GUÍA DOCENTE
2019 - 2020

FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	Engineering Thermodynamics
Código	DIM-SAP-336
Créditos	6,0 ECTS
Carácter	Optativa (Grado)
Departamento / Área	Departamento de Ingeniería Mecánica

Datos del profesorado	
Profesor	
Nombre	Eva María Arenas Pinilla
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DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura

Aportación al perfil profesional de la titulación

Engineering Thermodynamics is concerned with energy transformation and utilization. The key of the subject is the analysis of any energy process, determining the variation of the thermophysical properties of the fluids involved and applying energy and entropy balances. Special attention is paid to heat to mechanical/electric power conversion. Real-life examples and general overview of devices designed following Thermodynamic principles (power cycles, combustion engines, compressors, cooling systems, etc.) are shown. Understanding psychrometry is another goal, as the basis to air conditioning and climate control systems.

Prerequisitos

Having passed a first year of Bachelor degree in Engineering.

Competencias - Objetivos

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos

1. Introduction: Basic definitions, Systems, Properties, Specific volume, Pressure, Temperature.
2. Properties of a pure substance: Thermodynamic state, P-v-T surface, Tables of properties, Incompressible substance, Liquids approximation, Ideal gas: equation of state and compressibility factor.
3. The First Law of Thermodynamics: Energy, Energy transfer by work, Energy transfer by heat, Energy balance for closed systems, Energy balance for cycles.
4. The Second Law of Thermodynamics: Heat engines, Refrigerators and Heat pumps, Energy conversion efficiencies, Second Law formulations, Reversible and irreversible processes, The Carnot cycle, Carnot principles.
5. Entropy: Definition, Entropy balance in closed systems, Entropy balance in control volumes, Determination of entropy: pure substances and models, Isentropic efficiencies.
6. Availability: Exergy, Exergy balance for closed systems, Exergy balance for control volumes, Exergy efficiency.
7. Vapor and gas power systems: The Rankine cycle, Improving performance: superheat, reheat, supercritical, regenerative cycles, Internal Combustion Engines (Otto, Diesel, Dual cycles), Gas turbine power plants, Brayton cycle, Combined-cycle power plants.
8. Refrigeration and heat pump systems: Vapor refrigeration systems, Absorption refrigeration, Heat pump systems.
9. Ideal gas mixtures and psychometry: Composition and properties of an ideal gas mixture, First and Second Law to ideal gas mixtures, Psychrometric properties, Psychrometric processes.

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

Calificaciones

The grade will be determined by two midterms (25% each), homework (10%), and a final examination (40%). The exams are all closed notebook and closed textbook. The course will not be graded on a curve, i.e., there is no bound on the numbers of As, Bs, Cs, etc.

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

M.J. Moran, H.N. Shapiro, et al., Fundamentals of Engineering Thermodynamics, 8th Edition, John Wiley and Sons, 2014