



<b>Course ID:</b> HFH234	<b>Course name:</b> <b>THERMODYNAMICS OF IRREVERSIBLE PROCESSES</b>		
<b>Cycle:</b> SECOND	<b>Year:</b> FIRST	<b>Semester:</b> I	<b>ECTS credits:</b> 4
<b>Course status:</b> ELECTIVE	<b>Total course hours:</b> 60 Lectures: 45 Laboratory: 15		
<b>Teaching participants:</b>	<b>Teachers and associates with expertise in the field to which the subject belongs</b>		
<b>Prerequisite for enrollment:</b>	-		
<b>Course aims:</b>	Introduction of basic knowledge about irreversible thermodynamics.		
<b>Thematic course units:</b>	<ol style="list-style-type: none"><li>1. Reversible and irreversible processes.</li><li>2. Time-dependent processes. Dissipation.</li><li>3. Nonequilibrium in open systems. Local equilibrium principle.</li><li>4. Thermodynamic laws and basic equations.</li><li>5. Entropy production.</li><li>6. Rate of entropy production. Rate of energy dissipation.</li><li>7. Nonequilibrium thermodynamic postulates.</li><li>8. Onsager equations.</li><li>9. Thermodynamic forces and flows.</li><li>10. Maximum entropy production principle.</li><li>11. Diffusion, viscosity, heat and mass transfer.</li><li>12. Chemical reactions, coupling of chemical and transport processes.</li><li>13. Membrane transport.</li><li>14. Thermodynamics of biological systems.</li><li>15. Self-assembled structures</li></ol>		
<b>Learning outcomes:</b>	Students will have knowledge in irreversible thermodynamics. <b>Knowledge:</b> Acquired knowledge on irreversible thermodynamics. <b>Skills:</b> Students will be able to discuss and analyze different processes from irreversible thermodynamics standpoint. <b>Competences:</b> Application of specific knowledge in other branches of chemistry.		
<b>Teaching methodology:</b>	Lectures (Oral presentation and interactive teaching) Laboratory exercises		
<b>Assessment methods and grading system<sup>1</sup>:</b>	<b>Grading criteria</b>		
	Criteria	Maximal score	Required score
	1. Class attendance	5	3

<sup>1</sup> The grading structure for each subject is determined by the Council of the organizational unit before the beginning of the academic year in which the subject is taught as per Article 64, paragraph 6 of the Law on Higher Education of Sarajevo Canton

	2. Class activities	15	8
	3. Midterms	2 × 20	2 × 11
	4. Final exam	40	22
	Total	100	55
	Scores and grading		
	Score	Grade (B&H)	Grade (ECTS)
	< 55	5	F, FX
	55–64	6	E
	65–74	7	D
	75–84	8	C
	85–94	9	B
	95–100	10	A
<b>Literature<sup>2</sup>:</b>	<b>Mandatory literature:</b> 1. Yasar Demirel, Nonequilibrium Thermodynamics - Transport and Rate Processes in Physical, Chemical and Biological Systems, 2nd ed., Elsevier, 2007		

<sup>2</sup> The Senate of the higher education institution, as an institution, or the Council of the organizational unit of the higher education institution, as a public institution, determines by a special decision, which is published on its website before the beginning of the academic year obligatory, mandatory and recommended textbooks and manuals, as well as other recommended literature based on which exams are prepared and taken as per Article 56, paragraph 3 of the Law on Higher Education of the Sarajevo Canton