

<b>Course code</b>																																	
<b>Type and description</b>	EC																																
<b>ECTS credit</b>	1																																
<b>Course name</b>	<b>Methods of machining hard-to-machine materials</b>																																
<b>Course name in Polish</b>	<b>Metody obróbki materiałów trudnoobrabialnych</b>																																
<b>Language of instruction</b>	English																																
<b>Course level</b>	8 PRK																																
<b>Course coordinator</b>	Ph.D., D.Sc., Eng. Marcin Gołąbczak, prof. TUL																																
<b>Course instructors</b>	Ph.D., D.Sc., Eng. Marcin Gołąbczak, prof. TUL																																
<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>15</td> <td>0</td> <td>0</td> <td>15</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></td> </tr> <tr> <td>Assessment criteria (weightage)</td> <td>0,00</td> <td>0,00</td> <td>0,00</td> <td>1,00</td> <td>0,00</td> <td>0,00</td> <td></td> </tr> </tbody> </table>		Lecture	Tutorials	Laboratory	Project	Seminar	Other	Total of teaching hours during semester	Contact hours	0	0	0	15	0	0	15	E-learning	No	No	No	No	No	No		Assessment criteria (weightage)	0,00	0,00	0,00	1,00	0,00	0,00	
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<b>Course objective</b>	<ol style="list-style-type: none"> <li>1. Acquisition of knowledge about new methods of machining difficult-to-machine materials</li> <li>2. Acquisition of knowledge about processes and machine technologies</li> <li>3. Acquisition of knowledge about machines, tools and devices used in these processes</li> </ol>																																
<b>Learning outcomes</b>	<p>After the course a PhD student is able to:</p> <ol style="list-style-type: none"> <li>1. understands and applies notions of the theory of set-valued maps – effects W4, U4, K1</li> <li>2. knows the basic theorems on selection and approximation of set-valued maps – effect W4, U4, K1</li> <li>3. knows how to apply the acquired knowledge to some concrete problems, i.e. optimal control problems – effects W4, U4, K1</li> </ol>																																
<b>Assessment methods</b>	<p>Effects W4, U4, K1 – written reports and oral presentation</p> <p>The final evaluation is based on:</p> <p>Reports - 60%</p> <p>Presentation - 40%</p>																																
<b>Prerequisites</b>	Master degree course in machine technology, production engineering																																
<b>Course content with delivery methods</b>	<p>PROJECT</p> <ol style="list-style-type: none"> <li>1. Presentation of modern technologies of machining hard-to-machine materials (types and classification of modern methods of machining alloys used in the aerospace industry, erosive</li> </ol>																																

	<p>methods of machining, electrochemical ECM and electro-discharge EDM methods, LBM laser beam machining LBM, water jet machining WJM, hybrid machining methods).</p> <ol style="list-style-type: none"> <li>2. and press-abrasive AJM ).</li> <li>3. Introduction to design, choice of project topic.</li> <li>4. Technological design of manufacturing (according to the instructor) of parts or assemblies for the aircraft industry.</li> <li>5. Scope of the project: analysis of machining methods, development of the technological process, selection of machinery and equipment.</li> <li>6. Final computer presentation of the project in Power Point and handing over its written version.</li> </ol>
<b>Basic reference materials</b>	<ol style="list-style-type: none"> <li>1. J. Plichta, S. Plichta: Hybrydowe metody obróbki ubytkowej, Koszalin, 2022.</li> <li>2. S. Skoczypiec: Elektrochemiczne metody wytwarzania mikroelementów, Wydawnictwo Politechniki Krakowskiej, 2013.</li> <li>3. W.B. Rowe: Principles of Modern Grinding Technology, Elsevier, 2009.</li> <li>4. H. A-G. El-Hofy: Fundamentals of Machining Processes, CRC Press, USA 2014.</li> <li>5. F. Lei, Q. Xu, G. Zhang: Machinery, Materials Science and Engineering Applications, CRC Press, UK 2017.</li> <li>6. Wybrane artykuły z czasopism, katalogi i prospekty.</li> </ol>
<b>Other reference materials</b>	<ol style="list-style-type: none"> <li>1. W. Grzesik, A. Ruszaj: Hybrydowe metody obróbki materiałów konstrukcyjnych, PWN Warszawa, 2021.</li> </ol>
<b>Average student workload outside classroom</b>	10 h
<b>Comments</b>	
<b>Last update</b>	17 March 2023