Curriculum - Academic Year 2018-19

Characteristics of the Course Units

Name	*Applied Thermodynamics*
ECTS credits	***4***
Year / Semester	*I /1°*
Specific learning outcomes	*This course provides :* *1-an introduction to the essential theoretical basis of engineering thermodynamics and its application to a range of problems of relevance to practical engineering. Topics include : pressure; temperature; heat and heat transfer; properties of substances; First Law of Thermodynamics and its application; Second Law of Thermodynamics and its application; analysis of power and refrigeration cycles.* *2- understanding of hydraulic system components, their function, operation and how they form a working circuit*
Contents	1 *-Properties of thermodynamic systems including: Pressure, Temperature, Internal energy, Enthalpy, Specific heat, Entropy, Property tables, The ideal gas equation of state, processes in thermodynamic systems including: work, heat transfer, mass and energy balances, the first and second laws of thermodynamics and changes in exergy.* *2- Applied thermodynamic systems including heat engine, Refrigerant cycles* *3- hydraulics pump : displacement, shaft speed and flow rate, operating pressure and hydraulic power, types of pumps: external and internal gear pumps, fixed/variable displacement vane pumps, fixed/variable displacement radial and axial piston pumps ; flow and pressure control, constant power compensators ; limitations on pump performance: cavitation, mechanical strength, lubrication, bearings, heat dissipation ; flow, power, and torque equations, pressure/flow characteristics*
Teaching and learning methods	*Face to face, 60 hours*
Teaching techniques	*Lectures, 35 hours* *Assessment activities, 25 hours*
Assessment methods	*Written and oral.* *The evaluative tools may include any or all of the following as specified by the individual instructor's syllabus: objective examinations, research reports, laboratory reports, online activities and discussion, quizzes, projects, and papers.*
Assessment criteria	*1- Students will analyze and explain the basic concepts of how energy, heat, and mass relate to each other in engineering systems ; evaluate the First and Second Laws of Thermodynamics to the analysis of applied thermodynamic systems; and ; evaluate thermophysical properties and conservation equations with respect to fundamental problems and processes which will lead up to the analysis of entire cycles.* *2- understand how a wide range of hydraulic components and circuits operate,and be able to analyse hydraulic circuits from schematic drawings and to analyse simple linear actuator and hydrostatic transmission circuits*
Assessment metrics	*Attribution of a final grade*
Criteria of attribution of the final grade	*The grade for the course is based on a written examination for the Theory section and an for the laboratory work. The final grade will be determined according to the*

	following rules: - *Work laboratory test: 30%* - *First term written test : 20%* - *Final term written test: 50%*
Preparatory course units	*N.A.*
Didactic material	*BASIC & APPLIED THERMODYNAMICS BY PK NAG, 2010* *APPLIED THERMODYNAMICS BY ONKAR SINGH, 2010*