

<b>Course code</b>																																	
<b>Type and description</b>	EC– Elective Course in Discipline: Civil engineering and transport																																
<b>ECTS credit</b>	1																																
<b>Course name</b>	Computational Heat and Mass Transfer																																
<b>Course name in Polish</b>	Komputerowa analiza transportu ciepła i wilgoci																																
<b>Language of instruction</b>	English																																
<b>Course level</b>	8 PRK																																
<b>Course coordinator</b>	dr hab inż. Marcin Koniorczyk																																
<b>Course instructors</b>	dr hab inż. Marcin Koniorczyk																																
<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	no	no	no	no	no	no	Assessment criteria (weightage)	0	0	0	100%	0	0	100%
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<b>Course objective</b>	<p>Aims of the course is:</p> <ol style="list-style-type: none"> <li>1. to extend knowledge in the heat and mass transfer,</li> <li>2. to learn numerical methods used to solve elliptic and parabolic PDE,</li> <li>3. to learn numerical methods used for the Stefan problem.</li> </ol>																																
<b>Learning outcomes</b>	<p>After the course student:</p> <ol style="list-style-type: none"> <li>1. knows the basic mechanisms of heat transport (W1),</li> <li>2. knows the basic mechanisms of mass transport (W1),</li> <li>3. have the basic knowledge about porous materials, their microstructure, basic properties (W1),</li> <li>4. knows how to formulate the weak form of governing equations (W1),</li> <li>5. will be able to apply the numerical methods to solve the uncoupled governing equations (U1),</li> <li>6. will be able to apply the numerical methods to solve the coupled heat and mass equations (U1),</li> <li>7. will be able to solve the Stefan problem associated with the moving phase boundary (U1).</li> </ol>																																
<b>Assessment methods</b>	<p>Verification methods of learning outcomes: effects no. 1-8: by worksheet project.</p> <p>The final grade is composed of: 75% - project 25% - oral presentation of achieved solutions in project</p>																																
<b>Prerequisites</b>																																	
<b>Course content with delivery methods</b>	<p>The porous materials – microstructure, properties Macroscopic description of Transport Phenomena in Porous Media Mathematical Statement of the Problem, uncoupled, coupled heat and mass transfer Some special cases Phase transition – description, kinetics, measurement Stefan problem – moving boundary between phases Finite Differential Method – introduction, application, error Finite Element Method – introduction, application, error</p>																																

<b>Basic reference materials</b>	<ol style="list-style-type: none"> <li>1. J. Bear, Y. Bachmat, Introduction to Modelling of Transport Phenomena in Porous Media, Kluwer Academic Press, 1991.</li> <li>2. R.W. Lewis, B.A. Schrefler, The Finite Method in the Static and Dynamic Deformation and Consolidation of Porous Media, John Wiley and Sons 1998.</li> <li>3. D.R.J. Owen, E. Hinton, Finite Element in Plasticity: Theory and Practice, Pineridge Press Ltd. 1980.</li> </ol>
<b>Other reference materials</b>	
<b>Average student workload outside classroom</b>	15h
<b>Comments</b>	
<b>Last update</b>	July 2020