

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL AND METALLURGICAL ENGINEERING
ABET COURSE SYLLABI

ICM 2203 THERMAL FLUIDS

Credits and contact hours: 10 UC credits / 10 hours (3 h. Lectures / 7 h. Independent learning experiences)

Instructor's name: Ignacio Lira

Course coordinator's name To be defined

Textbook: W. S. Janna "Design of Fluid Thermal Systems", 3rd Ed., SI, Cengage Learning, 2011.

Course Catalog Description: Mechanical Engineering comprises several branches. One is the thermal area, its base are the minimum courses of Thermodynamics, Fluid Mechanics and Heat Transfer. These previous courses have shown that all thermal systems involve the transport of liquids or gases -generally called thermal fluids- through pipeline systems. It is thus needed to determine the characteristics of the pumps or fans for overcoming the pressure drops occurring in the various system components. This is the field of fluid mechanics. Moreover, in these systems there may be equipment for producing the temperature changes that may be required. For this, knowledge of thermodynamics and heat transfer is needed. Therefore, this course integrates the knowledge of the courses preceding it, which would otherwise appear isolated and without much connection between them.

Prerequisite Courses: ICM 2223 Heat Transfer

Co-requisite Courses: None

Status in the Curriculum: Required

Course Learning Outcomes:

1. To calculate pressure drops in piping systems.
2. To select an appropriate pump or fan for a given system.
3. To analyze different alternatives for heat exchangers.

**Relation of Course to ABET
Criteria:**

- a. Knowledge of mathematics, science and engineering
- b. Design and conduct experiments: analyze and interpret data
- c. Design a system, component, or process
- e. Identify, formulate, and solve engineering problems
- g. Effective communication
- k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

- 1. Piping systems
 - Bernoulli's equation
 - Pressure losses
 - Pipes in series
 - Pipes in parallel
 - Piping networks and the Hardy-Cross method
- 2. Pumps and fans
 - Pump testing
 - System characteristics and pump selection
 - Net positive suction head
 - The affinity laws
 - Specific speed
 - Graphic analysis of characteristic curves
 - Fans
- 3. Heat exchangers
 - Basic concepts of heat transfer
 - Methods of analysis
 - Calculating the global heat transfer coefficient and pressure losses
 - Analyzing cross flow heat exchangers

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