Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Functional Mechanical Design for Energy Efficiency
Course code	47509
Scientific sector	ING/IND/13
Degree	Master Industrial Mechanical Engineering
Semester	I
Year	II
Academic year	2018/2019
Credits	5
Modular	//

Total lecturing hours	28
Total lab hours	
Total exercise hours	18
Attendance	
Prerequisites	Some knowledge of electrical machines is preferred.
Course page	

Specific educational objectives	The course aims at giving the guidelines for the functional design of automatic machines, in particular taking into account mechanical and energetic efficiency. Criteria and methods to analyze and choose mechanical devices and to evaluate the best system to minimize the energy consumption in electromechanical systems will be addressed.

Lecturer	Roberto Belotti
Scientific sector of the lecturer	ING-IND/13
Teaching language	English
Office hours	By appointment
Teaching assistant ***(if any)***	//
Office hours	//
List of topics covered	• Introduction: The functional design. Introduction to functional design, classification of the mechanisms and motion systems. • Basic concepts and definitions. Mechanical efficiency, performance, energy efficiency and energy savings in automatic machines. Retrograde motion and motor-load systems. • Mechanical components for transfer and transformation of energy. Classification based on function, working principle and performance/efficiency.

	• Optimization aimed at improving the quality of motion and efficiency. • Energy storage systems and energy recovery. Classification (working principle and scope of use).
Teaching format	Frontal lectures, exercises.

Learning outcomes	**1. Knowledge and Understanding** • Identify the main components and sources of inefficiency in motor-transmission-load systems • Understand the basic principles of the main energy storage, recovery and redistribution systems; **2. Applying knowledge and understanding** • Evaluate and select, from the mechanical and energy efficiency point of view, the proper transmission system; **3. Making judgments** • Choose suitable and proper mechanical components for energy transformation and transfer **4. Communication skills** • Ability to structure and prepare scientific and technical documentation **5. Learning skills** • Ability to autonomously extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation.
Assessment	**Formative assessment** In class exercises and activities (2,3,4,5) **Summative assessment** The assessment of the course is: • Written exam. Written exam with exercises and questions to test the ability to use and transfer the acquired knowledge as well as to make judgement and use a proper technical language (1,2,3,4). • Project work. Short essay on a topic of interest, to be agreed upon with the lecturer (4,5).
Assessment language	English
Evaluation criteria and criteria for awarding marks	The final grade is the written exam grade, augmented or diminished by at most 1 point, according to the project work evaluation. N.B. The written exam grade must be ≥18 anyway.

Required readings	There is no single textbook that covers the entire course. A collection of suggested readings from various sources will be announced during the course.
Supplementary readings	