

<i>Course title:</i> <b>HVAC Technologies</b>	<i>Code:</i> ErF 10
<i>Field of study:</i> Environmental Engineering	<i>Year / semester:</i> III
<i>Speciality:</i>	<i>Course:</i> compulsory
<i>Hours / week:</i> Lectures: 1 Tutorials: 0,5 Laboratories: 0 Project / Seminars: 0	<i>Number of credits:</i> 6

**Lecturer:** Radoslaw Gorzenski, PhD                      Michal Szymanski, PhD  
Tel. +48 61 647 5825    Tel. +48 61 647 5825  
email: [radoslaw.gorzenski@put.poznan.pl](mailto:radoslaw.gorzenski@put.poznan.pl)      email: [michal.szymanski@put.poznan.pl](mailto:michal.szymanski@put.poznan.pl)

**Institute / Faculty:** Institute of Environmental Eng.,  
Faculty of Civil and Environmental Engineering,  
ul. Berdychowo  
60 965 Poznań  
tel. +48 61 665 2438, fax +48 61 665 2439  
e-mail: [office\\_ee@put.poznan.pl](mailto:office_ee@put.poznan.pl)

**Status of the course in the study program:**  
Core course for students of Environmental Engineering

**Course description:**  
Overview of the heating systems: Calculation of heat and moisture transfer for building envelopes. Thermal protection requirements. Calculations of heat transfer coefficients. Thermal bridges. Calculations of the design heat load. Calculations of the energy needs, delivered energy and primary energy for heating, ventilation and domestic hot water purposes. Classification of heating systems. Principles of pipe dimensioning in water heating. Heat sources. Automation used in heating systems. Thermostatic valves. Radiator - floor systems. The use of solar energy for heating systems. Overview of ventilation and air conditioning systems: Outdoor climate parameters. Climate comfort parameters incl. thermal comfort. Indoor air quality. Ventilation and air conditioning loads. Air volume calculation, indoor air distribution systems, duct sizing. Elements of air handling unit and ventilation system - calculation and selection. Natural and mechanical system of ventilation structures. Chillers, split and multisplit, VRV, heat pumps, chilled beams, fan coil units. Control systems. Mollier chart. Refrigerants, air cooling methods.

**Teaching outcomes:**  
The main aim of the course is to transfer the knowledge on heating, ventilation and air conditioning systems for buildings and to present methods of calculation, selection and design.

**Prerequisites:**  
Basic knowledge of mathematics, physics, thermodynamics, heat transfer and fluid mechanics.

**Teaching method:**  
Lectures (transparent and multimedia projector);  
Tutorials – blackboard case study calculations.

**Assessment method:**  
Written examination,  
Written colloquium.

**Bibliography:**  
1. Recknagel H., Sprenger E., Schramek E.R.: Kompendium wiedzy: ogrzewnictwo, klimatyzacja, ciepła woda, chłodnictwo, Wydawnictwo Omni Scala, Wrocław 2008 (in polish),  
2. Pelech A.: Wentylacja i klimatyzacja - podstawy. Oficyna Wydawnicza Politechniki Wrocławskiej. Wrocław 2008 (in polish),  
3. Jones W.P.: Klimatyzacja. ARKADY. Warszawa 2001 (in polish).