

# PhD in Environmental Engineering

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

<b>120</b> ECTS Credits	<b>6</b> Semesters	<b>24</b> Courses	<b>3000</b> Academic Hours
----------------------------	-----------------------	----------------------	-------------------------------

■ Required
 ■ Research
 ■ Elective
 ■ Thesis

## Semester 1 — Foundations and Methodology 20 ECTS

CODE	COURSE NAME	DESCRIPTION	ECTS	HOURS	TYPE
ENV-ENG-101	<b>Ecosystems and Environmental Services</b>	Structure and functioning of ecosystems; valuation of environmental services and biodiversity.	5	125h	Required
ENV-ENG-102	<b>Advanced Environmental Chemistry</b>	Geochemical reactions, biogeochemical cycles, speciation of contaminants in environmental matrices.	5	125h	Required
ENV-ENG-103	<b>Scientific Research Methodology</b>	Experimental design, hypothesis formulation, literature review, data management and scientific writing.	5	125h	Research
ENV-ENG-104	<b>Environmental Statistics and Geostatistics</b>	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	<b>Advanced Wastewater Treatment</b>	Advanced physico-chemical and biological processes: MBR, UASB, advanced oxidation and micropollutant removal.	5	125h	Required
ENV-ENG-202	<b>Air Pollution and Control</b>	Pollutant dispersion, air quality modeling, emission control technologies.	5	125h	Required
ENV-ENG-203	<b>Solid and Hazardous Waste Management</b>	Waste hierarchy, material and energy recovery, hazardous waste and WEEE treatment.	5	125h	Required
ENV-ENG-204	<b>Soil and Groundwater Remediation</b>	In situ and ex situ techniques; bioremediation, phytoremediation, multiphase extraction and reactive barriers.	5	125h	Required

## American Benedictine Catholic University

### Semester 3 — Climate Change and Assessment 20 ECTS

CODE	COURSE NAME	DESCRIPTION	ECTS	HOURS	TYPE
ENV-ENG-301	<b>Climate Change and Climate Modeling</b>	General circulation models, IPCC scenarios, vulnerability and adaptation to climate change.	5	125h	Required
ENV-ENG-302	<b>Environmental Impact Assessment and SEA</b>	EIA and strategic environmental assessment methodologies; risk analysis and public participation.	5	125h	Required
ENV-ENG-303	<b>Hydrology and Watershed Management</b>	Hydrological cycle, rainfall-runoff modeling, integrated water resource management and IWRM.	5	125h	Required
ENV-ENG-304	<b>Elective I — Constructed Wetland Engineering</b>	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	<b>Environmental Biotechnology</b>	Bioprocesses, bioreactors, applications of microorganisms in treatment and advanced bioremediation.	5	125h	Required
ENV-ENG-402	<b>Environmental Economics and Ecological Valuation</b>	Externalities, environmental policy instruments, contingent valuation and cost-benefit analysis.	5	125h	Required
ENV-ENG-403	<b>Elective II — GIS and Environmental Remote Sensing</b>	Geographic information systems, raster/vector analysis, satellite imagery and vegetation indices.	5	125h	Elective
ENV-ENG-404	<b>Doctoral Thesis Proposal</b>	Preparation, presentation and defense of the doctoral proposal before the academic committee.	5	125h	Thesis

## American Benedictine Catholic University

### Semester 5 — Research and Publication 20 ECTS

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

### Semester 6 — Doctoral Thesis and Defense 20 ECTS

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

PhD in Environmental Engineering · Official Curriculum · 120 ECTS Credits · 3 Academic Years