

ENVIRONMENTAL ENGINEERING

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## PORTFOLIO



Reform of Education Thru  
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## SCHOOL OF TECHNOLOGY AND MANAGEMENT POLYTECHNIC OF LEIRIA

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## LABORATORY FACILITIES

The Department of Environmental Engineering has the means to ensure teaching, research and development activities, consultancy and service provision to external entities, within the scope of the major intervention areas of Environmental Engineering.

### CONTACT

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## HYDRAULICS AND ENVIRONMENTAL LABORATORY WATER TREATMENT SECTION

The Water Treatment Section is prepared to ensure the simulation of water treatment processes, namely those of coagulation/flocculation, sedimentation, flotation, adsorption, ion exchange and activated sludge. It also has some basic equipment for monitoring the water quality during the experimental assays.





## BIOSCIENCES LABORATORY

The Biosciences Laboratory offers conditions to develop basic works in different fields of cellular and molecular biosciences. It is specially prepared for teaching and for the development of simple projects in the fields of the Environment and Biomedicine. It has optical microscopes, centrifuges, a spectrophotometer, incubators and equipment for microorganism growth.

### CONTACT

lbio.dea.estg@ipleiria.pt



## INSTRUMENTAL ANALYSIS LABORATORY

The Instrumental Analysis Laboratory is equipped to perform experimental and research work in the areas of monitoring and environmental technologies, namely the development of methods and techniques for the qualitative and quantitative analysis of physical-chemical parameters. It also allows the provision of services to society, mainly the carrying out of experimental work involving students from secondary schools or developing specialized studies for external entities. The laboratory equipment features the HPLC chromatograph, a water deionizer, a sample digester, an atomic absorption spectrometer, a UV/VIS spectrophotometer, a muffle, a potentiometer and a Karl Fischer titrator.

### CONTACT

lai.dea.estg@ipleiria.pt



## ENVIRONMENTAL ACOUSTICS LABORATORY

The Environmental Acoustics Laboratory has sound level meters, which allow frequency analysis, as well as specific numerical simulation software. It supports the teaching of acoustics, the development of research work and the provision of services to external entities, namely consultancy and the elaboration of Noise Maps.

### CONTACT

laa.dea.estg@ipleiria.pt



## MOBILE STATION OF MONITORING AIR QUALITY AND METEOROLOGICAL PARAMETERS

The mobile station is prepared to continuously monitor air quality in any outdoor environment, in accordance with the methods required by current legislation. It is equipped with analyzers of nitrogen oxides, sulfur dioxide, ozone, carbon monoxide, particulate matter (10 µm and 2.5 µm) and hydrocarbons. It also has equipment for the acquisition of meteorological parameters that is fundamental in the analysis of air quality.

### CONTACT

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# PROVISION OF SERVICES

The Department of Environmental Engineering provides the external community with a wide range of technical consulting services in Environmental Assessment, Environmental Management, Water and Wastewater Treatment, Waste Management, Water Resources Management, Climate and Air Quality, Environmental Acoustics and Sustainability in Buildings.

## ENVIRONMENTAL ASSESSMENT

- Environmental impact assessment
- Environmental performance assessment
- Assessment and management of environmental risks
- Diagnosis and evaluation of environmental pressures (air, sound and water pollution)
- Modelling of environmental systems

## ENVIRONMENTAL MANAGEMENT

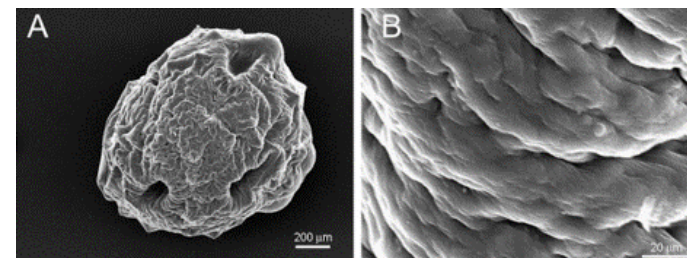
- Environmental licensing
- Environmental management systems
- Environmental audits

## WATER AND WASTEWATER TREATMENT

- Water and wastewater laboratory assays
- Water, wastewater and the reuse of wastewater treatment plants
- Monitoring, optimization and control of water treatment and reuse of water systems

## WASTE MANAGEMENT

- Waste treatment/recovery and disposal plants
- Monitoring, optimization and control of waste management systems



## WATER RESOURCES MANAGEMENT

- Intervention in surface water bodies and groundwater, including mitigation and adaptation to environmental and anthropogenic risks
- Hydrological studies
- Protection, rehabilitation and restoration, conservation and requalification of the river network and aquatic ecosystems
- Monitoring and control of surface and groundwater quality

## CLIMATE AND AIR QUALITY

- Climatic evaluation
- Mitigation and adaptation to climate change
- Planning and management of ambient air quality, gaseous effluents and indoor air
- Systems, processes and technologies for the treatment of air pollutants
- Monitoring and control of ambient air quality and indoor air quality



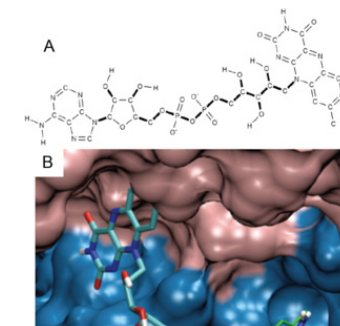
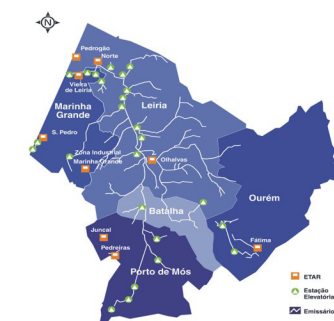
## SUSTAINABILITY IN BUILDINGS

- Rationalization of energy consumption and energy efficiency in buildings
- Energy auditing and energy management in buildings
- Incorporation of renewable energy in buildings
- Quality of indoor environment and thermal comfort in buildings



## ENVIRONMENTAL ACOUSTICS

- Control of noise emissions
- Noise maps, action plans and municipal noise reduction plans





## ATIVIDADES DE I&DT

- Implications of the alteration of land use in the district of Leiria in the capture/emissions of CO<sub>2</sub> – the case of the forests
- Modelling the impact of the N1 road traffic on air quality in Leiria
- Contribution to the implementation of an environmental biomonitoring system in the municipality of Leiria based on bee products
- Contributions to the implementation of an Environmental Management System in the Ammunition Depot of NATO in Lisbon – service and naval weapons of the Portuguese Navy
- Experimental study of the ventilation and thermal performance in roofing with ceramic tiles with ventilated eaves and sub-tiles
- Monitoring of heavy metals and PAH in PM<sub>10</sub> collected in local neighbourhoods of CMP, SA
- Domestic wastewater treatment in wetlands
- Study of sorbents for reactive dye removal from the wastewater of the Tanning Industry
- Performance evaluation of urban WWTP
- Incorporation of construction and demolition waste in the production of ceramic bricks
- Mineral fertilizer encapsulation polymer
- Modelling of biosorption processes
- Studies of molecular modelling of biomolecules
- BioEnergy for sustainability - Improvement of the energy generation system of WWTP for its self-sufficiency
- Development of low cost techniques for the collection of microalgae from liquid culture media
- Bioactivity of natural compounds and toxic agents in cell compartments
- Applications of biopolymers and biosorbents of toxic metals
- Flood risk assessment in urban areas
- Impact of climate change on water availability

## TeSP ENERGY AND ENVIRONMENTAL MANAGEMENT

### HIGHER PROFESSIONAL TECHNICAL COURSE

The completion of a Higher Professional Technical Course allows the students to be awarded a Senior Technical Officer Certificate, corresponding to a level 5 in the National Qualification Framework and in the International Standard Classification of Education.

#### GOALS

The course intends to train professionals with skills in the identification, study and resolution of energy and environmental problems in industries, organizations and services, complying with legal and other requirements, with reference to continuous improvement and sustainable development.

#### MAIN ACTIVITIES

- To rationally manage natural and energy resources in industries, organizations and services
- To monitor environmental and energy parameters
- To solve environmental pollution problems
- To solve energy efficiency problems
- To identify, evaluate, correct and prevent risks, hazards and environmental impacts

- To implement and monitor environmental management systems
- To implement and monitor energy management systems
- To communicate about environmental and energy aspects in both the organization and external entities
- To organize environmental licensing processes

#### FURTHER STUDIES

The students who hold a diploma in Energy and Environmental Management can apply for undergraduate courses at IPL, namely Energy and Environmental Engineering and Electrical Engineering, without the need to sit entrance exams and with some ECTS credited.

#### CONTACT

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## ENERGY AND ENVIRONMENTAL ENGINEERING BACHELOR/UNDERGRADUATE COURSE

### GOALS

Training in Energy and Environmental Engineering provides its graduates with competences at a technological, ecological, socio-economical and legislative level, enabling them to operate with technical expertise: (i) to plan and select systems for the production / supply / management of energy, recommending solutions that involve the rational use of energy, the energy efficiency, the use of renewable energy sources and the analysis of energy policies, and (ii) to identify, study and solve environmental problems, in the ambit of sustainable development.

### EMPLOYMENT

The course prepares graduates for professional careers in industries, public institutions, engineering offices and the provision of services in the following areas:

- Production, exploitation and management of energy, including renewable energy and biofuels
- Energy audits
- Environmental impact assessment, inspection and environmental monitoring on construction sites

- Environmental management, quality management and environmental licensing
- Water treatment and supply
- Drainage and treatment of wastewater
- Waste Management
- Ecosystem management
- Management of water resources
- Climate change and air quality
- Acoustics and vibrations
- Management and quality of soils and subsoils
- Environmental health and safety and health at work



## MASTER IN ENERGY AND ENVIRONMENTAL ENGINEERING

### GOALS

Energy and its relationship with the environment are important factors of sustained economic growth and its competitiveness, and the energy sector accounts for diverse and significant environmental impacts. This Master aims to meet the needs of specialization in the training of professionals with an integrated vision in energy and the environment. It provides participants with technical and scientific skills in terms of renewable energy, energy efficiency, energy production and environmental technologies associated with the management of water, air, waste, noise and transport. It also confers skills in the areas of energy and environmental policies, in its ecological, social and economic dimensions and technological developments, with a view to promoting sustainable development and management.

### EMPLOYMENT

The professional opportunities of the Masters in Energy and Environmental Engineering include the following areas of work in the field of environmental and energy management: energy savings and management; assessment of the social and

environmental impacts of energy production systems; development of renewable energy production systems; management and treatment of water, effluents and waste; management of air quality and ambient noise; energy and the environment in transport; monitoring of environmental parameters; integrated management of quality and environmental systems.

### INTERNATIONALIZATION

Double Degree programs have been established that give students the opportunity to take two master's degrees in two different institutions in a period of two years, on a reciprocal basis. At the conclusion of the course, students are awarded with two master's certificates issued by each of the universities, a Master in Energy and Environmental Engineering and:

- **Master degree in Management of Sanitary Engineering Facilities and Environmental Protection** - Technical University of Moldova, Moldova;
- **Master degree in Environmental Protection (in power engineering)** - National Polytechnic University of Armenia, Armenia;

- **Master in Science in Ecological Engineering** - Azerbaijan University of Architecture and Construction, Azerbaijan;
- **Master in Science in Ecological (Environmental) Engineering** - Donbas National Academy of Civil Engineering and Architecture, Ukraine.

These double degree qualifications were established under the Tempus RETHINke Project.

The **Department of Environmental Engineering** was created in 2003. It offers training in the area of Environmental Engineering, namely the Higher Professional Technical Course in Energy and Environmental Management, the Undergraduate course in Energy and Environmental Engineering, the Master in Energy Engineering and Environment and the Double Degree Programs of the Master in Energy and Environmental Engineering with the Technical University of Moldova, the National Polytechnic University of Armenia, the Azerbaijan University of Architecture and Construction and the Donbas National Academy of Civil Engineering and Architecture - Ukraine.

With a highly qualified teaching body, the department aims to provide its graduates with knowledge from an integrated perspective at the technological, social, ecological, economic and legislative levels that allow them to act with a technical and scientific capacity in the analysis and resolution of problems.

It has the support of 5 laboratories: Instrumental Analysis Laboratory, Biosciences Laboratory, Environmental Acoustics Laboratory, Hydraulics and Environmental Laboratory – Water Treatment Section and Mobile Station of Monitoring Air Quality and Meteorological Parameters. These laboratories ensure the practical training of students, the research and development activities of the teaching body and the provision of services to the community and business sector.

The R&DT projects and the provision of external services by the Department of Environmental Engineering aim to profit from the potential of its faculty and to develop innovative works that bring both the academic community and the business community of the region closer together.



ESCOLA SUPERIOR  
DE TECNOLOGIA  
E GESTÃO

