INTERNATIONAL MASTER'S
SIMOS
SIMulation and Optimization of energy Systems

Energy efficiency and reuse

Subject Information	
Code	UE3 S1
Credits (ECTS)	7
Semester	2 (mid-January - June)
Time Allocation (Lec. / Prac. / Lab/ Project)	28 h / 22 h / 0 / 50 h
Lecturer	Dr Tarik KOUSKSOU, Pr. Jean-Pierre BEDECARRATS.
Pre-requisites	
Assessment	2 hours final written examination + project

Lec. : Lectures *Prac. : Practical works ("small classes")* *Lab.: Laboratories*

Subject Description	
Introduction	This course presents energy efficient technologies and methods for various applications which offer the potential for substantial energy conservation. The technologies mainly concern energy storage and distribution. The main method uses thermoeconomics, which, as an exergy-aided cost-reduction method, provides important information for the design of cost-effective energy-conversion plants
Learning outcomes	Knowledge of thermoeconomics. Knowledge of each kind of energetic networks; Knowledge of physical and thermal mechanisms controlling energy storage.
Content	**1. Thermoeconomics** **2. Energy networks** - Electrical networks, Gas networks and Heat networks. **3. Energy Storage Methods** 4.1. Mechanical Energy Storage 4.2. Chemical Energy Storage 4.3. Magnetic Storage 4.4. Thermal Energy Storage (TES) **4. Hydrogen for Energy Storage** 5.1. Storage Characteristics of Hydrogen 5.2. Hydrogen Storage Technologies 5.3. Hydrogen Production **5. Comparison of ES Technologies** **Projects (50 h)**

Literature	*Thermal design and optimization.* Bejan, A., Tsatsaronis, G., and Moran, M., 1996. J. Wiley, New *York.* *Thermal Energy Storage: Systems and Applications*, Second Edition. Ibrahim Dincer and Marc A. Rosen. 2011 John Wiley & Sons, Ltd *Heat and cold storage with PCM. An up to date introduction into basics and applications*. Harald Mehling. Luisa F. Cabeza. Series: Heat and Mass Transfer. Springer, 2008**.**