



Subject card

Subject name and code	, PG_00058695						
Field of study	Materials Engineering, Materials Engineering, Materials Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2022/2023		
Education level	second-cycle studies		Subject group		Optional subject group 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	1		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Polymers Technology -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Maciej Sienkiewicz				
	Teachers		dr inż. Maciej Sienkiewicz				
			dr hab. inż. Justyna Kucińska-Lipka				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	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		25.0	75
Subject objectives	The goal of the course is to give the knowledge in the field of the basic groups of the polymer binders and processes for their production, the processes of drying of coatings and the types and functions of additives used in the production of paints and varnishes.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K7_W05	The student knows the basic methods, techniques, tools and materials used in solving complex engineering tasks in the field of engineering and technology of coating materials	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	K7_U04	The student knows the basic methods, techniques, tools and materials used in solving complex engineering tasks in the field of material engineering	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
	K7_U01	The student knows the source databases, how to use them and implement the acquired data in the preparation of a report or project	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
	K7_W06	The student knows the theoretical basis of the operation of scientific apparatus in the field of material engineering, including in particular the apparatus using for obtaining and testing the properties of varnish products and polymer coatings	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
Subject contents	<p>Characteristics of natural film-forming substances - technology of their production and properties.</p> <p>Characteristics of synthetic film-forming substances - technology of their production and properties ..</p> <p>Film-forming curing systems - technology of their production and properties ..</p> <p>Polycondensation film-forming systems - manufacturing and properties ..</p> <p>Solutions or dispersions of film-forming substances. Physicochemical and thermodynamic properties.</p> <p>Pigmentation and dyeing of paints and varnishes.</p> <p>Additives used in the production of paints and varnishes.</p> <p>Innovative solutions in the world of paints and varnishes.</p>		
Prerequisites and co-requisites	There is no requirement		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory	60.0%	40.0%
	lecture	60.0%	60.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Goldschmidt A., Streitberger H.J., <i>Basf handbook on Basic of coating technology</i>, BASF Coatings AG, Münster, Vincentz Network, Hannover 2003 2. Brock T., Groteklaes M., Mischke P., <i>European Coatings Handbook</i>, Curt R. Vincentz Verlag, Hannover 2000 3. Stoye D., <i>Paints, Coatings and solvents</i>, Verlagsgesellschaft mbH, Weinheim 1993 4. European Coatings, http://www.european-coatings.com/ 5. Coatings World, http://www.coatingsworld.com/news/ 6. Rynek Farb, http://www.rynekarb.pl/ 	

	Supplementary literature	<ol style="list-style-type: none"> 1. Wilson A.D., Nicholson J.W., Prosser H.J., <i>Surface Coatings</i>, Elsevier, London 1987, 2. Davison G., Lane B., <i>Additives in Water-borne Coatings</i>, Royal Society of Chemistry (Great Britain), 2003 3. Marrión A.R., <i>The Chemistry and Physics of Coatings</i>, Royal Society of Chemistry (Great Britain), 2003 4. Licari, J.J., <i>Coating Materials for Electronic Applications - Polymers, Processes, Reliability, Testing</i>, William Andrew Publishing/Noyes, 2003 5. Florio J.J., Calbo L.J., Miller D.J., <i>Handbook of Coatings Additives</i>, Marcel Dekker; New York 2004 6. Tracton A.A., Satas D., <i>Coatings Technology Handbook</i>, Marcel Dekker, Inc. USA 2001 7. Pappas S.P., Wicks Z.W., Jones F.N., Wicks D.A., <i>Organic Coatings: Science and Technology (Society of Plastics Engineers Monographs)</i> Wiley, John & Sons, Incorporated, USA, 2007 8. Lambourne, R.; Strivens, T.A., <i>Paint and Surface Coatings - Theory and Practice</i>, Woodhead Publishing, 1999 9. Bieleman J., <i>Additives for Coatings</i>, Wiley-Vch Verlag GmbH, Weinheim, 2000 10. Wypych G., <i>Handbook of Fillers - A Definitive User's Guide and Databook</i>, ChemTec Publishing, 2000
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Polimerowe Materiały Powłokotwórcze - wykład/laboratorium - semestr letni 2022/2023 - Moodle ID: 29004</p> <p>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29004</p>
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Describe the processes of physical drying, oxidation drying and chemical drying of coatings. 2. Classification of oils according to their tendency to dry. 3. The process of preparing capon varnishes. Describe the process starting from basic raw materials. 4. Characterize the polyurethane coatings with blocked polyisocyanate and polyurethane coatings cured by moisture. 5. Describe the reactions and a process for preparing glyptale or pentanale. Describe the advantages and disadvantages of coatings obtained from glyptale or pentanale. 6. Write a general reaction scheme of curing the epoxy coatings and describe the method of calculating the amount of hardener required for cross-linking of these products. 7. Give examples of acrylic monomers which are used in the production of film-forming polyacrylates. What defines the main application properties of acrylic resins, as binders. 8. Fillers, definition, role in the coatings, what is SOP (PVC). 9. Solvent, definition, role in the coatings, how the solvent content affects to the classification of coatings, what it is and how define of VOC (VOC) in solvent-based coatings. 10. Pigments and dyes, give the differences, the principle of their operation in the coatings and varnish, (why they staining). 11. Describe the techniques of coatings production. 12. Characterise the methods of testing the properties of liquid and cured coatings. 	
Work placement	Not applicable	