UCLouvain

lmeca2150

2019

Thermal cycles

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

5 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Bartosiewicz Yann ;
Language :	English
Place of the course	Louvain-la-Neuve
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, AA2.4 • AA3.1, AA3.2, AA3.3 • AA4.1, AA4.2, AA4.3, AA4.4 • AA5.1, AA5.3, AA5.4, AA5.5, AA5.6 • AA6.3 1 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	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** **Project:**Simulation of (i) a complex Rankine Cycle including breedings and reheat, (ii) a gaz turbine cycle, (iii) a combined cycle. The project also includes the energy and exergy analysis of those cycles. Exam: Closed book (3-4 h). Understanding/theory/application The final mak is calculated according the project and the exam marks. The relative weights of the project and exam is variable and calculated according the marks obtained in both evaluations. The exact calculation key is presented at the first lecture and in the moodle site (starting slides of the course). For information, the weight is 50% for the exam and 50% for the project if the mark at the exam is higher than 10/20, and the mark for the project is higher than 13/20 but lower or equal than 15/20. Other weights are applied according the case.
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** 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)
Inline resources	https://moodleucl.uclouvain.be/course/view.php?id=6963

Bibliography	• Thermal Power Plants - Energetic and Exergetic approaches", D. Johnson, Joseph Martin et Pierre Wauters, 2015, presses universitaires de Louvain, ISBN: 978-2-87558-408-3 • Slides disponibles sur Moodle • Eléments de thermodynamique technique",Joseph Martin et Pierre Wauters, 2014, presses universitaires de Louvain • Thermodynamique et énergétique: de l'énergie à l'exergie", L. Borel et D. Favrat, Presses polytechniques et universitaires romandes. • "Thermal Power Plants - Energetic and Exergetic approaches", D. Johnson, Joseph Martin et Pierre Wauters, 2015, presses universitaires de Louvain, ISBN: 978-2-87558-408-3. **Obligatoire** • "Eléments de thermodynamique technique",Joseph Martin et Pierre Wauters, 2014, presses universitaires de Louvain. **Recommandé** • Slides disponibles sur Moodle, **obligatoire** • "Thermodynamique et énergétique: de l'énergie à l'exergie", L. Borel et D. Favrat, Presses polytechniques et universitaires romandes. **Recommandé**
Faculty or entity in charge	MECA

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Electro-mechanical Engineering	ELME2M	5		
Master [120] in Mechanical Engineering	MECA2M	5		