Aalto-yliopisto
Insinööritieteiden
korkeakoulu

EEN-E4004 FUNDAMENTALS OF HVAC DESIGN (5 CR)

Starting lecture 27.2.2019

Welcome to the course!

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Common

- **Lecturers:**
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- **Lectures at Wednesdays 16.15-18.00 in class R008/326**
- **MagiCAD-trainings in R001/Y338**
- **Course materials and information in MyCourses**

Passing the course

- **Practise work:**
  - **HVAC design of one family house**
    - ✓ **Defining systems**
    - ✓ **Dimensioning of systems**
    - ✓ **Draft drawings hand drawn**
    - ✓ **CAD design with MagiCAD**
  - **Tasks**
    - ✓ **4 different tasks supporting design work**

- **Grading**
  - **Tasks 1-4** **40 %**
  - **Task 5 (draft drawings)** **30 %**
  - **Task 6 (CAD design)** **30 %**

  Every task is mandatory. The final course grade is the weighted average of the task grades.

Prequisites on completing the course

- **Completion of courses:**
  - **EEN-E4001 Comfortable and healthy indoor environment**
  - **EEN-E4002 Heating and cooling systems**
  - **EEN-E4003 Ventilation and air conditioning system**

  or similar knowledge.

The lecturers strongly advise not to participate in the course without the completion of the above-mentioned courses or similar knowledge.

Content of Course

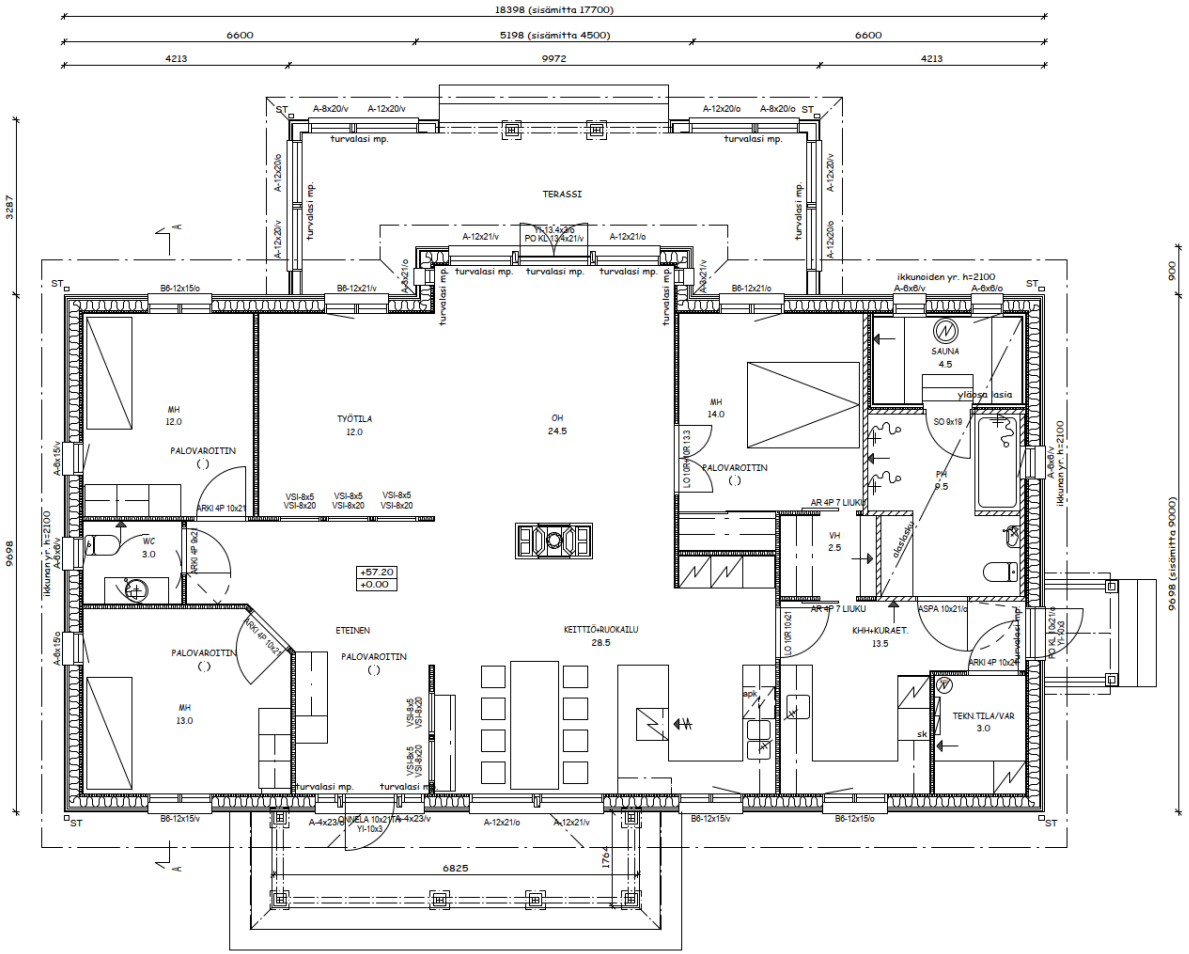
EEN-E4004 Fundamentals of HVAC Design

Week	Date	Time	Contents	Tasks	Location
9	27.2.2019	16.15-18.00	Introducing course, Construction process, HVAC design assignment in general, tasks and the scope of design work, HVAC design of one family housing		R008/326
10	6.3.2019	16.15-18.00	Choice of heating production, Energy calculations,	Task 1	R008/326
11	13.3.2019	16.15-18.00	Comparison and choice of heating systems	Task 2	R008/326
12	20.3.2019	16.15-18.00	Air conditioning design	Task 3	R008/326
13	27.3.2019	16.15-18.00	Water and sewer design	Task 4	R008/326
14	3.4.2019	16.15-18.00	Prelimary design phase	Task 5	R008/326
15	10.4.2019		No lecture **Return of tasks 1-5 14.4.2019**		
16	17.4.2019	16.15-20.00	**Feedback and evaluation of preliminary design phase (tasks 1-5)**, Introduction of Design programmes, Tender Phase Design	Task 6	R001/Y338
17	24.4.2019	16.15-18.00	Basics of MagiCAD		R001/Y338
18	1.5.2019		No lecture		
19	8.5.2019	16.15-18.00	MagiCAD practise		R001/Y338
20	15.5.2019	16.15-18.00	MagiCAD practise		R001/Y338
21	22.5.2019	16.15-18.00	Return of MagiCAD design		R008/326

Tasks

- All tasks aim to the design of all HVAC systems in a one family house
- Tasks 1-4 are calculations or comparisons of different systems:
  - Task 1: Heat loss calculation
  - Task 2: Comparison and choice of heating systems
  - Task 3: Air flow calculations + AHU design
  - Task 4: Water and sewer calculations
- Task 5 is a draft drawing excercise based on tasks 1-4
- Tasks 1-5 return date is 14.4.2019
- Individual feedback and evaluation of tasks 1-5 are given on 17.4.2019
- Task 6 is MagiCAD design based on tasks 1-5 and given feedback

Building in the tasks



- **One family house**
- **One storey**
- **Appr. 160 m2 / 670 m3**

Materials

- Architect drawings and sections of the building in the tasks (MyCourses)
  - Dwg + pdf
- Material and knowledge from previous courses
  - EEN-E4001 … E4003
- National Building Codes
- RT-cards
- Lecture slides
  - All slides are added in MyCourses before the lecture

Learning outcomes

- has preliminary readiness to design and size HVAC- systems for residential buildings
- has a basic understanding of building codes for indoor climate and energy efficiency of residential buildings
- has a basic understanding of heating, ventilation, water and sewage systems and their components
- has understanding to set targets for indoor climate and energy efficiency
- has understanding to calculate outdoor air flow rate and heating power of room space
- has understanding to size ventilation, heating, domestic hot water and sewage systems
- has a basic understanding how building systems are integrated into community infrastructure

Content and teaching methods

- Lectures and CAD-exercises
- Design assignment of a single family house where HVAC systems are selected and dimensioned
- Design tasks cover the main tasks and processes of HVAC-design
- Sizing of HVAC systems and its main components:
  - targets setting for indoor climate, calculation of outdoor airflow rate and heating power of room spaces,
  - system selection and sizing of ductwork, heating pipes and sewage and domestic hot water systems
  - sizing of heating plant, air handling unit and control strategy
  - integration of building system into public utilities
  - documentation of HVAC systems