SYLLABUS

1. Course title:

Heating and air conditioning

2. Code:

3. Cycle of study:

I

4. ECTS credits:

5

5. Type of course:

Mandatory

6. Prerequisites:

-

7. Class restrictions:

-

8. Duration / semester(s):

1 **7**

9. Weekly contact hours and student workload:

Semester (1)	**7**	**Semester (2)**		**(for two-semester courses)**	**Workload: (hours)**
9.1. Lectures	**3**			**Classes:**	**45.00**
9.2. Seminars	**1**			**Individual work:**	**98.42**
9.3. Laboratory / Practice classes	**0**			**In total:**	**143.4**

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Energetics and Thermofluid engineering

12. Lecturer:

Ph.D. Sandira Eljšan, full professor

13. Course aims:

Acquisition of theoretical knowledge and skills, as well as the adoption of methods for solving simple heating and air conditioning problems independently.

14. Learning outcomes:

At the end of the course, the student is expected:
- to distinguish between heating systems;
- to identify the basic elements of the heating and air conditioning system as well as the basic heating schemes;
- to calculate and sketch simpler practical problems of heating and air conditioning systems;
- to compare the advantages and disadvantages of different heating systems.

15. Course content:

Dynamics of processing teaching units by weeks of the semester:
1. Introduction. Meteorological - climatic factors and their impact on heating and air conditioning.
2. Thermal comfort of the climate. .Heat losses
3. Elements of heating plants. characteristics, operating properties and calculations.
4. Divisions of heating systems. Two-pipe and one-pipe gravity heating systems.
5. Dimensioning of the pipe network. Gravity and pump heating regimes. Regulation of central heating systems.
6. Types of surface heating - steam heating, gas heating.
7. District heating of the city. Thermal substations.
8. TEST I
9. Heating with a heat pump, low-energy houses, "passive houses.
10. Solar heating and DHW heating.
11. Basics of ventilation and air conditioning. Division of air conditioning systems. - Air distribution.
12. Calculation of basic air conditioning systems
13. Cooling systems - Air distribution.
14. Heating system regulation. Air conditioning regulation.
15. TEST II

16. Learning methods:

Lectures with the use of multimedia tools, active learning techniques and with active participation and discussions students
- creation of tasks for auditory exercises with the involvement of students
-consultations with teachers on a weekly basis.

17. Assessment methods:

- As part of the pre-examination requirements, students are required to prepare an individual or group seminar paper (depending on the number of students in the year), that will cover a certain topic from the content of the course. The seminar paper is sent electronically as well as in written form to the subject teacher for review and evaluation, and then it is presented orally. A student can earn up to 10 points for the completed and presented seminar work.
- For a project assignment that is done in exercises during the whole semester, a student can earn up to 24 points (15 for heating and 9 for air conditioning)
-As well as pre-examination obligations, a report on the visit is submitted (up to 5 points).
- After completing the pre-examination requirements and defending the project tasks with the teacher at the end of the semester (up to 15 points), which is only valid for the final exam, the student can take the mandatory theory exam. In all other exams, the student must take a written test (tasks) with exercises (up to 15 points). After passing the assignments (of 50% of the total points provided), he approaches the mandatory theoretical part of the exam, which can be a combination of written and interview, and passes the material covered in the lectures. The maximum number of points that a student can achieve on the theoretical exam is 42.

Grade	described	by letter	points
5 (five)	Does not meet minimum criteria	F;FX	<54
6 (six)	meets the minimum criteria	E	54 -64
7 (seven)	Generally good, but with significant flaws	D	65-74
8 (eight)	Average, with noticeable errors	C	75-84
9 (nine)	Above average, with some errors	B	85-94
10 (ten)	Exceptional success without mistakes or with minor mistakes	A	95-100

18. Assessment components:

Pre-exam obligations: 58 points
- Report on completed visits: 5 points
- Seminar work at lectures: 10 points
- Graphic work with exercises: 28 points (18 heating +10 air conditioning)
- presentation of work or exercises 15 points ,
- final exam or remedial exam: 42 points theory (50% passed)
total number of points: 100 points.

19. Mandatory reading list:

1. Todorović B.: Projektovanje postrojenja za centralno grijanje; Beograd, 2009.
2. Todorović B.: Klimatizacija, Beograd, 2009.
3. Eljšan S: Tehnika grijanja, Tuzla, 2019

20. Additional reading list:

4. Recknagel, Sprenger, Schrame, Čeperković: Grejanje i klimatizacija 05/06, Zagreb, 2012.
5. Eljšan S. Authorized lectures, Tuzla, 2025

21. Web sources:

22. Applicable from the academic year:

23. Adopted in the Faculty/Academy session: