

Department	05 Technical Systems, Processes and Communication
Course title	Thermodynamics
Course number	
Hours per week (SWS)	4
Number of ECTS credits	5
Course objective	The overall objective of this course is to develop in the student an ability to logically define and analytically solve problems involving work, heat, and energy. This includes a clear understanding of the definition of a thermodynamic system, the concept of a thermodynamic state, determination of fluid properties for liquids, ideal and real gases and fluids with phase changes. The student will learn how to apply these concepts in the application of the first law of thermodynamics to both closed and open systems, and develop an understanding of the limitations placed on processes and heat engines by the second law of thermodynamics including Exergy analysis.
Prerequisites	Engineering Mathematics (incl. calculus and differential equations), Dynamics
Recommended reading	Fundamentals of Engineering Thermodynamics, 5th Edition by M. Moran & H. Shapiro, John Wiley & Sons
Teaching methods	Lectures, workshops and examples
Assessment methods	1 mid-term exam (90 minutes) ; 1 Final exam (90 minutes)
Language of instruction	English
Name of lecturer	Dr. Alejandro Pérez Ponce
Email	perez-po@hm.edu
Link	
Course content	Introduction and definitions (ca. 2 hours) Work, Power and Energy (ca. 4 hours) Energy and the first law of Thermodynamics (ca. 8 hours) Properties of pure substances (ca. 4 hours) Ideal gases (ca. 4 hours) Mass and Energy balance equations in control volumes (first law) (ca. 8 hours) The second law of Thermodynamics (ca. 6 hours) Entropy, TdS equations (ca. 8 hours) Power cycles analysis (ca. 8 hours) Refrigeration and heat pumps cycles analysis (ca. 8 hours) Exergy (control volume) (ca. 6 hours)
Remarks	