PhD in Environmental Engineering

Curriculum · 6 semesters · 120 ECTS credits · 3000 academic hours

120	6	24	3000
ECTS credits	Semesters	Courses	Academic Hours

Required · Research · Elective · Thesis

Semester 1 — Foundations and Methodology — 20 ECTS

CODE	COURSE NAME	DESCRIPTION	ECTS	HOURS	TYPE
ENV-ENG-101	**Ecosystems and Environmental Services**	Structure and functioning of ecosystems; valuation of environmental services and biodiversity.	5	125h	Required
ENV-ENG-102	**Advanced Environmental Chemistry**	Geochemical reactions, biogeochemical cycles, speciation of contaminants in environmental matrices.	5	125h	Required
ENV-ENG-103	**Scientific Research Methodology**	Experimental design, hypothesis formulation, literature review, data management and scientific writing.	5	125h	Research
ENV-ENG-104	**Environmental Statistics and Geostatistics**	Multivariate analysis, regression models, kriging and spatial analysis applied to environmental problems.	5	125h	Required

Semester 2 — Pollution and Treatment — 20 ECTS

CODE	COURSE NAME	DESCRIPTION	ECTS	HOURS	TYPE
ENV-ENG-201	**Advanced Wastewater Treatment**	Advanced physico-chemical and biological processes: MBR, UASB, advanced oxidation and micropollutant removal.	5	125h	Required
ENV-ENG-202	**Air Pollution and Control**	Pollutant dispersion, air quality modeling, emission control technologies.	5	125h	Required
ENV-ENG-203	**Solid and Hazardous Waste Management**	Waste hierarchy, material and energy recovery, hazardous waste and WEEE treatment.	5	125h	Required
ENV-ENG-204	**Soil and Groundwater Remediation**	In situ and ex situ techniques; bioremediation, phytoremediation, multiphase extraction and reactive barriers.	5	125h	Required

Semester 3 — Climate Change and Assessment — 20 ECTS

CODE	COURSE NAME	DESCRIPTION	ECTS	HOURS	TYPE
ENV-ENG-301	**Climate Change and Climate Modeling**	General circulation models, IPCC scenarios, vulnerability and adaptation to climate change.	5	125h	Required
ENV-ENG-302	**Environmental Impact Assessment and SEA**	EIA and strategic environmental assessment methodologies; risk analysis and public participation.	5	125h	Required
ENV-ENG-303	**Hydrology and Watershed Management**	Hydrological cycle, rainfall-runoff modeling, integrated water resource management and IWRM.	5	125h	Required
ENV-ENG-304	**Elective I — Constructed Wetland Engineering**	Design and operation of constructed wetlands for wastewater treatment and stormwater control.	5	125h	Elective

Semester 4 — Emerging Technologies and Thesis Proposal — 20 ECTS

CODE	COURSE NAME	DESCRIPTION	ECTS	HOURS	TYPE
ENV-ENG-401	**Environmental Biotechnology**	Bioprocesses, bioreactors, applications of microorganisms in treatment and advanced bioremediation.	5	125h	Required
ENV-ENG-402	**Environmental Economics and Ecological Valuation**	Externalities, environmental policy instruments, contingent valuation and cost-benefit analysis.	5	125h	Required
ENV-ENG-403	**Elective II — GIS and Environmental Remote Sensing**	Geographic information systems, raster/vector analysis, satellite imagery and vegetation indices.	5	125h	Elective
ENV-ENG-404	**Doctoral Thesis Proposal**	Preparation, presentation and defense of the doctoral proposal before the academic committee.	5	125h	Thesis

Semester 5 — Research and Publication — 20 ECTS

CODE	COURSE NAME	DESCRIPTION	ECTS	HOURS	TYPE
ENV-ENG-501	**Advanced Research Seminar I**	Progress presentations, peer review, methodological discussion and engagement with the scientific community.	5	125h	Research
ENV-ENG-502	**Elective III — Environmental Nanotechnology**	Nanomaterials for water treatment, nanoscale environmental sensors and ecotoxicity assessment.	5	125h	Elective
ENV-ENG-503	**Research Internship or Exchange**	Academic exchange at an external institution; minimum 4 weeks with technical report and external co-supervisor.	5	125h	Research
ENV-ENG-504	**Scientific Writing and Publication**	Strategies for writing ISI/Scopus articles, editorial process, peer review and research ethics.	5	125h	Research

Semester 6 — Doctoral Thesis and Defense — 20 ECTS

CODE	COURSE NAME	DESCRIPTION	ECTS	HOURS	TYPE
ENV-ENG-601	**Advanced Research Seminar II**	Final presentation of results and validation with an external jury prior to the defense.	3	75h	Research
ENV-ENG-602	**Research Ethics and Biosafety**	Professional ethics, laboratory biosafety, data protection and intellectual property.	2	50h	Required
ENV-ENG-603	**Doctoral Thesis — Development and Writing**	Writing the final thesis document: introduction, methodology, results, discussion and conclusions.	10	250h	Thesis
ENV-ENG-604	**Public Doctoral Thesis Defense**	Presentation and defense before an external examining committee; evaluation of originality and scientific contribution.	5	125h	Thesis