

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL ENGINEERING
ABET COURSE SYLLABI

ICH3374 PHYSICAL-CHEMICAL TREATMENT

Credits and contact hours:	10 UC credits/ 10 hours (3 h. Lectures ; 1,5 h. Assistanhip and 5,5 h. Independent learning experiences)
Instructor's name:	Gonzalo Pizarro, Marco Alsina
Course coordinator's name	Gonzalo Pizarro
Textbook:	Unit operations and processes in environmental engineering, Tom D. Reynolds, Paul A. Richards. PWS Publishing, 1996. (628.162 R465u 1996)
Course Catalog Description:	This course enables students to solve water treatment needs through traditional and advanced technologies, in order to meet appropriate standards of quality and sustainability for various uses (drinking, industry, mining, irrigation), emission standards (discharge of industrial effluents and mining). The course uses a theoretical and practical approach so that students understand the operation of the basic and advanced unit operations and realize the design needs of a treatment system to respond to traditional and/or emerging contaminants. The course familiarizes students with the use of experimental and analytical techniques used in R&D (research and development) for water treatment.
Prerequisite Courses:	ICH 2314 Water Quality or ICH 3314 Water Quality
Co-requisite Courses:	None
Status in the Curriculum:	Required
Course Learning Outcomes:	<ol style="list-style-type: none">1. Meet and propose the use of unit operations for water treatment systems.2. Apply concepts and chemical and physical principles to solve simple and complex problems of potable water.3. Designing physical-chemical units to meet quality standards and environmental sustainability treatment4. Perform and interpret laboratory experiences associated with the design of treatment unit operations.5. Know and use sources of knowledge to propose innovative treatment systems6. Suggest experimental designs to test novel treatment systems and implement them at the laboratory and / or pilot scale.

**Relation of Course to ABET
Criteria:**

- h. Broad education necessary for global, economic, environmental and societal context
- i. Recognition of the need for, and an ability to engage in life-long learning
- k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

1. Introduction: water quality parameters
2. Reactor analysis
3. Preliminary unit operations
4. Coagulation, flocculation
5. Sedimentation
6. Filtration
7. Aeration and removal of volatile compounds
8. Adsorption
9. Softening
10. Fe and Mn removal
11. Fluorination
12. Disinfection