

<b>Course code</b>																																	
<b>Type and description</b>	EC – elective subjects from the discipline of Chemical sciences																																
<b>ECTS credit</b>	1																																
<b>Course name</b>	Advanced Materials for Printed Electronics																																
<b>Course name in Polish</b>	Zaawansowane materiały do zastosowań w elektronice drukowanej																																
<b>Language of instruction</b>	English																																
<b>Course level</b>	8 PRK																																
<b>Course coordinator</b>	dr hab. inż. Beata Łuszczczyńska																																
<b>Course instructors</b>	dr hab. inż. Beata Łuszczczyńska																																
<b>Delivery methods and course duration</b>	<table border="1"> <thead> <tr> <th></th> <th>Lecture</th> <th>Tutorials</th> <th>Laboratory</th> <th>Project</th> <th>Seminar</th> <th>Other</th> <th>Total of teaching hours during semester</th> </tr> </thead> <tbody> <tr> <td>Contact hours</td> <td>0</td> <td>0</td> <td>0</td> <td>5</td> <td>0</td> <td>0</td> <td>5</td> </tr> <tr> <td>E-learning</td> <td>no</td> <td>no</td> <td>no</td> <td>no</td> <td>no</td> <td>no</td> <td>no</td> </tr> <tr> <td>Assessment criteria (weightage)</td> <td>0</td> <td>0</td> <td>0</td> <td>100%</td> <td>0</td> <td>0</td> <td>100%</td> </tr> </tbody> </table>		Lecture	Tutorials	Laboratory	Project	Seminar	Other	Total of teaching hours during semester	Contact hours	0	0	0	5	0	0	5	E-learning	no	Assessment criteria (weightage)	0	0	0	100%	0	0	100%						
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<b>Course objective</b>	<p>The aim of the course is to enable students to acquire knowledge in the field</p> <ol style="list-style-type: none"> <li>1. Organic semiconductors used in electronics,</li> <li>2. Printing techniques and the principles of selecting components for printing inks and printing mixtures in terms of their application in a given printing technique.</li> </ol>																																
<b>Learning outcomes</b>	<p>After completing the course, a PhD student is able to:</p> <ol style="list-style-type: none"> <li>1. List the known printing techniques for obtaining two-dimensional and three-dimensional elements,</li> <li>2. List the requirements for materials as components of mixtures prepared for printing with the use of the proposed printing technique,</li> <li>3. Have knowledge related to the physico-chemical processes occurring during the deposition of materials by means of known printing techniques,</li> <li>4. Indicate the development prospects and limitations of known printing techniques used to obtain two-dimensional and three-dimensional elements</li> <li>5. Be able to define the directions and priorities of the necessary further learning on the basis of acquired knowledge in the field of printing techniques,</li> </ol>																																
<b>Assessment methods</b>	<p>Methods of verification of learning outcomes</p> <p>Effects 1-3- lecture test effect 4-5 - presentation</p> <p>The final grade consists of: The result of the lecture test - 70% Presentation - 20%</p>																																
<b>Prerequisites</b>	Basic knowledge in chemistry and physics																																
<b>Course content with delivery methods</b>	<p>The project covers the following topics:</p> <ul style="list-style-type: none"> <li>-Printing techniques used to obtain 2D and 3D elements using functional materials:</li> <li>-Printing techniques: screen printing, inkjet, aerosol printing, 3-D printing</li> <li>-Functional materials and their modification for use in various printing techniques.</li> <li>-Compositions of mixtures for printing, principles of selecting components in inks and printing mixtures: the problem of selecting solvents in inkjet compositions, the problem of orthogonal solvents</li> </ul>																																

	<p>in layer-by-layer printing.</p> <ul style="list-style-type: none"> <li>-Resolution offered by various printing techniques (smallest sizes) and thickness of printed elements.</li> <li>-Types of substrates in printing techniques and methods of activating their surface.</li> <li>-Printing of 3D elements: the use of polymeric materials and the process of two-photon polymerization in the production of three-dimensional structures, biocomponents for the production of 3D elements with a given functionality, such as the production of implants.</li> </ul>
<b>Basic reference materials</b>	Materials from lectures
<b>Other reference materials</b>	Kelsall R. W., Hamley I.W., Geoghegan M.: "Nanotechnologie, Wydawnictwo Naukowe PWN, Warszawa 2012.
<b>Average student workload outside classroom</b>	15h
<b>Comments</b>	
<b>Last update</b>	September 2020