

REFRIGERATION AND AIR CONDITIONING SYSTEMS (IInd Year of study, IVth SEMESTER; IIIrd Year of study, Vth SEMESTER)

Credit value (ECTS) 3+5

Course category

Domain (Imposed)

Course holder:

Prof. Dr. Radu ROȘCA

Discipline objectives (course and practical works)

The aim of the course is to present the fundamental knowledge about thermodynamics, cooling systems (mainly vapor compression systems), air conditioning systems and the use of artificial cold in food preservation (chilling, freezing, freeze-drying).

Contents (syllabus)

Course (chapters/subchapters)
Introduction to thermodynamics; the first and second principle. Ideal gases. Real gases.
Basics of heat transfer
Compressors: one stage and two stage compressors. Compressors for refrigeration systems.
Refrigeration systems: principle of evaporative cooling, refrigerants, mechanical compression cooling systems.
Vapor absorption refrigeration systems
Air conditioning systems
Food chilling
Food freezing
Freeze drying of foods

Practical works
Measuring errors: sources, types, evaluation of errors.
Temperature measurement
Pressure measurement.
Measurement of the adiabatic coefficient of air.
Reciprocating piston compressors for refrigeration systems.
Vapor compression refrigeration systems: parts, operating principle, operating cycle diagrams.
Evaluation of the operating parameters of a vapor compression refrigeration system.
CoolPack presentation and use.
Peltier cooling.
Evaluation of the refrigeration time for food products.
Humid air parameters.
Air conditioning systems; thermal comfort evaluation.
Design of a cold store

Bibliography

1. James S.J., James C., 2002 – *Meat refrigeration*. Woodhead Publishing Ltd., Cambridge, UK.
2. Kennedy C. J. (editor), 2000 – *Managing frozen foods*. Woodhead Publishing Ltd., Cambridge.
3. Evans J. A., 2008 – *Frozen food science and technology*. Blackwell Publishing Ltd., Oxford, UK.
4. Roșca R., 2011 – *Cooling and air conditioning systems in food engineering* (in Romanian). Edit. Alfa, Iași.
5. Roșca R., 2013 – *Basics of artificial cold* (in Romanian). Edit. „Ion Ionescu de la Brad”, Iași.
6. Sun Da-Wen, 2006 – *Handbook of frozen food processing and packaging*. Taylor&Francis, Boca Raton, U.S.A.
7. Trott A.R., Welch T., 2000 - *Refrigeration and air conditioning*. Buterworth – Heinemann, Oxford, UK.
8. http://nptel.iitk.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Ref%20and%20Air%20Cond/New_index1.html - *Refrigeration and air conditioning*. Indian Institute of Technology Kharagpur.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Course attendance	-	10%
Laboratory activity	tests, laboratory activity	30%
Exam	oral	60%

Contact

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