



**COURSE TITLE:** HVAC System Design

**Number of contact hours:** 45

**Duration:** 1 semester (spring)

**ECTS credits:** 4

### **Programme description:**

This course focuses on issues related to the design of water-based, two-pipe, closed heating systems for residential buildings. The course objectives are to provide knowledge related to:

- Determination of the design heat load of buildings using computer-aided design tools used in practice,
- Design of heating systems using computer-aided design tools used in practice, including the selection of necessary devices and their operating parameters,
- Selection of peripheral and safety devices for heating systems using commercial calculation sheets and selection programs used in practice.

The calculation and selection procedures are based on the guidelines and requirements contained in European (EN) and international (ISO) standards, and are additionally supported by a broad theoretical foundation and optimization procedures, as well as engineering practice used in design/planning offices. The calculation examples are based on a typical design solutions and devices encountered in practice, including manifold and tee installations as well as convection-type (panel-type, bathroom, column-type) and radiation-type (underfloor) radiators.

**Course type:** project (15), computer simulations (30)

### **Literature:**

1. Muniak D.: Radiators in hydronic heating installations. Structure, selection and thermal characteristics, Springer, Cham, Switzerland 2017
2. Muniak D.: Regulation fixtures in hydronic heating installations. Types, structures, characteristics and applications, Springer, Cham 2019
3. European Standard EN 12831:2003: Heating systems in buildings - Method for calculation of the design heat load
4. European EN 12828:2003: Heating systems in buildings. Design for water-based heating systems

**Assessment method:** Reports from individual computer simulation and individual project

**Lecturer:** Prof. Damian Piotr Muniak

**Contact person:** Damian Piotr Muniak (e-mail: damian.muniak@pk.edu.pl)