



Subject card

Subject name and code	POLYMERS FOR COATING APPLICATIONS, PG_00064312						
Field of study	Chemical Technology						
Date of commencement of studies	February 2027		Academic year of realisation of subject			2026/2027	
Education level	second-cycle studies		Subject group			Optional subject group Specialty subject group Subject group related to scientific research in the field of study	
Mode of study	Full-time studies		Mode of delivery			blended-learning	
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 Polymer Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Maciej Sienkiewicz				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	E-learning hours included: 15.0						
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 aim of the course is to familiarize students with basic and innovative groups of polymers used in formulations of paints, varnishes, and other protective polymer coatings. The course covers methods of synthesis and modification of these polymers, mechanisms of coating formation, and their physicochemical properties. Students will learn about the processes of coating drying and curing, as well as the role of additives used in their production. They will also become acquainted with specialized terminology and relevant industry standards. The course develops students ability to analyze and select appropriate polymers for industrial applications, taking into account durability, protective functions, and aesthetic properties of coatings. In addition, students will gain the ability to evaluate the commercialization potential of modern coating technologies based on scientific literature and patent documentation.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_K04] is aware of his/her responsibility for making decisions, respecting and developing principles of professional ethics and taking action to uphold these principles	knows and understands the fundamental ethical principles in force in the area of protective coating technology. Is able to analyze the effects of professional decisions made, taking into account their impact on the environment, health and safety. Demonstrates knowledge of applicable legal norms and standards regarding the production and use of coating polymers, ensuring their compliance. Is aware of the impact of engineering activities on the environment and is able to make decisions that minimize negative technological and ecological effects.	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills
	[K7_U08] assesses the potential for commercialisation of a product or technology based on an analysis of scientific publications and patents	is able to compare existing technologies with new solutions, identifying their potential advantages and market limitations. Has the ability to search patent and publication databases, assess the merits of inventions and their commercialization potential, and critically evaluate scientific publications on new products and technologies in the field of polymer coatings.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
	[K7_U09] prepares documentation of experiments and technological processes using professional terminology	is able to correctly use specialist vocabulary in the field of chemistry, materials engineering and polymer coating technology. Is able to prepare descriptions of the course of experiments, present research results and formulate conclusions based on the obtained data. Is able to prepare documentation of technological processes, taking into account operational parameters, production schemes and quality control aspects.	[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
Subject contents	Course content – lecture <ul style="list-style-type: none"> • Characteristics of natural film-forming substances - technology of their production and properties. • Characteristics of synthetic film-forming substances - technology of their production and properties. • Solutions or dispersions of film-forming substances. Physicochemical and thermodynamic properties. • Pigmentation and dyeing of paints and varnishes. • Additives used in the production of paints and varnishes. • Technologies for the preparation and production of paints and varnishes. • Testing the properties of film-forming substances and coatings. • Innovative solutions in the world of paints and varnishes. 		
	Course content – laboratory <ul style="list-style-type: none"> • Health and safety rules for working in a chemical laboratory, including the handling of chemical reagents and laboratory equipment • Coatings based on natural, unmodified, and modified polymers • Latex coatings, asphalt emulsions, isocyanate blocking, acrylic lacquers • Fluidized-bed application of polymer coatings • Analysis of polymer coatings using microscopic and spectroscopic techniques 		
Prerequisites and co-requisites	There are no requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory (tests, reports, activity)	60.0%	40.0%
	Lecture (partial tests or final test)	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. https://www.coatingsworld.com/news/ 5. https://www.european-coatings.com/
	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. Marrion 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	
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. 13. Present the commercialization possibilities of modern polymeric coating substances and the possibilities of preparing paint products using them. 14. Using publication databases, industry databases and patent databases, characterize trends in paint product research. 	
Practical activities within the subject	Not applicable	

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