



COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Solid State Reactions	

Academic staff	Core academic unit(s)
Coordinating: Prof. Aivaras Kareiva Other:	Department of Inorganic Chemistry, Faculty of Chemistry and Geosciences

Study cycle	Type of the course unit
Master's	

Mode of delivery	Semester or period when it is delivered	Language of instruction
Lectures 32	Autumn semester	Lithuanian
Seminars 32		
Tutorials 36		
Individual work 30		

Requisites	
Prerequisites: Bachelor of Science	Co-requisites (if relevant):

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
5	130	100	30

Purpose of the course unit
To provide students with knowledge of contemporary modern inorganic chemistry

Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
A.1., A.2., A.4., C.1. Students will get the ability of analytical, critical and creative thinking to characterize solid state chemical reactions; the ability to evaluate the thermodynamics of solid state chemical reactions;	Literature studies, active lecture, exercises, problem teaching, comparative analysis, independent work.	Colloquium (written answers to questions of a mixed nature) - test writing, solution writing, exam
A.1., C.1. A.3., C.2. Students will get the ability to evaluate the kinetics of solid state chemical reactions.	Lecture, independent work, discussion.	Colloquium (written answers to questions of a mixed nature) - test writing, solution writing, exam
A.1., A.2., C.2., D.1. Students will get the ability to understand the general methods for investigating solid state reactions.	Problem teaching, problem solving, group discussion.	Colloquium (written answers to questions of a mixed nature) - test writing, solution writing, exam

Content	Contact hours	Individual work: time and assignments

	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship	Contact hours, total	Individual work	Tasks for individual work
1. Solid state reactions	2	2	2				6	2	By topic.
2. Thermodynamics	2	2	2				6	2	By topic.
3. Methods of thermodynamics investigation	2	4	2				8	2	By topic.
4. Electrochemical methods	2	4	2				8	2	By topic.
5. Heterogeneous equilibrium method	2	2	2				6	2	By topic.
6. Thermochemical methods	2	2	2				6	2	By topic.
7. Methods of investigation of mechanisms	2	2	2				6	2	By topic.
8. Diffusion annealing method	2	2	2				6	2	By topic.
9. Kinetics of reactions between metal oxides	2	2	2				6	2	By topic.
10. Fundamentals of kinetics	2	1	1				4	2	By topic.
11. Techniques for material characterization	2	1	1				4	2	By topic.
12. Thermal analysis: theory and applications	2	2	2				6	1	By topic.
13. Interpretation of TG and DTA curves. Differential thermal analysis and scanning calorimetry	2	2	2				6	1	By topic.
14. Thermooptics, thermomechanics, thermodilatometry, evolved gas analysis	2	2	2				6	1	By topic.
15. Investigation of solid state reactions using XRD method	2	2	2				6	1	By topic.
16. Investigation of solid state reactions using SEM method	2	4	2				8	4	By topic.
Total	32	36	32				100	30	

Assessment strategy	Weight %	Deadline	Assessment criteria
1st colloquium.	33,33	March	Universally accepted. Answers to questions of a mixed or test nature according to the studied topics. The colloquium questions cover the topics covered during the lectures and discussions in the first part of the course. It is necessary to answer 10 questions, each of which is evaluated with 1 point (evaluation criteria below). The

			<p>evaluations of individual questions are added together for the overall evaluation. 10 points make up 33,33 percent. exam grade. Evaluation Criteria: 1 point - the question was answered in detail and clearly, based not only on the lecture material, but also on your own, reasonable reasoning. 0.5 points - the question is answered in detail, but not very precisely, the answer contains significant errors. 0.25 points - the answer is unclear or incomplete, with several gross errors. 0 points - there is no answer or it is completely incorrect.</p> <p>The composition of the final grade is 100% cumulative.</p>
2nd colloquium.	33,33	May	<p>Universally accepted. Answers to questions of a mixed or test nature according to the studied topics. The colloquium questions cover the topics covered during the lectures and discussions in the second part of the course.</p> <p>It is necessary to answer 10 questions, each of which is evaluated with 1 point (evaluation criteria below). The evaluations of individual questions are added together for the overall evaluation. 10 points make up 33,33 percent. exam grade. Evaluation Criteria: 1 point - the question was answered in detail and clearly, based not only on the lecture material, but also on your own, reasonable reasoning. 0.5 points - the question is answered in detail, but not very precisely, the answer contains significant errors. 0.25 points - the answer is unclear or incomplete, with several gross errors. 0 points - there is no answer or it is completely incorrect.</p> <p>The composition of the final grade is 100% cumulative.</p>
Written tests.	33,33	March-May	<p>Universally accepted. Answers to the tasks according to the studied topics. The control questions cover the topics covered during the lectures and discussions in the respective parts of the course.</p> <p>It is necessary to answer 10 questions, each of which is evaluated with 1 point (evaluation criteria below). The evaluations of individual questions are added together for the overall evaluation. 10 points make up 33,33 percent. exam grade. Evaluation Criteria: 1 point - the question was answered in detail and clearly, based not only on the lecture material, but also on your own, reasonable reasoning. 0.5 points - the question is answered in detail, but not very precisely, the answer contains significant errors. 0.25 points - the answer is unclear or incomplete, with several gross errors. 0 points - there is no answer or it is completely incorrect.</p> <p>The composition of the final grade is 100% cumulative.</p>

Author (-s)	Publishing year	Title	Issue of a periodical or volume of a publication	Publishing house or web link
Required reading				
A. R. West.	1995	Solid State Chemistry and its Applications.		John Wiley and Sons, New York.
Ed. by John P. Sibilila	1988	A Guide to Materials		VCH Publishers,

		Characterization and Chemical Analysis		Inc., New York
A. R. West	1997	Basic Solid State Chemistry		John Wiley and Sons, New York,
Recommended reading				
A.F. WELLS	1975	4th ed., Structural Inorganic Chemistry		CLARENDON PRESS - OXFORD Oxford University Press Ely House, London W1
E. Riedel. C. Janiak.	2011	Anorganische Chemie		Berlin, New York: De Gruyter, 2011