Course unit title:	Building Energy Characteristics		
Course unit code:	ME307		
Type of course unit:	Elective		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	3		
Semester when the unit is delivered:	2 (Spring)		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr Paris Fokaides		
Learning outcomes of the course unit:	1. Understand the basic principles that govern the energy transfer from and to the building envelope 2. Identify the parameters that affect the indoor thermal comfort and calculate the relative indoor comfort indexes. 3. Be aware of the best practices in building's thermal insulation 4. Perform standard calculations for the overall heat transfer coefficient of building elements 5. Quantify the building losses from vulnerable building elements such as the glazed areas and the thermal bridges 6. Be aware of the principles related to the energy performance certification(EPCs) in process and be in position to issue EPCs.		
Mode of delivery:	Face-to-face		
Prerequisites:		Co-requisites:	None
Recommended optional program components:			
Course contents:	**Module 1: Energy transfer principles** • Fundamentals of energy transfer mechanisms • Parameters affecting energy transfer mechanisms from and to the building envelope • Quantification of energy losses – worked examples **Module 2: Indoor thermal comfort** • Energy interaction between building user and building envelope • The Fanger model – worked examples • Quantification of thermal comfort indexes (PMV, PPD) • The psychrometric chart – worked examples **Module 3: Building elements thermal behavior** • Definition of the overall heat transfer coefficient of building elements • Calculation of energy losses from building elements consisting of several layers • Definition of thermal bridges and calculation of energy losses • Best practices in selection and application of buildings thermal insulation • Minimum legislative requirements in buildings thermal insulation **Module 4: Buildings energy performance certification** • Fundamentals of calculation buildings heating and cooling loads • Building services contribution to buildings energy consumption • Definition of the operational and asset rating • Energy classification rationale – the reference building • Definition of buildings energy class – worked examples		
Recommended and/or required reading:			
Textbooks:	• ASHRAE 2013 Handbook of fundamentals, ISBN: 978-1-936504-46-6 (SI) • VDI-Wärmeatlas, ISBN: 978-3-540-25504-8		
References:	• 2010/31/EC Directive on the energy performance of buildings (EPBD) • CEN/TR 15615 ”Umbrella document” • EN 15603 Overall energy use and definition of energy ratings		

	• ISO 7730:2005: Ergonomics of the thermal environment -- Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria • ISO 6946:2007: Building components and building elements -- Thermal resistance and thermal transmittance -- Calculation method • ISO 14683:2007: Thermal bridges in building construction -- Linear thermal transmittance -- Simplified methods and default values • ISO 13790:2008: Energy performance of buildings -- Calculation of energy use for space heating and cooling
Planned learning activities and teaching methods:	The course will be presented through theoretical lectures in class. The lectures will present to the student the course content and allow for questions. Part of the material will be presented using visual aids. The aim is to familiarize the student with the different and faster pace of presentation and also allow the instructor to present related material (photographs etc) that would otherwise be very difficult to do. The learning process will be enhanced with the requirement from the student to solve exercises. These include self evaluation exercises which will be solved in class. These exercises will not be graded. Exercises will also be given as homework (final project) which will be part of their assessment. Besides from the notes taken by students in class, all of the course material will be made available through the class website and also through the eLearning platform. Finally the instructor will be available to students during office hours or by appointment in order to provide any necessary tutoring.
Assessment methods and criteria:	• Assignments 20% • Tests: 30% • Final Exam 50%
Language of instruction:	English
Work placement(s):	No