching, personal reading and oral presentations by the student, group discussion work, web surfing

Examination methods
The final mark will be the weighted average of 3 evaluation criteria:
- Active participation and oral presentations during the lessons (30%);
- Written text (35%);
- Oral examination (35%).

References
Some papers, standards, guidelines and other teaching material will be made available to the students on Moodle (https://elearning.unipd.it/scuolaamv/).

To contact the teacher:
- write a mail to davide.pettenella@unipd.it
- call the tel. no. 029 8272741 or
- Skype to davidepettenella

Remarks
Some course for Sutrofor and Medfor (2nd year).
Expected learning outcomes
Teaching and learning methods are based on presentations and analyses of the main subjects are carried out in classrooms sessions, with the support of exercises related to theory and case studies. In addition, the teaching is supported by at least one visit at selected companies’ production sites and offices, where students have the opportunity to meet managers, businessmen, organisations’ staff, experts, etc. and directly discuss with them while also directly observing key-aspects of societal marketing (raw material suppliers’ selection, premium prices, etc). The course is supported by e-learning materials (on Agraria Moodle platform). Exercises and case studies are presented to explain how the different instruments work in practice and which are their main pros and cons.

Course objectives
In the rapidly changing scenario of the global economy, an important new fact is that, in a market economy with sufficiently competitive and transparent markets, and with environmentally conscious citizens and consumers, organisations will be rewarded for their environmental and social achievements, while they will face constraints if they use environmentally and socially poor practices without taking into account stakeholders’ point of views and expectations. Due to this new trend, which is influencing also the forestry sector’s companies and the forest products and services traders and users, the societal marketing is becoming a strategic instrument for business. The aim of the course is to give students a thorough understanding of the current situation and potential role of societal marketing applied to the forestry sector. Particularly stressed is the role of environmental and social instruments that can be used by both private and public organisations in order to improve their reputation and image among consumers and civil society.

Expected learning outcomes
Competences acquired: (i) Understanding of past developments and recent trends of societal marketing, (ii) knowledge of key issues, instruments and methodologies of societal marketing, (iii) detail skills related to societal marketing concepts and tools, (iv) detailed knowledge of the most important environmental and social responsibility’s instruments, including communication, codes of good practices, auditing, reporting and accounting, third party certification and labelling, (v) capacity to formulate useful questions to companies’ managers, businessmen, etc. and discuss with them in order to analyse their companies’ case-studies, (vi) ability to analyse case-studies and to use them in understanding theory and concepts and in identifying weaknesses and strengths, (vii) capacity to link global forest policy principles and initiatives to promote environmental and social values protection with operational instruments and projects to improve organisations’ market performances, internal organisational rules, image and reputation.

Prerequisites
- No pre-requirements requested.
- It would be useful to contemporarily follow or to have previously followed the course on “Social Responsibility by public and private organisations”.

Programme
1st ETCS: (i) Fundamentals of Marketing and Societal marketing and Strategic planning: the business plan (environment and organisation analysis, SWOT analysis, the marketing mix: the “4+2 P’s variables”); (ii) Market
Segmentation and Differentiation; competitive advantages and marketing positioning; (iii) Introduction to the various instruments and initiatives for adopting and implementing environmental and social responsible behaviours, included legislation, financial and voluntary instruments for enterprises as well as initiatives linked to policy framework such as the EU FLEGT Action Plan.

2nd and 3rd ETCS: (iv) Sustainable Management standards (contents’ analysis, system-based vs. performance-based, stakeholders consultation in standards setting processes; focus on Sustainable Forest Management standards, Environmental Management Systems standards like ISO 14001 and Social Accountability standards like SA8000 and AA1000); (v) Certification systems to be applied in forestry, included: ISO 14001 international EMS standards, SA8000 standards, FSC and PEFC standards for Forest Management and Chain-of-Custody; others: FLO and WFTO for fair trade certification, IFOAM for organic farming certification, etc.): basic concepts, ratio and effectiveness, pros and cons, procedures and instruments (manuals, checklists, record forms, etc.).

3rd ETCS: (vi) Special topics: biomasses certification and market demand; standards and certification of Carbon offsets projects; Group certification (forest management and chain-of-custody); Forest plantations’ certification; Certification and market demand of non-wood forest products and forest environmental services; (vii) Environmental and social auditing, independent forest monitoring and accounting; (viii) Environmental and social communication and reporting (focus on Global Reporting Initiative).

4th and 5th ETCS: All the above mentioned topics further explored by the students (working groups) by means of class-room exercises, detailed case-studies analysis, specialised advanced seminars by experts to be identified on the basis of students’ background and special interests for their thesis development, plenary discussions, readings.

6th ETCS: ix) Case studies are presented in detail to explain how the different instruments apply in practice and which are their main pros and cons. In addition, selected forest management and/or wood processing companies implementing such instruments, mainly located in the North Italy with suppliers and partners in tropical or other countries, are visited by the students.

**Teaching organization**
Frontal lessons: 24 h Class-room exercises: 16 h Field visits: 8 h.

**Examination methods**
Examination
The students are first required to pass a written examination (open-ended questions on main contents of the course). Only those passing the written examination are admitted to the final oral examination. The oral examination includes: a) discussion on eventual weaknesses identified in the previous written examination; b) additional open-ended questions on the modules’ contents; c) presentation and discussion of a written report (in form of a draft research synopsis) on one key issue selected by the student him/herself (e.g. market for certified products, marketing plan, reporting, certification, etc.) (max 1,500 words – tables, figures, appendixes, references excluded). The written examination counts 40% for final marking; the point a) and b) of the oral examination counts for 40% and the written report counts 20% for final marking. A premium mark from 0 to 1 is assigned for active participation during classroom activities and visits. Not exams in itinerary.

**References**
- PPT presentations of the lectures (available as PDF file)
- PDF documents (available on-line) and books/articles (available at the Faculty’s library) suggested step-by-step during the course.
- Exercises carried out in classroom.

**Remarks**
Same course for Sutrofor and Medfor 2nd year students.
STRUCTURE AND DYNAMIC OF MOUNTAIN AND MEDITERRANEAN FORESTS

Language: English  
Teaching period: 1st Year - 1st Semester  
Lecturer: Marco Carrer  
Credits: 6 ECTS

Expected learning outcomes
The aim of the course is to give students a thorough understanding of forest structure and dynamics. In particular, it is stressed the role of present and past natural and anthropogenic disturbances in defining the present and future forest structure and evolutionary dynamics.

Prerequisites
Ecology, General and special silviculture

Programme
Over the last years, the quantitative definition of forest structure and stand dynamics has rapidly become more and more important because the knowledge of the main patterns and processes controlling a forest ecosystem is a critical prerequisite for a high-quality forest management. Therefore, tree-ring and spatial analysis are becoming key instruments for a thorough knowledge of forest systems. More specifically, the course includes: (i) Tree-ring analyses: material and methods in dendrochronology; (ii) Forest disturbances: their role in forest dynamics; (iii) Methods for spatial analysis of forest structure; (iv): Dendroecology: using tree rings to analyse present and past forest disturbances and dynamics. Case-studies are presented in detail to explain how the different instruments apply in practice and which are their main pros and cons. In addition, most of the case-studies discussed are directly visited by the students; they are (a) an even-aged beech forest located in the fore-Alps; (b) a Pinus sylvestris stand heavily disturbed by landslides; (c) a typical subalpine spruce forest; (d) a typical uneven-aged, unmanaged mixed larch-stone pine timberline forest.

Teaching organization
Lectures: 32 hours. Technical visits and exercises: 16 hours.  
3 days excursion to the dolomite mountains

Examination methods
Oral. No ongoing tests.

References
Lecture material.
VALUATION AND ASSESSMENT OF FOREST AND ENVIRONMENTAL GOODS AND SERVICES

Expected learning outcomes
The course aims at developing knowledge and competences on the role and potentialities of forests goods and services at different institutional scales: international, national and local. Timber, wood, and non wood products and forest ecosystem services will be considered according to the drivers in place in the different geo-political and economic areas of the world, eg tropical, Mediterranean and mountainous areas. Emphasis is given to situations in which forest resources represent livelihood means for rural populations.

The course is based on the main theories, concepts and approaches of development and environmental economics and makes reference to the core concepts of environmental sustainability and social responsibility in the management of forest resources.

Prerequisites
basic economics (functioning of the market mechanism, reasons for market failure, theory of public goods, market imperfections linked to costs of exchange).

Programme
1. Course introduction,
2. Market and trade for timber products: characteristics and drivers (1.5 ECTS) - Situation of forest resources and of timber products at the international scale, General features of timber markets and trade, Barriers to trade, Illegality in the timber trade, Class work,
3. Forest dependence and livelihood: fuelwood and NWFPs (1.5 ECTS) - Concepts of poverty and how to measure them, What is environmental income and how it is measured, Value chain analysis, Class work 4. Forest services: Payments for Ecosystem Services (PES) and other Market-based tools (3 ECTS) - Theoretical background from institutional economics: property rights theory/property regimes (insights in commons theory from Ostrom), PES basic concepts – PES typologies and examples, Class work, Designing and applying PES, PES case studies in the field of water, Carbon, biodiversity and recreation/amenity, Class work

Teaching organization
The main topics are presented through lectures (ppt presentations). However, learning methods encompass also exercises and class work, which will be performed for each module. Class work includes use of online data bank, data processing, individual case-study analysis followed by discussion

Examination methods
The final mark is made up of three components: 40%: individual project work (guidelines and deadlines will be provided), 40% oral exam, 10% participation

Assessment criteria: Individual project work: Relevance (connection with course topics), good conceptual framework, absence of relevant conceptual errors, overall consistency and coordination, matching of objectives with conclusions, presence of detailed literature review, awareness of problems and critical approach, accuracy in quotations

Oral exam: knowledge of the topics, capacity to present and discuss them in a critical way, to place them in the correct context and to understand logic relationships with other topics of the course and, in general, with the other disciplines (a check list for self assessment will be provided) participation: proactive attitude in lectures and during class exercises

References
ppt presentations and detailed list of readings will be provided at the course webpage in moodle: https://elearning.unipd.it/scuolaamv/ (enrolment key needed, ask the teacher)

Office hours: Thrusday 14:30 - 16:30
Dipartimento TESAF, Third Floor, Room 068

Remarks
Same course for FES, Sufonama, Medfor 2nd year and Sutrofor (Environmental economics for tropical forest resources).

VEGETATION ATMOSPHERE INTERACTIONS

Language: English
Teaching period: 1st Year - 2nd Semester
Lecturer: andrea.pitacco@unipd.it
Credits: 8 ECTS

Expected learning outcomes
The course aims at the development of a thorough understanding of physical variables and processes affecting plant functioning, with a focus on the development of fundamental interactions between Biosphere and Geosphere related to energy, water and carbon cycles.

The role of vegetation in determining local and global climates will be underlined along with the perspectives of mitigation of climate changes through the enhancement of carbon sequestration.

The student will be trained to a quantitative approach to the study of energy and mass fluxes and will gain also technical abilities related to the measurement of environmental variables.

Prerequisites
No specific prerequisites are strictly needed, but a basic knowledge of Calculus, General Physics, and Plant Physiology is requested, as given in most of graduate courses.

Programme
1st Credit: Introduction to Biosphere-Geosphere Interactions; Basic concepts; Energy exchanges; Mass and momentum fluxes.
2nd Credit: Radiation; Basic laws; Radiation fluxes in the natural environment; Shortwave radiation; Longwave radiation; Net all-wave radiation; Radiation budget; Radiative properties of leaf canopies; Instruments and measurements.
3rd Credit: Energy balance; Soil thermal properties; Heat conduction in the soil; Soil temperature regime; Introduction to

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measurement techniques and data logging equipment; Practical setup of an environmental monitoring station.

4th Credit: Water and hygrometry; Thermodynamics of evaporation; Water vapour fluxes and transpiration; Fick's law and diffusion; Techniques for measuring leaf gas exchanges.

5th Credit: Wind; Laminar and turbulent flow; Statistical properties of turbulence; Navier-Stokes equation and turbulent transport; Momentum transfer; Logarithmic wind profile; Concept of boundary-layer at leaf and canopy scales; Aerodynamical properties of vegetation.

6th Credit: Introduction to the Eddy-Covariance technique; Heat and mass fluxes above vegetation; Sonic anemometry; Infra-Red gas analyzers.

7th Credit: Introduction to energy budget partitioning; Sensible and latent heat fluxes; Bowen ratio; Flux-gradient relationships; Aerodynamical properties of canopies; Evapotranspiration and Penman-Monteith equation.

8th Credit: Integrated view of energy, water, and carbon fluxes; Carbon budget of vegetation canopies; Net ecosystem exchange; Carbon flux partitioning; Carbon sequestration and its role in mitigation of climate change; Mathematical modelling of plant canopies and Soil-Vegetation-Atmosphere-Transfer schemes.

Teaching organization
Lectures will lead the students towards an integrated view of natural processes, demonstrating the usefulness of applying concepts of physics and physiology to the understanding of the fundamental natural processes studied during the course. Students will be trained to the discussion, reserving time during classes to the critical examination of scientific papers distributed in advance which will have to be preliminarily studied.
To develop technical abilities, students will be involved in the setup of a measuring station to monitor environmental variables. Collected data will be used to write a technical report.

Examination methods
The examination will be based on: a) a mid-term presentation by the student on a key topic selected among a range of papers proposed by the teacher; b) the write-up of a technical report on the data collected during the practical work; c) a final oral colloquium.
The ability of a critical interpretation of natural processes discussed during the course will be evaluated, along the capacity of the student of an integral view of interactions. Technical and analytical competences, related to the experimental measurements carried out during the course will be also checked.

References
Textbooks are to be intended as a general reference.
Lecture notes, scientific papers and experimental data will be made available through the Moodle platform of the School at https://elearning.unipd.it/scuolaamv/
**VETERINARY GENERAL PATHOLOGY**

Language: English  
Teaching period: 2nd Year - 2nd Semester  
Lecturer: valentina.zappulli@unipd.it  
Credits: 6 ECTS

**Expected learning outcomes**
Understand the four aspects of a disease process that form the core of pathology: its cause (etiopathogenesis), the mechanisms of its development (pathogenesis), the structural alterations induced in the cell and organs of the body (morphologic changes), and the functional consequences of the morphologic changes. Student should pay attention on how cells and tissues respond to injury in a chronological sequence of events and to understand the complex interplay between the host defense mechanisms with the primary cause.

**Prerequisites**  
The requested knowledge regards anatomy, histology and physioogy

**Programme**  

Hexogen causes of diseases: Pathogenic mechanisms of ionizing and non-ionizing radiations. Thermal injuries (thermal burns, hyperthermia and heat stroke, hypothermia and freezing). Electrical injuries. Foreign bodies reactions. General principles of diseases caused by microorganisms (viruses, bacteria and parasites)

Cell degeneration and necrosis:  

Amyloidoses: Definition and criteria of amyloid identification. Classification criteria of amyloidoses. Mechanisms of amyloidoses. Morphologic features of amyloidoses in animals.

Hemodynamic disorders: Control of

**Teaching organization**
Frontal lectures and practicals in necropsy lab

**Examination methods**
Six written interim evaluations (10-15 MCQ) and final written examination (20 MCQ) and lab assessment at the end of each section with 5 MCQ and/or SAQ. Students will have to demonstrate their ability in answering to short answer multiple choice questions showing their knowledge and ability to think.

**References**
Pathology website, gross samples
- V. Kumar, A. K. Abbas e N. Fausto. Robbins and Cotran Pathological Basis of Disease.

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**WILDLIFE CONSERVATION AND MANAGEMENT**

Language: English
Teaching period: 1st Year - 2nd Semester
Lecturer: Maurizio Ramanzin
Credits: 6 ECTS

**Expected learning outcomes**
Students will acquire an understanding of the basic ecological principles involved in wildlife conservation, a knowledge of principles and techniques involved in population monitoring, the ability to make judgements on management options according to species/population status and management objectives.

**Prerequisites**
No prerequisites are requested.

**Programme**
The course is organised in 6 sections, that present and discuss the following topics: 1. Introduction to wildlife conservation and management. The value of wildlife as a natural resource. Economic and social implications of wildlife conservation and management. Goals of wildlife management and management options. What do we conserve/manage? Concepts of species, evolutionarily significant unit, management unit and population: genetic approach, demographic approach, and geographic approach. Distribution, dispersal and metapopulation theories. 2. Population growth. Rate of increase; geometric or exponential population growth; intra-specific competition and density-dependent population growth; the logistic model of population growth and its limitations, population stability and cycles. Age-specific population models. The concepts of sensitivity and elasticity. 3. Wildlife populations monitoring. Counting animals: sampling, accuracy and precision of estimates, overview of the main principles and methods for large mammals and gamebirds.

**Teaching organization**
Lectures: 32 hours. Field exercises: 16 hours.

**Examination methods**
Open questions written tests and final oral exam.

**References**

**Remarks**
The same course FES/ MEDfOR. The course is elective course for MEDfOR students.
WOOD HARVESTING AND TRANSPORTATION SYSTEMS
Language: English
Teaching period: 2nd Year - 2nd Semester
Lecturer: Raffaele Cavalli
Credits: 8 ECTS

Expected learning outcomes
The student will develop an attitude in analysing and designing facilities and networks of technical processes required to harvest and to transport biomass and other forest products from the stump site to mill facilities. The course is based on the analysis of tree conversion, off-road transportation, material handling, and on-road transportation

Prerequisites
None.

Programme
Forestry wood products; forestry wood supplying chains: forest work features; safety and health in forest work. Cutting operations: guiding principles and recommended practices in tree felling, trimming and crosscutting; risk assessment and protection of forestry workers. Ground-based extraction operations: guiding principles and recommended practices (extraction with chutes, extraction with ground-skidding, extraction with forwarder). Aerial extraction operations: guiding principles and recommended practices (extraction with cable systems; extraction with helicopter). Off-road transport: guiding principles and recommended practices (transport with trailer and forwarder). Material handling and on-road transportation: guiding principles and recommended practices (loading and unloading with crane and transport with truck)

Teaching organization
The course is taught partly by lectures and partly through laboratory activities during which they analyze the technical and operational issues of the different forest exploitation systems. It is provided a practical activity to be carried out at the Bundesamt und Forschungszentrum für Wald - Forstliche Ausbildungsstätte (BFW-FAST) Ossiach, Austria, during which they provided the elements to analyze a system of mechanization in the operating environment
Field trip to Austria 17 – 19 March 2014

Examination methods
The examination consists in a PowerPoint presentation of an intervention in a forest area choosen by the student. Main elements of the presentation are: description of the area and of the forest, definition of the wood product obtainable by the forest exploitation, analysis of the road network, identification of the forest exploitation system, performance of the forest exploitation system, analysis of the environmental impacts connecte to the intervention.
The presentation time is 20 minutes
The completeness of the presentation, the rational of the technical solutions adopted, the clearnes of the exposition are evaluated

References
At the end of each lecture a .pdf copy of the presentation is provided.
The lecturing material is available at https://elearning.unipd.it/scuolaamv/ (Moodle Platform of the Agriculture and Veterinary Medicine School)
The teacher receives students in his own office (Dept. TESAF, building 1, third floor, room 075) by appointment via e-mail
http://www.fao.org/docrep/v6530e/v6530e00.htm

Remarks
Course for FES students. The MEDfOR course in Forest Operations takes part on the lectures for 6 ECTS.