Course title: Introduction to environmental engineering

Course basic information	
Academic unit:	Faculty of Civil Engineering
Course name:	Introduction to Environmental Engineering
Level:	Bachelor
Course status:	Mandatory
Year of study:	I year, II semester
Number of hours per week:	2+2
ECTS Credits:	ECTS: 6
Time/Venue:	According to time table
Course teacher:	Prof. Ass. Dr. Mimoza Dugolli
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Course description	This is a fundamental sustainability course for students on the first year. This course introduces students to sustainability principles in the field of environmental engineering. During this class, students will apply these principles to engineering problems in order to evaluate the environmental, economic, and social implications of engineering and design decisions. Topics include definition(s) of sustainability, main engineering sustainability challenges (e.g., water, energy, climate, and materials), pollution generation and prevention, and sustainability assessment tools (e.g., life cycle assessment).
Course objectives:	By the end of this course, students will be able to: 1. Define sustainability as it applies to engineering problems. 2. Describe the main sustainability challenges in engineering (e.g., water, energy, climate, materials, etc.). 3. Calculate and balance the material and energy flows over multiple life cycle stages of engineered systems. 4. Describe the mechanisms of environmental impacts due to pollution (e.g., for smog, ozone depletion, eutrophication, etc.). 5. Interpret life cycle assessment results to recommend potential solutions engineering problems. 6. Compare engineering systems and justify engineering design decisions based on the results of sustainability assessments by identifying and describing the relevant environmental, economic, and/or social impacts.
Learning outcomes:	By the end of this course the students will be able to understand and address the challenges on environmental engineering, make decisions based on results of sustainability assessments, calculate and balance the material and energy flows over multiple life cycle of engineering systems.

Student workload (Consistent with the learning outcomes)			
Activity	**Hours**	**Day/Week**	**Total**
Lectures	2	15	30
Practical work	2	15	30
Contacts hours with teacher	2	15	30
Consultations during office hours	1	15	15
Field work			
Colloquium, seminars	1	2	2
Homework	1	15	15
Self-study time (in the library or at home)	1	15	15
Final exam reparation	1	2	2
Evaluations (tests, quizzes, final exam)	2	2	4
Projects, presentations, etc.	2	5	10
Total			**153**

Teaching methodology:	The course is conducted through regular lectures and numerical exercises selected in the classroom and home.
Evaluation methods:	One of the ways of evaluation would be as follows: • First Assessment: 35% • Second Assessment 35% • Homework 30% • Regular attendance - decisive in border cases • Final exam
Literature	
Basic literature:	James R. Mihelcic Julie B. Zimmerman "Environmental Engineering: Fundamentals, Sustainability, Design", second edition. Other texts as provided during the lectures
Additional literature:	Tom Theis & Jonathan Tomkin "Sustainability: A Comprehensive Foundation"

Course plan:	
Week	**Title of the lecture**
Week 1:	Population, economic growth, industrialization, urbanization and energy-use, as causes of environmental pollution.
Week 2:	Mass and energy balance for environmental engineering systems under steady state and unsteady state conditions.
Week 3:	Physical and transport properties of homogeneous and heterogeneous mixtures.
Week 4:	Contaminant partitioning and transport in air, water and solids.
Week 5:	Characteristics of particles, chemistry of solutions and gases, material balances, reaction kinetics, microbiology and ecology, as related to the environment.

Week 6:	Application of environmental principles (technical and non-technical) to: water resource management, water and wastewater treatment, air pollution control, solid waste management, environmental impact assessment, and environmental ethics.
Week 7:	First assessment
Week 8:	Thermal pollution, noise pollution, greenhouse effect, acid precipitation, ozone depletion, air toxics, and ground-level ozone and fine particulates (photochemical smog).
Week 9:	Sustainable development, life cycle analysis, and principles of environmental quality objectives, standards and guidelines.
Week 10:	Soils as a treatment system
Week 11:	Environmental Assessment and Management Systems
Week 12:	Site Assessment and Remediation
Week 13:	Instrumentation and Process Control
Week 14:	Social Concepts: Stakeholder Engagement
Week 15:	Second assessment

Academic policies and rules of civility:
Regular attendance at lectures and exercises; Calm in the lesson; Disconnection of mobile phones in the hall; Entering the hall in time, etc.