UNIVERSITY OF LJUBLJANA
Faculty of Mechanical Engineering

Refrigeration and Heat Pumps (6019-M) 5 ECTS

Lecturer: **A. Kitanovski, K. Klinar**

Lectures: 30h | Tutorials: 10h | Labs: 20h | Project: 0h | Lang. :

Objectives

The main objective of the subject is to provide student with knowledge in a domain of refrigeration and heat-pumping:

- to obtain knowledge in management of processes for: Food refrigeration and freezing; Cooling in buildings; Industrial refrigeration; Commercial refrigeration; Refrigerated transport; Cooling in electronics; Low temperature refrigeration – Cryogenics; Special refrigeration applications;
- to obtain basic and applied knowledge for development of refrigeration processes in different refrigeration devices and systems;
- to obtain basic and applied knowledge for development of heat pumps and related systems;
- to gain capabilities of critical thinking, analysis and design of refrigeration devices and heat pumps;
- to establish knowledge on newest and emerging refrigeration and heat pump technologies or knowhow, and their implementation in different engineering domains.

Programme

1. Thermodynamics of basic refrigeration cycles
2. Vapor-compression refrigeration and heat pumping
3. Sorption refrigeration and heat pumping
4. Enhanced heat transfer in heat exchangers
5. Gas refrigeration cycle
6. Solid-state refrigeration
7. Applications

Prerequisites

In order to successfully achieve this course, the students must have:

- good knowledge in heat and mass transfer.

Learning outcomes

After attending this course, the student will have:

- deep theoretical, methodological and analytical thinking with research capabilities, which is the basis for understanding and implementation of solutions in the field of different refrigeration and heat pump technologies;
- knowledge of design of complex processes and systems from the field of refrigeration and heat pumping. Obtained skill will allow to solve analytical and numerical problems in the field of refrigeration and heat pumps;
- capability for research and development and implementation of original findings/creations from the field of refrigeration or heat pump applications, which person can implement.

Assessment

Theory - from lectures and exercise problems (50%); Work and collaboration in laboratory and auditorial problems (20%); Practical seminar or group project (30%)

Literature

1. G. F. Hundy et. al: Refrigeration and Airconditioning, Elsevier, 2008
2. Roy J. Dossat, Thomas J. Horan, Principles of Refrigeration, 2001
3. R. Radermacher, Y. Hwang, Vapor Compression Heat Pumps with Refrigerant Mixtures, CRC Press, 2005
4. Poredoš A. et al: Heat pumps for heating and cooling, University of Ljubljana, 2018