

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
SCHOOL OF ENGINEERING
DEPARTAMENT OF CHEMICAL ENGINEERING AND BIOPROCESSES
ABET COURSE SYLLABI

IIQ2363/3363 SOLID AND HAZARDOUS WASTE

Credits and contact hours: 10 UC credits / 10 hours (3 h. Lectures; 1,5 h. Labs; 5,5 h. Independent learning experiences)

Instructor's name: César Sáez

Course coordinator's name To be defined

Textbook: Tchobanoglous, G., Thiesen, H. and Vigil, S. Gestión Integral de Residuos Sólidos. McGraw Hill. 1994.

Course Catalog Description: The course approaches the proper management of industrial and municipal solid waste. The course uses tools and knowledge acquired by students in their specialty courses, and supplements them to facilitate learning and understanding of various systems of pollution control. Focused on the design, the course develops the skills necessary to make decisions, suggest solutions and propose conceptual designs of systems of biological and physico-chemical treatment, recovery and disposal of solid waste of various kinds.

Prerequisite Courses: Credits approved by the student ≥ 250

Co-requisite Courses: None

Status in the Curriculum: Minimum course

Course Learning Outcomes:

1. Know the origins of solid and hazardous waste (SHW) and the impact their poor management can have on people health and the environment.
2. Identify and list the physical, chemical and biological properties of the urban and industrial SW and their hazardous characteristics.
3. Know the principle of operation of the available technologies of pollution control and waste recovery, and select the best(s) option(s) for a particular request.

**Relation of Course to
ABET Criteria:**

- c. Design a system, component, or process
- e. Identify, formulate, and solve engineering problems
- k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

Unit I: Introduction

- 1.1. The origin of the waste and the environment
- 1.2. The definition of waste.
- 1.3. Classification (ISW, USW, SHP1), physical and chemical properties (ISW, USW, SHW).
- 1.4. National and international current situation

Unit II: Technologies and systems of treatment and recovery of SW

- 2.1. Anaerobic biodigestion of organic waste: Biogas Plants
- 2.2. Aerobic biodigestion of the biodegradable fraction of SW: Landfills and composting
- 2.3. Heat treatments: Incineration, gasification, liquefaction, pyrolysis
- 2.4. Bioremediation of petroleum hydrocarbons contaminated soil: Bioremediation in-situ, ex-situ
- 2.5. Recyclable materials in USW

Unit III: Technologies for SHW treatment and valorization

- 3.1. Stabilisation and solidification
- 3.2. Ceramification and vitrification

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