GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Thermodynamics, PG_00063340		
Field of study	Nanotechnology		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division Of Strongly Correlated Electronic Systems -> Institute Of Nanotechnology And Materials Engineering -> Faculty Of Applied Physics And Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Michał Winiarski	
	Teachers	dr inż. Michał Winiarski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	0.0	0.0	0.0	45

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	45	5.0	50.0	100

Subject objectives

The aim of the course is to familiarize students with the basics of thermodynamics, with a particular emphasis on their application in materials engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W05] has knowledge of inorganic and organic chemistry, physical chemistry and chemical thermodynamics.	The student is able to apply the principles of thermodynamics and perform simple calculations to explain the mechanism of chemical reactions.	[SW1] Assessment of factual knowledge
[K6_U02] can analyze and solve simple scientific and technical problems based on possessed knowledge, applying analytical, numerical, simulation and experimental methods.	The student is able to calculate the basic thermomechanical properties of phases based on given equations of state.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
[K6_W03] has systematic knowledge within the scope of all branches of general physics (mechanics and study of heat, electricity and magnetism, waves, optics, elements of modern physics).	The listed branches of general physics are covered in other courses; in the current course, their thermodynamic aspects are emphasized.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>

- Introduction: Definitions of state and process functions, thermodynamic potentials, specific heat
- Equation of state: Ideal gas and its properties
- Solids and liquids
- Thermodynamic equilibrium
- Microstate and macrostate. Entropy
- Einstein model and Debye model. Thermodynamic properties of crystals
- Phase equilibrium in single- and multi-component systems
- CALPHAD

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<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Calculation exercises test</td><td>50.0%</td><td>34.0%</td></tr>
<tr><td>Mid-term exam on the lecture part</td><td>50.0%</td><td>33.0%</td></tr>
<tr><td>Final exam on the second part of the lecture at the end of the semester</td><td>50.0%</td><td>33.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>• S.J. Ling, W. Moebs, J. Sanny. University Physics Vol. 2. OpenStax, 2016</td></tr>
<tr><td>Supplementary literature</td><td>1. Ch. Schiller. Motion Mountain: The adventure of physics - vol. I. Ed. 31.
Available on-line: https://www.motionmountain.net/online.html</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>

- Provide the assumptions and basic conclusions of the Debye model.
- Explain the factors that may cause deviations of real gas behavior from the ideal gas model.

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<tr><td>Work placement</td><td>Not applicable</td></tr>
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