

PEES8AA REACTOR SYSTEME ANALYSIS

PEES8AA		ECTS Credits : 2	Semester : S8	
Reactor System Analysis		Duration : 21 hours		
Person(s) in charge :				
Fabrice PATISSON, Professor, fabrice.patisson@mines-nancy.univ-lorraine.fr				
Keywords : Systemic approach, reactors, heat exchangers, process engineering, chemical kinetics, transfers				
Prerequisites : Transport phenomena				
Objective: To become familiar with the systemic approach to reactor and heat exchanger modelling .				
<p>The goals of this course are to illustrate the way energy, process and environment interact, to give the theoretical tools to size reactors and to calculate their matter and energy balances. This course builds the methodological bridge between the SP131 "Transport phenomena" and SP145 "Environmental Impact Assessment". After introducing the systemic approach in process engineering, it will be applied to determine the working parameters of reactors and exchangers used for energy production in the industry, before moving on to the assessment of their environment impact.</p> <p>Progress : - Course presentation. Goals. Systemic analysis. Reactor classification. Energy hungry and/or CO₂ emitting industrial processes : examples. Ideal reactors. (1) Chemical kinetics revision class. Matter balance in a transient state closed reactors. (2) Matter balance in perfectly mixed reactors and steady-state pistons. Associating reactors. (3) Energy balance in ideal reactors. - Heat exchangers. (1) Inter phase transfers. Simplified theory of matter exchangers, closed and open. (2) Simultaneous heat and matter exchanges. Humid air processing.</p> <p>Complementary conference : CO₂ sequestration processes for industrial energy production.</p>				
Abilities :				
Levels		Description and operational vocabulary		
Know		Define the systemic approach applied to process engineering. Identify reactors and exchangers. State the laws of chemical kinetics		
Understand		Explain the way ideal reactors work. Grasp the interest of the systemic approach as simplifying approach for industrial processes modelling.		
Apply		Apply the balances of matter and energy (SP131) to new objects. Resolve very simplified industrial problems. Size reactors or exchangers.		
Analyse		Model an industrial problem. Link together reactors. Couple heat and mass exchanges.		
Summarise		Write written reports. Choose, plan and draft a mini-project.		
Assess		Judge compared reactors' performances. Evaluate the relevance of a model. Quantify the contribution of kinetics.		
Évaluations :				
<input checked="" type="checkbox"/> Written test		<input checked="" type="checkbox"/> Continuous Control	<input type="checkbox"/> Oral report	<input checked="" type="checkbox"/> Project
				<input checked="" type="checkbox"/> Written report