Syllabus

Program: MEC-BAC – Bachelors in Mechanical Engineering		
Department: CCT-DEM – DEPARTMENT OF MECHANICAL ENGINEERING – CCT		
Course: Refrigeration		
Code: REF0001	**Class hours:** 54 hours	**Academic year:** 2023/2
Professor: MARCUS VINICIUS CANHOTO ALVES	**Contact:** marcus.alves@udesc.br	

Topics

Vapor compression cycle. Refrigeration compressors. Condensers. Evaporators. Expansion devices. Sizing of capillary tubes. Soft drinks. Ecological soft drinks. Analysis of a vapor compression system. Absorption system.

General Objective

Analyze refrigeration systems.

Specific Objectives

1 Calculate refrigeration cycle performance metrics;
2 Become familiar with the different types of components and fluids used in refrigeration systems;
3 Analyze the influence of operating parameters on refrigeration systems.

Program

Introduction to refrigeration;
Standard compression cycle: theory;
Standard compression cycle: refrigeration fluids;
Alternative compressors;
Rotary compressors
Standard compression cycle: second law analysis;
Heat exchangers: condensator;
Heat exchangers: evaporator;
Expansion devices: capillary tube;
Expansion devices: expansion valve;
Multi-pressure systems;
Heat pumps;
Refrigeration system analysis;

Methodology

The presential lectures focus on the delivery of fundamental material and provide an environment to discuss the salient concepts of fluid mechanics with the help of partially prepared slides and notes. Solution of limited exercises and in-depth examples during lectures. Homework problems every week.

Grading system

Homework – H;
Mid-term exam – ME;
End-term exam – EE;
Class project – CP;

Semester grade – SG;
SG = 0.1H+0.3ME+0.4EE+0.2CP

If the semester grade (SG) is greater or equal 7.0 the student is considered approved. If the semester grade (SG) less than 7.0, the student is considered to be under Final Examination (FE) and can take a final test that will be graded according to the following weighting (articles n°144 a n°148 of UDESC's general regiment and Resolution 044/2007 CONSUNI) and generate the Final Score (FS):

Syllabus

FS=0.6SG+0.4FE;

If the student's FS is greater or equal to 5.0, the student is considered approved; if not, the student reproved in the discipline and will not be granted the scholar credits of Fluid Mechanics I.

Frequency is mandatory to a minimum of 75% of the classes, otherwise the student will be automatically fail by frequency. All tests and exams will be graded from 0.0 to 10.0 and will be evaluated in the following criteria:

1- Interpretation;
2- Organization;
3- Notation and unities;
4- Solution detailing and justification;
5- Final answers;

Basic bibliography

1- Gosney, W. B. Principles of Refrigeration. Cambridge: Cambridge University Press, 1982.
2- Shah, R. K.; Sekulic, D. P. Fundamentals of Heat Exchanger Design. Hoboken: John Wiley & Sons, 2003.
3- Bejan, A. Advanced Engineering Thermodynamics. New York: John Wiley & Sons, 1988.

Supplementary bibliography

1- ASHRAE handbook. Atlanta: ASHRAE, c1981. 4 v. ISBN 1883413540 (enc. : v.4).
2- DUNDAS, James L. Licensing exams for refrigeration, air conditioning and heating: 4000 questions & answers. Michigan: Business News Publishing Company, 1994. 511 p. ISBN 0912524898(enc.).
3- Dossat, R. J. and Horan, T. J., Principles of Refrigeration, Pearson; 5th edition (July 29, 2001), ISBN: 0130272701
4- BOEHM, R. F. Design analysis of thermal systems. New York, NY: J. Wiley, 1987. 266 p. ISBN 0471832049(enc.).
5- TADMOR, Ellad B.; MILLER, Ronald E.; ELLIOTT, Ryan S. Continuum mechanics and thermodynamics: from fundamental concepts to governing equations. New York, NY: Cambridge University Press, 2012. xxii, 350 p. ISBN 9781107008267 (enc.).