

COURSE ID SHEET



Course No. **5279**

NTUA

Semester:

5

Core

X

Elective

Specialization

Title:

ELECTROMECHANICAL PROCESSES EQUIPMENT

Aim:

The aim of this course is the familiarization of the student with the mechanical and electrical equipment (tubes, pumps, compressors, circuits, sensors, transformers and electrical engines) used in the chemical industry, as well as the process of selection, installation and operation of this equipment.

Content:

- **Transportation of liquids:** flow in conduits – Types of conduits-surface roughness - Valves - Bernoulli equation- Static and dynamic pressure – Static pressure tubes, Pitot and Prandtl – Energy line and hydraulic line for in viscid flow – main energy losses for flow in circular tubes - Darcy-Weisbach law – friction factor and Moody, Karman charts, special friction charts for water and air – secondary energy losses – methods of loss factor and equivalent length – flow in noncircular tubes – Energy line and hydraulic line for viscid flow- cavitation – energetic analysis of simple tube assemblies and hydraulic networks – Dynamic pumps – Positive displacement pumps – Characteristics of a pumping installation – Required and available net positive suction head – Centrifugal Pumps - Characteristic curves for pumps – Operating point – Dimensional analysis of pumps – Similarity rules – Selection of pump type – Pump selection diagrams.
- **Transportation of gases and compressible flow:** Introduction -Thermodynamic relations for ideal gases-Propagation of sound waves – Local properties of stagnation and flow for ideal gases – Isentropic flow in conduits of variable diameter – introduction to transportation of natural gas – Compressors – Types of compressors - Piston compressors standard cold air cycle – displacement compressors – centrifugal compressors.
- **Electrical systems:** electrical charge - Potential - Current - Magnetic field - Capacitance –Induction. DC and AC circuits – Special application circuits (amplifiers, voltage and current sources). Sensors: Temperature – Light – Magnetic field - Transformation - Pressure -Elongation - Acceleration -Measurements (AC - DC) – Data collection. Magnetic fields and Circuits - Transformers- Electromechanical energy conversion. Electrical engines - Introduction – Rotary engines – Synchronous engines – DC Engines.

Hours per semester:

LECTURES	39	EXERCISES	13	LABORATORY	-	HOME-WORK	98	TOTAL HOURS: 150
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Student performance/ evaluation

Evaluation through final examination (FE) which consists of problem solving and on a voluntary basis through solving of exercises or a project (EX) by the student and grading by the teaching assistants.

Formula for final grade: Final Grade = (FE) (1 + 0.2 x (EX))