

COURSE UNIT DESCRIPTION

Course unit title	
Solid State Reactions	

Lecturer(s)	Department
Coordinating lecturer dr. Andrius Laurikėnas	Dept. Inorganic Chemistry, Vilnius University

Cycle	Type of the course unit
Second	Optional

Mode of delivery	Period of delivery	Language of instruction
Face to face	Autumn semester	English

Prerequisites and co-requisites
Physical and Inorganic Chemistry.

Number of credits	Student's total workload	Contact hours	Self-study hours
5	133	64	69

Programme Learning Outcomes to be developed.
<p>A1. Understanding of the newest achievements in the chemical theories, ideas and principles; their critical assessment and application in problem solving.</p> <p>A2. Ability to integrate knowledge from various fields of chemistry to solve unknown problems.</p> <p>A4. Ability to explain the principles of modern methods used for the synthesis and characterization of substances.</p> <p>B3. Ability to interpret data obtained from laboratory observations and measurements.</p> <p>C1. Ability to formulate problems of practical activities, plan and design the progress of the activity, and control its performance.</p> <p>C2. Ability to analyze, make generalizations and critically evaluate scientific and practical information.</p> <p>C3. Ability to make innovative decisions and evaluate social consequences.</p> <p>D1. Ability to communicate both orally and through the written word in proper Lithuanian and English.</p> <p>D2. Ability to present the results of a scientific research both orally and through the written word for specialist and non-specialist audience.</p> <p>D3. Readiness to study continuously and autonomously, ability to evaluate critically the novelties in the field of chemistry and related sciences, ability to improve and update knowledge and skills and to seek new ones.</p>

Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
<p>After successful completion of this course student should be able to have:</p> <p>Ability to read the literatures related to new development in the applications of solid state reactions.</p> <p>Ability to develop research proposals in the areas of solid state reactions.</p> <p>Ability of presentations on applications of their research expertise to the investigation of solid state reactions.</p> <p>Ability to use equations for the thermodynamics and kinetics.</p> <p>Ability to construct theoretical models of nanostructures.</p>	<p>The theoretical material is provided on lectures, acquirement is developed during the seminars.</p>	<p>Pass of intermediate colloquiums and final exam.</p>

Topics	Contact work hours						Time and tasks of self-study	
	Lectures	Consultations	Seminars	Tutorials	Laboratory work	Total contact hours	Self-study	Tasks
Solid state reactions	2		2			4	3	Textbook reading. Problem solving.
Thermodynamics	2		2			4	3	Textbook reading. Problem solving.
Methods of thermodynamics investigation	2		2			4	3	Textbook reading. Problem solving.
Electrochemical methods	2		2			4	3	Textbook reading. Problem solving.
Heterogeneous equilibrium method	2		2			4	3	Textbook reading. Problem solving.
Thermochemical methods	2		2			4	3	Textbook reading. Problem solving.
Methods of investigation of mechanisms	2		2			4	3	Textbook reading. Problem solving.
Diffusion annealing method	2		2			4	3	Textbook reading. Problem solving.
Kinetics of reactions between metal oxides	2		2			4	3	Textbook reading. Problem solving.
Techniques for material characterization	2		2			4	6	Textbook reading. Problem solving.
Thermal analysis: theory and applications	2		2			4	6	Textbook reading. Problem solving.
Investigation of solid state reactions using XRD method	2		2			4	6	Textbook reading. Problem solving.
Investigation of solid state reactions using SEM method	2		2			4	6	Textbook reading. Problem solving.
Ceramics and cermets. Sol-gel synthesis method	2		2			4	6	Textbook reading. Problem solving.
Solid phase organic synthesis 1	2		2			4	6	Textbook reading. Problem solving.
Solid phase organic synthesis 2	2		2			4	6	Textbook reading. Problem solving.
Total	32		32			64	69	

Assesment strategy	Weight %	Assessment period	Assessment criteria
Colloquium 1	50%	After 1,5 months	Multiple choice tasks, short answer tasks and open answer tasks.
Colloquium 2	50%	After 3,5 months	Multiple choice tasks, short answer tasks and open answer tasks.

Reading list

Author	Year of publ.	Title	Publisher	Number of volumes in the library of faculty
Main reading list				
A. R. West.	1995	Solid State Chemistry and its Applications.	John Wiley and Sons, New York	1
Ed. by John P. Sibilila.	1988	A Guide to Materials Characterization and Chemical Analysis	VCH Publishers, Inc., New York	1
A. R. West	1997	Basic Solid State Chemistry.	John Wiley and Sons, New York	15
C.H. Bamford, C.F.H. Tipper	1980	Reactions in the Solid State	Elsevier Science	
Additional reading list				
A. F. Wells	2012	Structural Inorganic Chemistry	Clarendon Press, Oxford	1
Patrick H. Toy, Yulin Lam	2012	Solid-Phase Organic Synthesis: Concepts, Strategies, and Applications	Wiley	