

SYLLABUS

1. Course title:

Heat and Mass Transfer I

2. Code:

3. Cycle of study:

4. ECTS credits:

5. Type of course:

6. Prerequisites:

7. Class restrictions:

8. Duration / semester(s):

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)
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9.1. Lectures	<input style="width: 40px; height: 20px;" type="text" value="3"/>	<input style="width: 40px; height: 20px;" type="text"/>	Classes:	<input style="width: 40px; height: 20px;" type="text" value="56,25"/>
9.2. Seminars	<input style="width: 40px; height: 20px;" type="text" value="1"/>	<input style="width: 40px; height: 20px;" type="text"/>	Individual work:	<input style="width: 40px; height: 20px;" type="text" value="123"/>
9.3. Laboratory / Practice classes	<input style="width: 40px; height: 20px;" type="text" value="1"/>	<input style="width: 40px; height: 20px;" type="text"/>	In total:	<input style="width: 40px; height: 20px;" type="text" value="179,25"/>

10. Faculty:

11. Department/study program:

12. Lecturer:

13. Course aims:

- To present various methods used in buildings, industry and households in the evaluation of heat and electricity consumption and how to select an adequate method.
- To point out to students the need to manage energy resources and energy with the aim of achieving global sustainable development.

14. Learning outcomes:

After successfully completing this course, the student will be able to:

- Define basic concepts in the field of energy efficiency;
- Interpret relevant European and national standards in the mentioned field;
- Apply different methods for calculating energy consumption in various systems in the building and industry sectors;
- Analyze the obtained results on the efficiency of energy production, distribution, storage and transmission subsystem;
- Summarize existing results and propose measures to improve energy efficiency in individual systems.

15. Course content:

1. Introduction. Methods of heat transfer. Temperature field.
2. Fourier's law. Heat conduction. Temperature field of the plate.
3. Boundary conditions. Temperature field of the cylinder. Temperature field of the sphere.
4. Fin temperature field. Efficiency of fins and finned surface.
5. Multidimensional heat conduction. Unsteady heat conduction.
6. Forced convection. Hydraulic and thermal boundary layer.
7. Knowledge test.
8. Flow in a laminar boundary layer. Flowing around a cylindrical body.
9. Turbulent flow. Heat transfer within nanofluid.
10. Mass transfer mechanisms. Fick's laws of diffusion. Diffusion in a gaseous medium.
11. Diffusion in liquid and solid media. Mass diffusion with chemical reaction.
12. Stefan's equation. Convective mass transfer.
13. Transient mass transfer. Heat and mass transfer in a porous medium.
14. Analogies between mass transfer, momentum and heat.
15. Knowledge test.

16. Learning methods:

The following methods will be used in the course of the course in order to effectively conduct classes and achieve the set objectives of the course and student competencies:

- lectures with the use of multimedia tools with active participation and discussions of students,
- preparation and presentation of problems during auditory exercises and individual and team/group laboratory exercises,
- presentation in a real environment.

17. Assessment methods:

The concept of knowledge assessment is based on continuous work with students throughout the semester. Knowledge assessment methods include: assessment of both individual and group activities during the semester, preparation of a seminar paper, and final knowledge assessment in written and/or oral form. This ensures equal treatment (written and/or oral knowledge assessment) for all students with different affinities.

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:

The exam grade is based on the total number of points that the student has earned by completing the pre-exam requirements and taking the exam and contains a maximum of 100 points, according to the following scale

Student obligations

Points

Lecture attendance 5

Test I 25

Test II 25

Total pre-exam requirements 55

Final exam 25 - 45

19. Mandatory reading list:

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| <ol style="list-style-type: none">1. Leinhard, J.H.IV, Leinhard, J.H.V(2008) A Heat Transfer Textbook, Cambridge, Phloginston Press2. Brodkey, R.S., Hershey, H.C.(2001) Transport Phenomena, New York, McGraw Hill3. E.Ganić (2005) Prenos toplote i mase, Sarajevo, Svjetlost |
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20. Additional reading list:

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21. Web sources:

<p>http://www.efunda.com/formulae/heat_transfer/home/overview.cfm http://energy.concord.org/energy2d/</p>
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22. Applicable from the academic year:

2025/26

23. Adopted in the Faculty/Academy session:

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