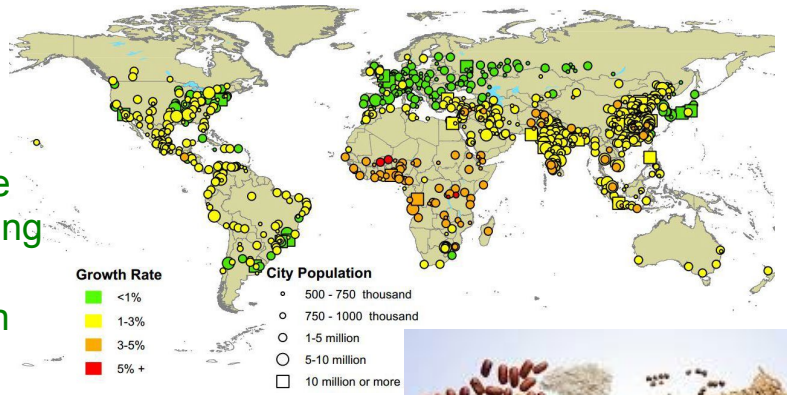
Water and Food Security

Track in EngEnv4Sust (course 02A/10A)

8 Credits, II Sem

Topics

Humanity faces the grand challenge of feeding a growing, more affluent population in the coming decades. This course is aimed to analyse the constraints and challenges of ensuring an adequate and environmentally sustainable supply of water and food in the face of global changes such as human population dimension and diet habits, energy policies, land use and climate.



CREDIT UN WORLD URBANIZATION PROSPECTS REPORT, 2014

Keywords

Sustainable water and Food Security; Food-Energy-Water Nexus;

About the teacher

Prof. Maria Cristina Rulli
Associate Professor
Department of Civil and Environmental Engineering

e-mail: cristina.rulli@polimi.it

Research interests

Water,
Food,
Energy

Representative works

Davis *et al.* (2017) Increased food production and reduced water use through optimized crop distribution. *Nature Geoscience*, **10**: 919

Rulli *et al.* (2016) The water-land-food nexus of first-generation biofuels. *Scientific Reports*, **6**: 22521

Publication list:

Ocean and Coastal Engineering

Track in EngEnv4Sust (course 02B/10B)

10 Credits, I Sem

Topics

Mechanics of wind driven surface waves from deep to shallow waters. Wave interaction with fixed/floating structures. Rubble mounds and caisson breakwaters. Probabilistic design. Port engineering. Wave-sediment interaction. Coastal morpho-dynamics. Coastal protection. Nonlinear hydro-dynamics in the surf zone. Wave energy conversion: principles and technologies.

Keywords

Wave mechanics; wave-structure dynamics, ports, breakwaters, coastal evolution/protection, energy from waves

About the teacher

Prof. Giuseppe Passoni
Associate Professor
Department DEIB

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Website: www.deib.polimi.it/305808

Research interests

Wave energy conversion
Wave-structure interaction
Environ/biological flows

Representative works

Coastal Eng, 2018, 136, 130-146
Ren. Energy, 2014, 62, 407-416
Energies, 2013, 6, 3033-3051
Appl. Math. Mod., 2012, 9, 36, 4186-419
Phys. Lett. A, 2008, 372, 13, 2223-2229

Publication list: ResearchGate

Photogrammetry and drone surveying

Track in EngEnv4Sust (course 02C/10C)

10 Credits, I Sem

Topics

The goal of the course is to provide students with the mathematical background and the practical skill to model 3D surfaces by photogrammetric techniques.

Students will be familiar with digital images acquired from terrestrial, drone, airplane and satellite surveys and with software packages for 3D modelling and mapping.

Drone survey of a dismissed railway

Keywords

drones; cameras; 3D modelling

About the teacher

Prof. Mirko Reguzzoni
Assistant Professor
Department of Civil and Environmental Engineering
Email: mirko.reguzzoni@polimi.it
Website: Mirko Reguzzoni's PoliMI page

Projects: ESA GOCE mission

Research interests
Satellite Geodesy
Gravity inversion
GNSS monitoring

Representative works
GOCE data processing
GEMMA crustal model

Publication list:

ResearchGate

Water and Wastewater Treatment Technologies

Track in EngEnv4Sust (course 02D/10D)

8 Credits, I Sem

Topics

Taught in English to international students, it focuses on:

- design principles of water and wastewater treatment processes, with emphasis on biological processes;
- sludge treatment and management

Classwork sessions explains design procedures of treatment processes

Keywords

Biological processes; design

About the teacher

Prof. Roberto Canziani
Full professor
Department of Civil and Environmental Engineering
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http://intranet.dica.polimi.it/people/canziani-roberto/

Projects: http://sludgetreat.eu; http://life-dentreat.eu

Research interests

- Biological processes
- Advanced nitrogen removal processes
- Sludge management

Representative works

- Salvetti *et al.* (2006) Effects of Temperature on Tertiary Nitrification in Moving-Bed Biofilm Reactors. Wat. Res, 40, 2981.
- Perotto *et al.* (2008) Environmental performance, indicators and measurement uncertainty in EMS context: a case study, J. Cle. Pro., **16**, 517.

Publication list:

ResearchGate ORCID

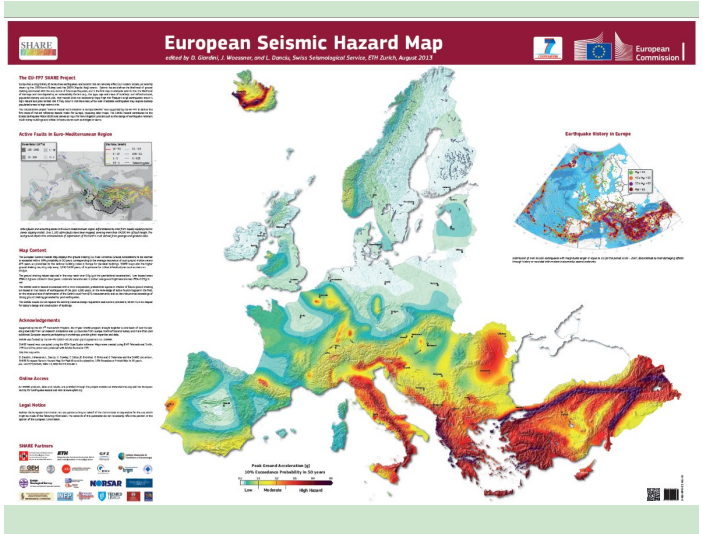
Engineering Seismology

Track in EngEnv4Sust (course 03)

10 Credits, I Sem

Topics

Earthquake source. Seismic wave propagation. Analysis of seismic records. Probabilistic approaches to seismic hazard evaluation. Seismic actions for design. Seismic vulnerability and risk evalauation.



Keywords

Seismic hazard; Accelerometric records; Wave propagation

About the teacher

Prof. Roberto Paolucci
Full Professor
Department of Civil and Environmental Engineering
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roberto.paolucci@polimi.it

Research interests

Seismic risk
Seismic wave propagation
Dynamic soil-structure interaction
Seismic actions for design

Representative appointments

Since 2018: Member of the scientific consulting committee of the Italian Dept. of Civil Protection

2015-2018: Member of the committee in charge of the revision of the section on seismic actions of the European norm (Eurocode 8)

Natural Resources Management

Track in EngEnv4Sust (course 06)

10 credits/ II sem

Topics

The course develops knowledge and skills for advanced modelling, planning, and control of natural resources systems.

The emphasis will be on the operational aspects of natural resources management over different spatio-temporal scales, with a focus on water resources systems and real-world case studies.

Keywords

Natural resources, integrated water resources management, Optimal control, Water-energy-food nexus

About the teacher

Prof. Andrea Castelletti
Associate Professor
Electronics, Information, and Bioengineering

Research interests
Water systems analysis
Machine learning/AI
Env. Decision Making

Representative works
Schmitt et al. 2018
Nature Sustainability 1, 96-104

Website: www.nrm.deib.polimi.it

Projects: available HERE

Publication list:

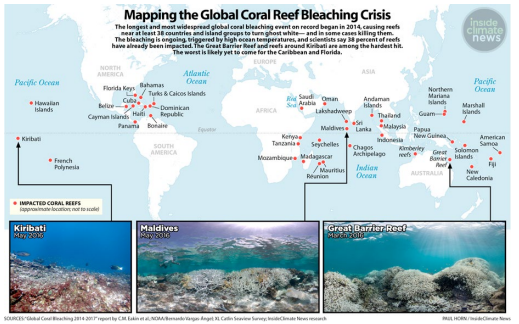
Ecosystems conservation and management

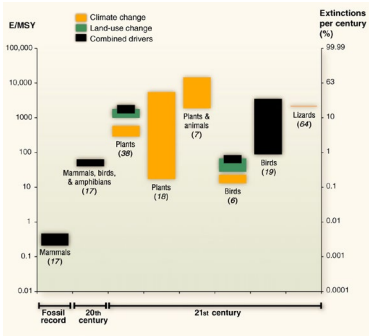
Track in EngEnv4Sust (course 07)

10 Credits, 2nd sem

Topics

Aim of the course is to provide students with the quantitative instruments for rationally managing animal and plant populations and ecosystems.
1. Species and populations threatened by extinction, 2. Populations in spatially explicit landscapes, 3. Sustainabilty of biomass harvesting and its management, 4. Parasite and disease ecology





About the teacher

Marino Gatto
Full professor, Ecology
Department of Electronics, Information & Bioengineering
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http://home.deib.polimi.it/gatto

Research interests
Parasite and disease ecology
Marine ecology
Climate change

Publication list:
ORCID

Representative works
Big-data-driven modeling unveils country-wide drivers of endemic schistosomiasis, *Scientific Reports*, 7:489
A generalized definition of reactivity for ecological systems and the problem of transient species dynamics, *Methods in Ecology and Evolution*, **8**: 1574

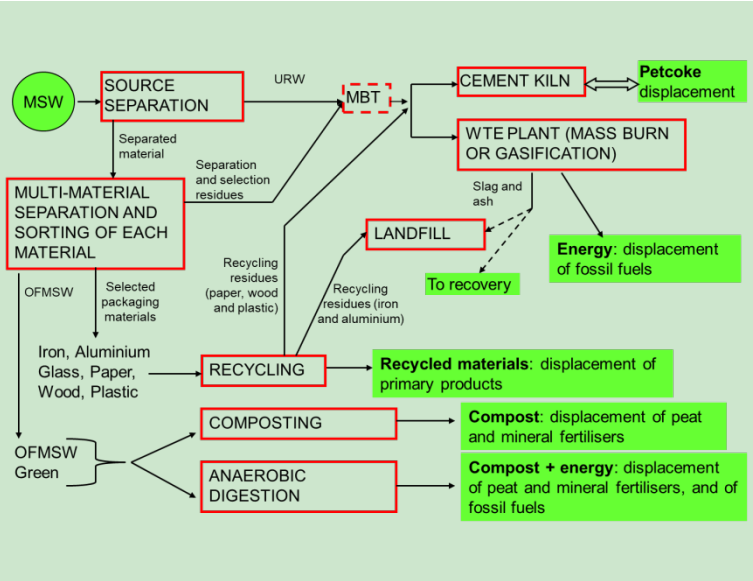
Solid Waste Management and Treatment

Track in EngEnv4Sust (course 08)

10 Credits, I Sem

Topics

Knowledge of the characteristics of waste
Knowledge of EU and Italian legislation on waste
Setting up of integrated waste management schemes and plans
Design of treatment and disposal plants
Assessment and control of the environmental impacts of waste treatment plants
Evaluation of various treatment alternatives by means of Life Cycle Assessment - LCA



Keywords

Recycling; Recovery; Thermal treatments; Biological treatments

About the teacher

Prof. Mario Grosso
Associate Professor
Department of Civil and Environmental Engineering
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Website: http://www.dica.polimi.it/u?n=mario.grosso

Projects: http://www.aware.polimi.it

Research interests
Waste management
Waste treatment technologies
Life Cycle Assessment

Representative works
Bioplastics and waste management *WastMan*, 2018
Packaging re-use: a starting point for its quantification *JMCWM*, 2018

Publication list: ORCID

Advanced Environmental Systems Analysis

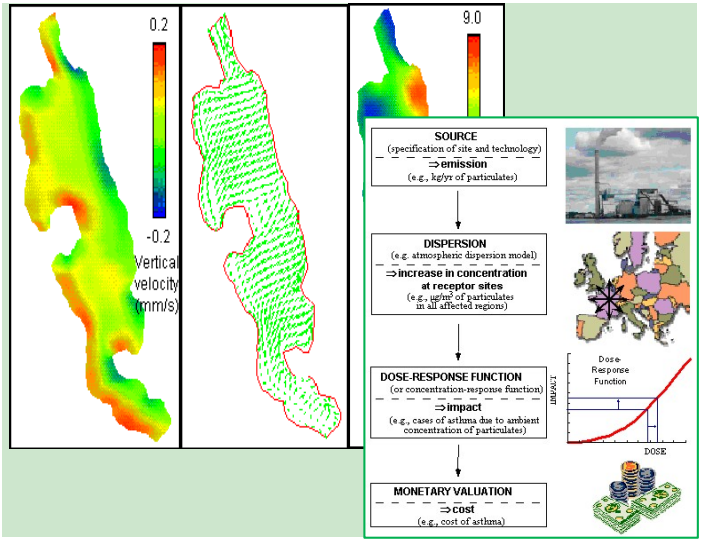
Track in EngEnv4Sust (course 09 part I)

5 Credits, I Sem

Topics

The course offers a systematic overview of environmental decision-making at regional/local level. It provides to the students the ability to deal with real-world environmental quality problems by formulating and applying suitable models.

The integrated modelling approach, meaning that dealing with the full DPSIR chain, is also illustrated.



Keywords

Water quality and air quality management and planning

About the teacher

Prof. Giorgio Guariso
Full professor
Dipartimento di Elettronica, Informazione e Bioingegneria
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Website:
https://www.deib.polimi.it/eng/people/details/60512

Research interests
Environmental DSS
Air Quality
Energy impacts

Representative works
Air Quality Integrated Assessment, Springer, 2017

Publication list:

Geophysical Data Processing

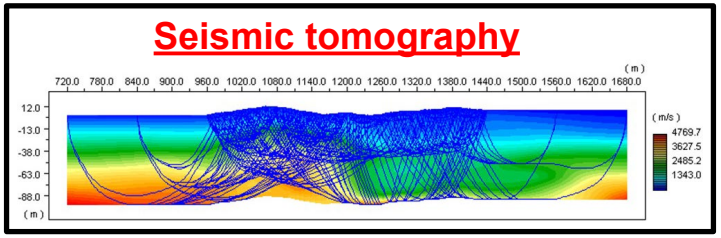
Track in EngEnv4Sust (course 12A)

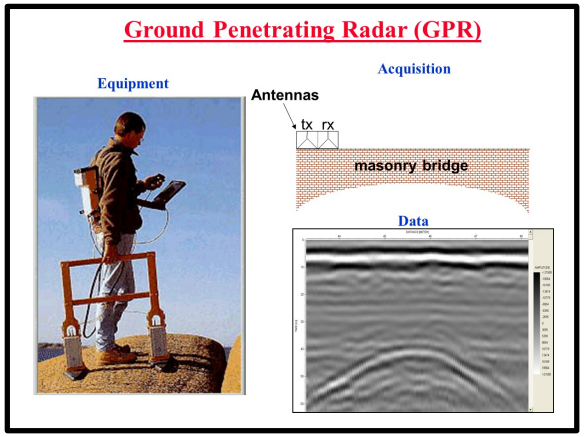
10 Credits, I Sem

Topics

The goal of the course is to introduce the student to the 2D and 3D data processing algorithms that are used to process geophysical data from seismic or georadar surveys.

Algorithms are presented in simple and intuitive ways during the lectures and are tested by the student on real data during the laboratory hours.





Keywords

Seismic prospecting; Ground Penetrating Radar;

About the teacher

Prof. Luigi Zanzi
Full Professor
Dep. of Civil and Env. Eng.

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Research interests

Microseismic monitoring
Landslides, levees, quarries
Ground Penetrating Radar

Representative works

doi: 10.1093/gji/ggy010
doi: 10.1007/s10064-017-1153-x
doi: 10.1515/geo-2017-0035

Publication list ResearchGate

River engineering and basin reclamation

Track in EngEnv4Sust (course 12E)

10 Credits, I Sem

Topics

The course drives the student to design hydraulic works for flood risk reduction, merging the Italian traditional design experience with the recent outcomes in hydrology, fluvial processes and ecology.
The design of hydraulic works are defined according to: residual risk analysis, environmental sediment transport, vegetation impacts and project maintenance needs.

Keywords

River design; Flood risk mitigation, Soil moisture

About the teacher

Prof. Marco Mancini
Full Professor
Department of Civil and Environmental Engineering
marco.mancini@polimi.it
www.fest.polimi.it

Research interests
Soil moisture from satellite,
Flood forecast,
Irrigation demand,
Sustainable design.

Representative works
C. Corbari *et al.* (2015) Can satellite land surface temperature data be used similarly to river discharge measurements for distributed hydrological model calibration? *Hydrological Sciences Journal*, **60**: 202. *Paper selected as 'featured article'*

Projects: http://sim.polimi.it, http://sol.mmidro.it

Publication list: www.fest.polimi.it

Soil remediation

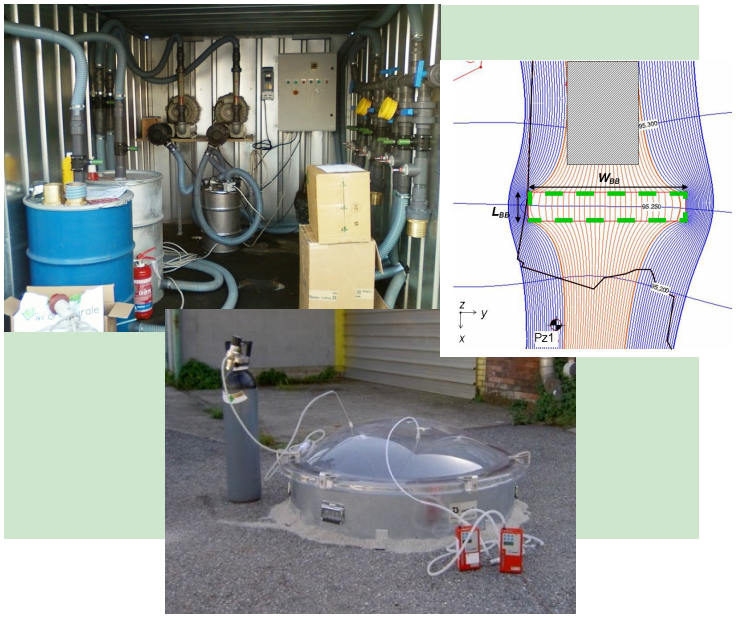
Track in EngEnv4Sust (course 12H)

10 Credits, II Sem

Topics

The course aims at giving the tools to address the issues of contaminated sites, with particular reference to chemical pollution in soil, subsoil, and groundwater.

The goal is to enable students to approach properly site characterization, to evaluate and design proper management and intervention strategies according to the site-specific conditions, and to design remediation actions for reclamation.



Keywords

Contaminated sites; chemical pollution; soil; groundwater

About the teacher

Prof. Sabrina Saponaro
Associate Professor
Department of Civil and Environmental Engineering
sabrina.saponaro@polimi.it
Website: https://www.polimi.it
Projects: http://www.beverage.polimi.it/

Research interests
Remediation technologies,
Risk assessment

Representative works
Patent PCT/IB2015/058147
(Open Dynamic Flux Chamber)

Publication list: ORCID

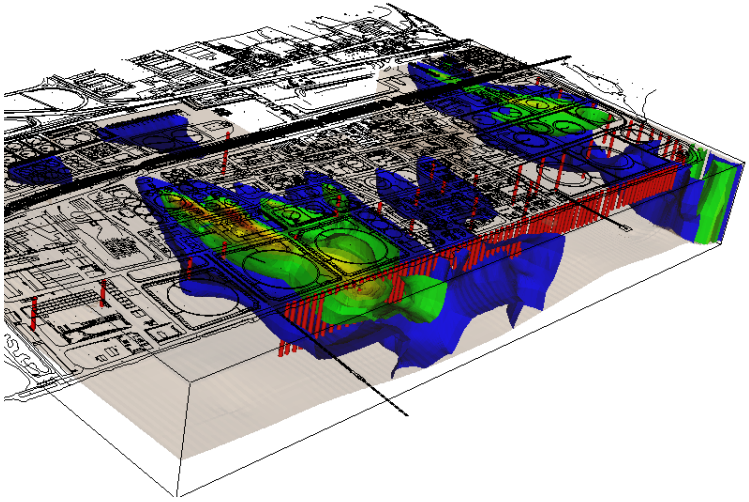
Idrogeologia
Hydrogeology

Level: Master
5 Credits, II Sem

Topics

Starting from the theory of groundwater flow we teach students how build up the hydrogeologic structure and model the flow and the contaminant transport in aquifers

Applying these numerical tools during lab exercises, students learn how to manage quantitatively and qualitatively the groundwater resource



Keywords

Groundwater modeling and management

Groundwater contamination and remediation

About the teacher

Prof. Luca Alberti
Researcher
DICA

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Website: www.dica.polimi.it/u?n=Luca.Alberti

Projects: https://www.interreg-central.eu/Content.Node/AMIIGA.html
http://nauru.como.polimi.it/

Research interests

Contaminant transport
Salt water intrusion
Heat transport

Representative works

Alberti et al. (2018) *Science of the Total Environment* 621: 326

Angelotti et al. (2018) *Energy Conversion and Management* 77: 700

Publication list: ORCID ResearchGate

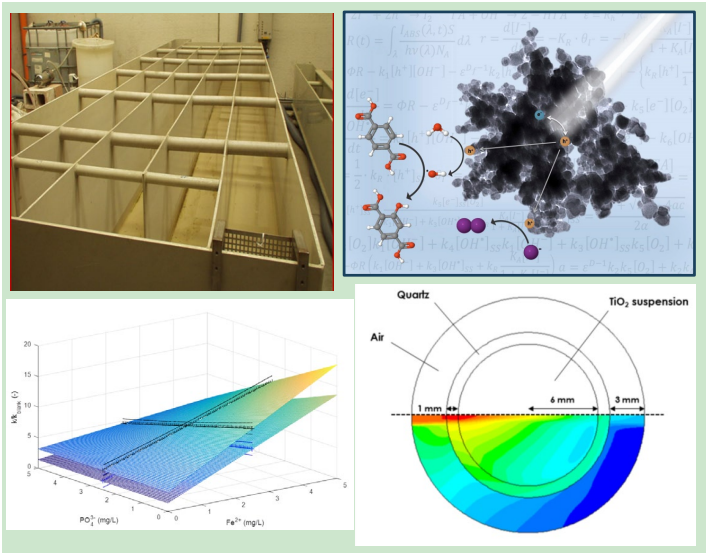
Drinking water treatment
(Trattamento delle Acque di Approvvigionamneto)

Level: Bachelor/Master
10 Credits, II Sem

Topics

The course provides principles for: i) describing applicability and designing unit processes; ii) defining the most appropriate treatment train for water production depending on supply source.

The relevant aspects involved in the definition of the treatment train are specifically addressed, according to a multiple-barrier approach, from water quality at the source and at the POU (Point of Use), to the reliability and flexibility of the treatment train, up to the interactions of water with the distribution network.



Keywords

Water supply, Water Quality; Treatment technologies

About the teacher

Prof. Manuela Antonelli
Associate Professor
Department of Civil and Environmental Engineering

manuela.antonelli@polimi.it

Research interests

- Disinfection
- Advanced Oxidation Processes (AOPs)
- Adsorption
- Wastewater reuse

Representative works

10.1016/j.scitotenv.2018.06.219
10.1016/j.watres.2018.02.019
10.1016/j.snb.2018.10.107

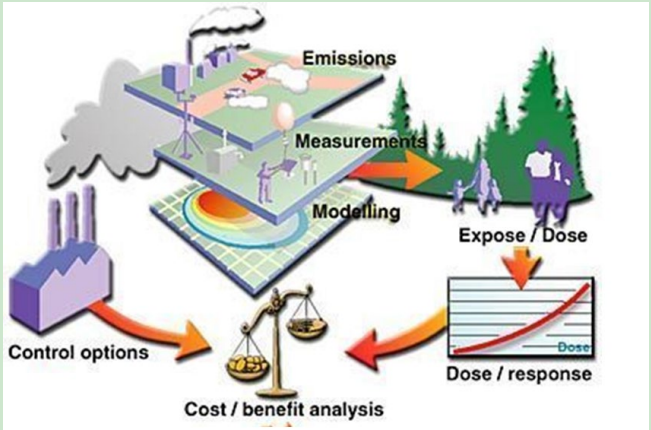
Publication list: ORCID

Environmental Impact Assessment
Valutazione di Impatto Ambientale

10 Credits, Master
I Sem

Topics

The aim of the course is to provide the multidisciplinary knowledge necessary to understand environmental phenomena and to evaluate the interferences and impacts that new infrastructures can determine in the environment. Specific learning goals are the achievement of the capability to retrieve and manage the territorial information needed to provide the background knowledge to assess the quality status and to predict the impacts through appropriate simulation tools



Keywords

Environmental Impact Assessment; Scenario Analysis; Simulation tools

About the teacher

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Research interests

Environmental Impact Assessment
Knowledge-based managementt
Scenario based decision support

Representative works

Azzellino et al. 2015. Disentangling the multiple stressors acting on stream ecosystems to support restoration priorities. Water Science and Technology, **72**: 293

Azzellino et al. 2013. Optimal siting of offshore wind-power combined with wave energy through a marine spatial planning approach. International Journal of Marine Energy (ISSN:2214-1669), (pp. e11- e27), 3-4.

Publication list: ORCID

Applied Hydraulics
(Idraulica Applicata)

Level: Master
6 Credits, II Sem

Topics

In this course students learn how to model natural rivers. After revising basics of open channel flow, they progressively face the intrinsic complexity of real rivers.

Teaching approach comprehends both traditional and active learning activities.

Keywords

River Hydraulics; Flood Risk

About the teacher

prof. **Francesco Ballio**
professor of Hydraulics
Department DICA

francesco.ballio@polimi.it
projects: www.grid.polimi.it

Research interests
Sediment mechanics
Bridges
Flood Risk

Representative works
patent "BLESS" (sedimeter)
AGU book on flood damages

Publication list:

Power Generation Systems

Level: Master
8 Credits, II Sem

Topics

Fuels and Combustion, Steam and Gas cycles, Cogeneration, Internal Combustion Engines, Wind, Solar and Geothermal energy

Goals of the course are:

- Review of basic principles/tools for the analysis of energy conversion systems
- Develop capability to analyze, model and assess performance of conventional/innovative power generation systems

Keywords

Energy Systems; Thermodynamic cycles; Renewables

About the teacher

Prof. Marco Binotti
Assistant Professor
Energy Department

Marco.Binotti@polimi.it
Website: Marco Binotti's page

Projects: www.bionicoproject.eu, www.sco2-flex.eu

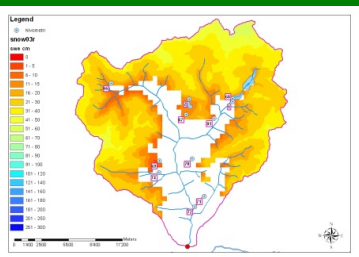
Research interests
Concentrating Solar
Green hydrogen
Supercritical CO_2 cycles

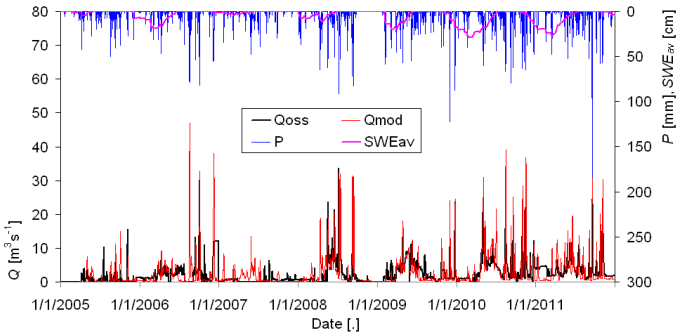
Representative works
CSP publication
sCO_2 publication

Publication list:

Water Resources Management

Level: Master
6 Credits, I Sem





Topics

1) Assessment of water resources, hydrological budgets, impact of climate change on hydrology of mountain areas, ecological flows.
2)Optimal water alllocation strategies.
3)Reservoirs' design and management, flood operation.
4) Flood design, reliability analysis.

Keywords Water resources; Reservoirs' operation; climate change

About the teacher

Research interests: Water resources; Hydrology; Flood modeling; Climate change

Prof. Daniele Bocchiola
Associate Professor
Dept Civil & Environmental Eng.

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Website: http://intranet.dica.polimi.it/people/bocchiola-daniele/

Representative works

Akbari, H., Soncini, A, Dinpashoh, Y., Fakheri-Fard, A., Talatahri, S., Bocchiola, D., *Operation of two major reservoirs of Iran under IPCC scenarios during XXI Century*, Hydrol. Proc., https://doi.org/10.1002/hyp.13254

Projects: https://www.climatelab.polimi.it/en/

Publication list: ResearchGate

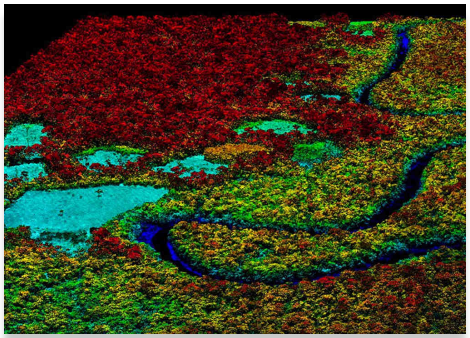
Ecology
(Ecologia)

Level: Bachelor
8 Credits, II Sem

Topics

The course aims at providing simple, yet effective, quantitative methods to let engineers deal with ecological problems at three levels of complexity: single species populations, communities and ecosystems, global issues

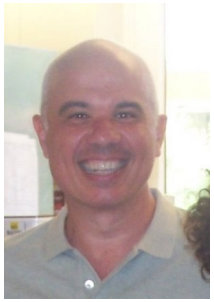
1. Ecological processes in ecosystems; 2. Population dynamics (from Malthusian to density and age/stage dependent models), 3. Trophic and competition interactions (Lotka-Volterra and beyond). 4. Biodiversity, conservation and climate change.



Keywords

Population dynamics; Species interactions; Biodiversity

About the teacher



Prof. Renato Casagrandi
Full Professor
Dipartimento di Elettronica, Informazione e Bioingegneria
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website: http://www.ecologia.polimi.it/casagrandi

Research interests
Ecological modelling
Infectious diseases
Complex dynamics

Projects: www.ecopotential-project.eu, www.http://www.polisocial.polimi.it/?s=mastr-sls

Representative works

Barn swallows long-distance migration occurs between significantly temperature-correlated areas. *Scientific Reports*, 8:12359

Big-data-driven modeling unveils country-wide drivers of endemic schistosomiasis, *Scientific Reports*, 7:489

Looking for hotspots of marine metacommunity connectivity: a methodological framework. 2016 *Scientific Reports*, 6:23705

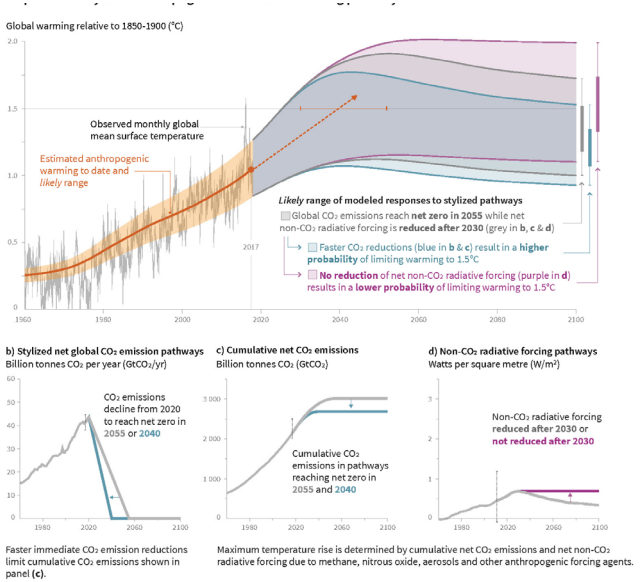
Publication list: ORCID ResearchGate

Mitigation of climate change
(Mitigazione dei cambiamenti climatici)

Level: Master
8 Credits, I Sem

Topics

The course addresses the various aspects of the problem of global climate change, providing the physical science basis and the necessary elements for setting and evaluating mitigation policies. The strategies for reducing greenhouse gas emissions are presented in different sectors and at different scales. The evolution of the international negotiations on climate change is explained and the main instruments of the carbon market are illustrated.



Keywords

Climate change; global warming; mitigation; emissions

About the teacher

Prof. Stefano Caserini
Adjunct Professor
Department of Civil and Environmental Engineering

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www.caserinik.it

Research interests
Climate change
CO_2 negative emissions
Atmospheric pollution

Publication list:
ResearchGate

Representative work
Caserini S. et al (2017) Evaluation of a new technology for carbon dioxide submarine storage in glass capsules. International *Journal of Greenhouse Gas Control*, 60:140

Environmental engineering
(Ingegneria Sanitaria-Ambientale)

Level: Bachelor
8 Credits, II Sem

Topics

Description, analysis and evaluation of pollution phenomena of air, water and soil

- Basic principles of pollution: characteristics and measurement
- Emission sources characterization for air, water and soil environments.
- Engineering evaluation of environmental quality requirements
- Preventive and removal techniques for pollution control

Keywords

Pollution phenomena; pollution sources; reduction & removal technologies.

About the teacher

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Full professor
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Website: ww.dica.polimi.it/personale

Research interests
Air quality analysis
Air emissions
characterization and control
Urban wastes treatment

Publication list:
https://www.mendeley.com/profiles/stefano-cernuschi/

Computational mechanics for geomaterials

(Meccanica computazionale per i geomateriali)

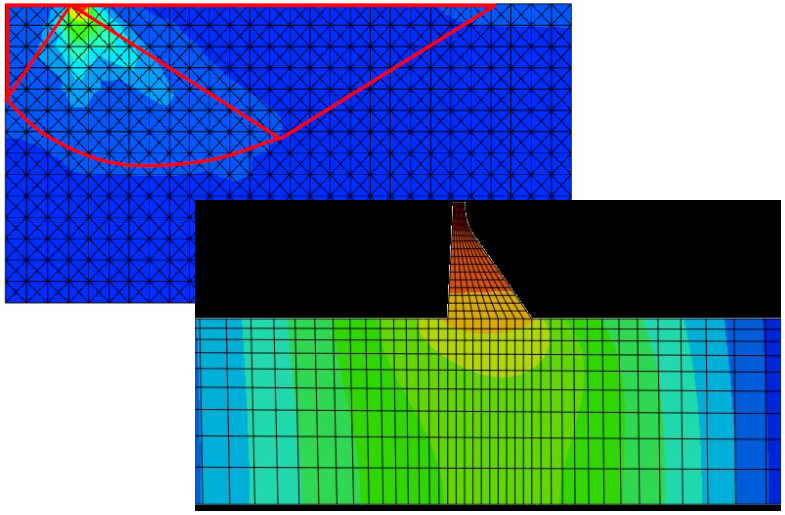
Level: Master

10 Credits, I Sem

Topics

The objective is to teach the theoretical bases and the practical use of the finite element method for the solution of static elastic and elasto-plastic problems.

Non linear constitutive behaviour and coupled hydro-mechanical modelling of saturated geomaterials are considered, in geotechnical engineering applications.



Keywords

Finite Elements; Plasticity; Geomechanics

About the teachers

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Full professor
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claudia.comi@polimi.it
Website: www.polimi.it/comi

Prof. Donatella Sterpi
Associate professor
Dept. Civil Environm. Eng.
donatella.sterpi@polimi.it

Research interests

Mechanics of materials
Metamaterials
MEMS

Soil/Rock mechanics
Tunnelling
Energy geotechnics

Representative works

A new MEMS three-axial frequency-modulated (FM) gyroscope, *Eur.J. Mech.A/Solids* (2018)

Wave propagation in cellular locally resonant metamaterials, *LAJSS* (2018)

Time dependent modelling of tunnels in squeezing conditions, *ASCE Int. J. Geomech.* (2012)

Investigation on the behaviour of a thermo-active diaphragm wall … *Geomech. Energy Environ.* (2017)

Fundamentals of environmental technologies

(Fondamenti di tecnologie ambientali)

Level: Bachelor
8 Credits, I Sem

Topics

The course provides tools to describe, understand and predict the behavior of pollutants in environmental systems and in chemical and biochemical reactors applied to environmental protection.

Two aspects are specifically addressed: the reactivity (stoichiometry and kinetics) and the fluid dynamics (residence time distribution).

Keywords

Reactors engineering; chemical and biochemical reactions;

About the teacher

Prof. Elena Ficara
Associate Professor
DICA

elena.ficara@polimi.it

Research interests
Wastewater treatment
Bioremediation
Bioenergy from wastes

Representative works
10.1039/C5EE01633A
10.1016/j.algal.2017.03.014
10.1016/j.biortech.2014.11.019

Publication list: ORCID ResearchGate

Projects: http://www.imap-project.it/

Remote Sensing
(Telerilevamento)

Level: Master
10 Credits, I Sem

Topics

This course covers basic concepts of Remote Sensing and emphasizes the understanding of satellite and airborne multi- and hyper-spectral images for environmental applications.

The course is designed for beginning level users and consists of lectures, examples and case studies. A laboratory of image processing complements teaching activities.

Keywords

Earth observation; satellite; environment; monitoring; mapping; climate change; landscape; change detection

About the teacher

Prof. Marco GIANINETTO
Associate Professor of Geomatics
Department of architecture, built environment and construction engineering

Email: marco.gianinetto@polimi.it
Website: http://www.abc.polimi.it/en/teaching-staff/GIANINETTO-MARCO

Research interests
Satellite surveys
Multi-scale data processing
Multi-temporal analysis

Publication list
ResearchGate

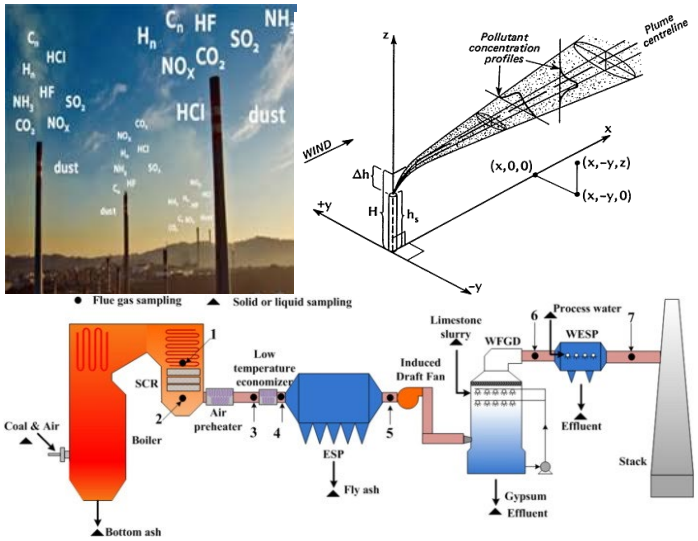
Inquinamento atmosferico (Atmospheric pollution)

Level: Bachelor/Master 10 Credits, II Semester

Topics

The course is intended to introduce the students to the subject of air pollution with reference to its causes, to its phenomenological aspects, and to its effects at different spatial scales.

Students will learn to assess atmospheric emissions, to identify the most appropriate treatment technologies, and to design the emission control systems with the related operating performance



Keywords

Air quality; Emission assessment; Emission control unit design

About the teacher

Prof. Giovanni Lonati
Associate professor
Dept. DICA

Email: giovanni.lonati@polimi.it
Website: www.polimi.it

Projects: TOBICUP , BLACK CAT

Research interests
Air quality
Emission control
Env. impact assessment

Representative works
Lonati et al. *Atmosphere 2017*
Corsini et al. *Toxicol. Lett. 2017*
Lonati et al. *Env. Int. 2008*

Publication list: ORCID

Ecology and sustainability of production systems Level: B/M

(Ecologia e sostenibilità dei sistemi produttivi) 8 Credits, II Sem

Topics

a multidisciplinary overview of the main interactions between human activities and ecological systems at different geographical scales

tools to assess the impact of projects and plans on different environmental matrices and the socio-economic system and to integrate the different dimensions of sustainability

Keywords

environmental impact assessment; multi-criteria decision making; sustainability; ecosystem services; life cycle assessment

About the teacher

Prof. Paco Melià
Assistant Professor of Ecology
Dipartimento di Elettronica, Informazione e Bioingegneria
paco.melia@polimi.it
http://home.deib.polimi.it/melia/

Research interests

ecological modelling
biological conservation
natural resources management

Representative work

10.1038/srep23705
10.1016/j.jclepro.2014.05.073
10.1016/j.advwatres.2017.04.024

Publications

ResearcherID: E-8844-2012

ORCID

Projects: tinyurl.com/safenet-eu, ecopotential-project.eu

Land Use and its effects
(Usi del suolo ed effetti ambientali)

Level: Master
8 Credits, II Sem

Topics

The course introduces Soil as a no-renewable ecosystem giving us resources. Monitoring indicators and methods are presented to calculate the main negative effects of land consumption.

A brief panorama of planning solutions to land consumption is then offered focusing on local good practices, public policies at national level and smart tools to improve awareness on the topic.

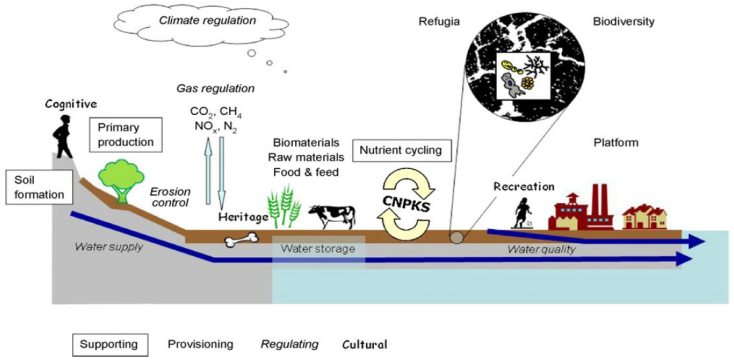


Fig. 2. Categorisation and nature of the key ecosystem goods and services provided by soil systems.

Keywords

Land&soil; Environmental impacts;

About the teacher

Prof. Paolo Pileri
Full professor
Department of Architecture and Urban Studies
paolo.pileri@polimi.it:

Research interests
Soil and Land Use
Environmental impacts
Cycling infrastructure plan

Representative works

Pileri et alii. (2017), Soil Sealing: Quantifying Impacts on Soil Functions by a Geospatial Decision Support System *Land Degradation & Development* 28
Pileri P. e Maggi M., (2010), Sustainable planning? First results in land uptakes in rural, natural and protected areas: the Lombardia (Italy) case study, *Journal of Land Use Science*, **5**: 2

Projects: http://www.progetto.vento.polimi.it

Publication list ResearchGate