UCL Université catholique de Louvain

LMECA2150

2016-2017

Thermal cycles

5.0 credits	30.0 h + 30.0 h	1q

Teacher(s) :	Bartosiewicz Yann ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Inline resources:	> http://icampus.uclouvain.be/claroline/course/index.php?cid=MECA2150
Prerequisites :	Students are expected to master the following skills: basics in thermodynamics and fluid mechanics , as they are covered within the courses LMECA1855 and LMECA1321
Aims :	In consideration of the reference table AA of the program "Masters degree in Mechanical Engineering", this course contributes to the development, to the acquisition and to the evaluation of the following experiences of learning: -- AA1.1, AA1.2, AA1.3 -- AA2.1, AA2.2, AA2.3 -- AA3.1, AA3.3 -- AA4.1, AA4.2, AA4.3, AA4.4 -- AA5.4, AA5.5, AA5.6 -- AA6.3, AA6.4 The student will acquire the necessary knowledge to understand, design and evaluate thermodynamic systems involved in power cycles. A the end of the course he/she will be able to: Use the concept of exergy to evaluate the performance of a power cycle and complete the energy approach To formulate a detailed analysis of losses and irreversibilities at each component of a power cycle and present results by plots/ pie charts To elaborate assumptions and setup models to simulate a steam, gas and combined cycles To setup a user friendly software with a GUI to simulate a complex combined cycle up to 3 pressure levels and performing energy/ exergy analysis *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods :	Final mark = project (40%) + exam (60%) Project mark = report (80%) + code (20%) Exam: written, closed book (3h-4h) including theoretical questions, understanding, and small exercises to solve
Teaching methods :	Lectures intensively use slides with technical drawings, plots, and main formula. Some theoretical developments and thermodynamic reminders are done in class. Attendance is highly recommended as a permanent link between models/theory/ formula and practical/technological arrangements is explained during the class. The spirit of the course is a permanent comparison between the classical energy approach and the exergy analysis. To apply the theory as seen in class, a project is organized over the whole session with periodic consultations by the assistant
Content :	Chapter 1: characterization of performances of driving engines Chapter 2: Steam power cycles (Rnakine-Hirn) Chapter 3: Gas power cycles (Brayton) Chapter 4: Combined gas-steam cycles Chapter 5: Combined heat and power cycles (CHP)
Bibliography :	"Installations thermiques motrices. Analyse énergétique et exergétique", Joseph Martin et Pierre Wauters, 2e ed., 2011, presses universitaires de Louvain. In french, being translated in english. Compulsory Slides, available online via icampus. Compulsory "Eléments de thermodynamique technique",Joseph Martin et Pierre Wauters, 2014, presses universitaires de Louvain. In french, Recommended "Thermodynamique et énergétique: de l'énergie à l'exergie", L. Borel et D. Favrat, Presses polytechniques et universitaires romandes. In french, Recommended

Faculty or entity in charge:	MECA

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Master [120] in Mechanical Engineering	MECA2M	5	-	
Master [120] in Electro-mechanical Engineering	ELME2M	5	-	