

Course code																																	
Type and description	EC - elective subjects from the discipline of Chemical engineering																																
ECTS credit	1																																
Course name	Introduction to bioreactor engineering																																
Course name in Polish	Wprowadzenie do inżynierii bioreaktorowej																																
Language of instruction	English																																
Course level	8 PRK																																
Course coordinator	prof. dr hab. inż. Marcin Bizukojć																																
Course instructors	prof. dr hab. inż. Marcin Bizukojć																																
Delivery methods and course duration	<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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Assessment criteria (weightage)	0	0	0	100%	0	0	100%																										
Course objective	<p>The course is aimed at</p> <ul style="list-style-type: none"> supplying the knowledge concerning the issues connected with the application of bioreactors in the industrial process; knowing how to mathematically describe the processes run in bioreactors. 																																
Learning outcomes	<p>The PhD student:</p> <ol style="list-style-type: none"> can formulate the hydrodynamic balance of a bioreactor operating in various modes. can apply the most important biological models to be used in bioreactor engineering. can select the valid term to describe product formation kinetics upon the available experimental data. can formulate the full model for a bioreactor 																																
Assessment methods	<p>Outcomes 1-4 - presentation of the project in the written form</p> <p>Grade - the result of project in the written form 100%</p>																																
Prerequisites	Basic knowledge of chemical engineering.																																
Course content with delivery methods	<ul style="list-style-type: none"> - basic hydrodynamic balance of a bioreactor - operation modes of bioreactors - biological model to be used in the bioreactor balance: <ul style="list-style-type: none"> -- biomass growth curve -- substrate limitation and inhibition -- multisubstrate kinetics -- product inhibition -- maintenance and death rate kinetics - numerical solutions of hydrodynamic balance and biological model of bioreactors for various operation modes 																																
Basic reference materials	<p>Aiba Sh., Humphrey A.E., Millis N.F. "Biochemical Engineering", Academic Press 1973 Bailey J.E., Ollis D.F. "Biochemical Engineering Fundamentals" McGraw-Hill 1994 Nielsen J. Villadsen J. Liden G. "Bioreaction Engineering Principles", Plenum Press 2003 Doran P. M "Bioprocess Engineering Principles" Academic Press, 1995</p>																																
Other reference materials	Biotechnology: a comprehensive treatise in 8 volumes" ed. H.J. Rehm and G. Reed																																

Average student workload outside classroom	15 hours
Comments	Realization in the winter semester
Last update	July 2020