

Pollution, Environment and Sustainability

- 1. Course number and name:** 020PEDES5 Pollution, Environment and Sustainability
- 2. Credits, contact hours:** 4 ECTS credits, 2x1:15 contact hours per week
- 3. Name(s) of instructor(s) or course coordinator(s):** Renalda Samra (EL) Khalil
- 4. Instructional Materials:** Class notes and PowerPoint slides

5. Specific course information

a. Catalog description:

An overview of the causes and effects of global climate change covering the basic science, projected impacts, and approaches to mitigation. It also includes the methods available to quantify greenhouse gases emissions, control these emissions and adapt to it, especially in the sector of buildings' HVAC/heating systems and building materials. Introduction to natural and anthropogenic carbon cycle, and carbon and climate. Topics also touch on the basic concepts of green buildings, green materials for building construction, material selection for sustainable design, green building certification, Methods for increasing energy efficiency of buildings. Moreover, the course will include the quantification of Air/Water/Soil pollution and their sources, sustainable wastewater treatment, Solid waste (sources and impacts of solid waste), zero waste concept and the 3 R concept.

b. Prerequisite: None.

c. Selected Elective for ME and EE students.

6. Educational objectives for the course

a. Specific outcomes of instruction:

At the end of the course. students should be able to:

- Understand climate change, global warming, carbon credits, carbon trading and carbon footprint.
- Compute greenhouse gases (GHGs) emissions from buildings (especially from HVAC systems, heating, different building materials, etc.), and from different industry sectors by using the carbon dioxide (CO₂) life cycle method.
- Describe air, water and soil pollution and quantify their amounts.
- Appreciate the impact of building design on energy consumption and greenhouse gas emissions.
- Identify renewable energy sources and calculate GHGs emissions from different renewable energy sources.
- Identify the need and concept of sustainability, nexus between technology and sustainable development, challenges for sustainable development. Introduction on multilateral environmental agreements and Protocols - Environmental legislations in Lebanon. Understanding water grid concept.

b. PI addressed by the course:

PI	1.1	1.3	2.3	2.4	3.1	4.2
Covered	x	x	x	x	x	x
Assessed	x	x	x	x	x	x

7. Brief list of topics to be covered

- **Introduction to Environmental Engineering**
- **Climate Change, causes and effects**
- **Greenhouse gases**, emissions, quantification and mitigation measures (especially from HVAC and heating systems and from different industry sectors by using the carbon dioxide (CO₂) life cycle method.
- **Air/Water/Soil Pollution, causes, design of treatment options:** River Pollution, water Treatment, wastewater treatment, soil rehabilitation, solid waste treatment.
- **The Sustainability concepts:** Renewable energy (Solar, wind, hydro, biomass), re-use of recycled water and wastewater.