Course Unit Title	**MES530/MEEB504 Energy Design of Buildings and Audits**
Programme of study	MSc in Energy Systems and the Built Environment
Lecturer	Dr.-Ing. Paris A. Fokaides
Type of course unit	Technical Elective
ECTS	7
Year of study:	1
Semester(s) offered	Fall Semester 2016, Spring Semester 2018, 2019, 2021, 2022, 2023
Course content	▪ Aspects of the energy design of buildings that are related to the sustainable energy field. ▪ Energy interaction between the building shell and the environment ▪ Buildings shell design towards minimizing energy losses to the environment ▪ Energy behaviour of building elements ▪ Whole buildings energy analysis
Course modules:	Module 1: Heat Transfer Principles Applied to the Built Environment ▪ Heat Conduction in building elements. ▪ The interaction of the atmosphere and the building shell by means of heat convection. ▪ Solar radiation exposure of buildings and internal radiation thermal loads. ▪ The urban heat island effect Module 2: Thermal performance of building elements ▪ Definition of overall heat transfer coefficient of building elements (6946:2007) ▪ Thermal properties of building materials (10456:2007) ▪ Thermal insulating materials ▪ Calculation of heat losses from thermal bridges (14683:2007 Module 3: Definition of buildings heating and cooling loads ▪ Calculation of buildings heating and cooling loads based on the DD method ▪ Calculation of buildings heating and cooling loads based on the 13790:2008 standard ▪ Application of calculation software Module 4: Indoor thermal comfort ▪ The Fanger model for the definition of buildings indoor thermal conditions ▪ Parameters affecting the indoor thermal comfort ▪ Definition of PPD and PMV as comfort indicators Module 5: Psychrometry: ▪ Indoor air thermodynamic properties ▪ The psychrometric chart ▪ Calculation of air conditioning processes required energy using psychrometric chart ▪ Application of calculation software
Textbooks:	ASHRAE, F. (2013). Fundamentals Handbook. SI Edition. Wärmeatlas, VDI. (2006). Verein Deutscher Ingenieure. Springer Verlag, Berlin, Heidelberg, New York, (2), 4.
Instruction language	English
External reference	link