

EFS8AC ENERGY SYSTEMS

EFS8AC		ECTS Credits: 2		Semester: S8	
Energy Systems		Duration: 21 h + 3 Department h			
Person(s) in charge:					
Vincent Schick, assistant professor, vincent.schick@mines-nancy.univ-lorraine.fr					
Keywords: Combustion engines - Refrigerating systems - Gas turbine - Steam turbine - Combustion					
Prerequisites: Bachelor thermodynamics, open/closed systems thermodynamics					
Objective:					
The study of energy systems and their industrial applications					
1. Simplified approach to combustion : calculating LHV, HHV, theoretical air, composition of exhaust gas, theoretical combustion temperature, stoichiometry, with excess air, dilution ratios, Ostwald diagrams, fuel comparisons 2. Gaz turbine : open cycle, closed cycle, electricity production, aeronautical applications 3. Steam turbine : racking, superheating, resuperheating, classical thermodynamic and supercritical cycles 4. Combined cycles : cogeneration and trigeneration, 5. Internal combustion engine : petrol engines, diesel engines (two and four stroke cycles), supercharge with intermediary cooling, EGR systems, Stirling engine 6. Cold generation : by steam compression, absorption, adsorption, thermoelectricity, heat pumps 7. An opening on air conditioning The software Thermoptim is used to model rather precisely some systems.					
Abilities:					
Levels		Description and operational verbs			
Know		Open/closed systems steady-state thermodynamics			
Understand		The way energy is produced by combustion engines, thermodynamic cycles and different energy systems			
Apply		Pre-size different systems for energy and environment efficiency			
Analyse		Choose an energy system's operating characteristics. Define specifications for an energy production system. Energy system efficiency.			
Summarise					
Assess					
Evaluations:					
☒ Written test		☒ Continuous Control		☐ Oral report	
				☐ Project	
				☐ Written report	