EC- elective subjects from the discipline of Chemical engineering	Course code								
Course name Introduction to bioreactor engineering	Type and description	EC - elective subjects from the discipline of Chemical engineering							
Course name in Polish English	ECTS credit	1							
English SPRK	Course name	Introduction to bioreactor engineering							
Course coordinator prof. dr hab. inż. Marcin Bizukojć Course instructors prof. dr hab. inż. Marcin Bizukojć Delivery methods and course duration Lacture	Course name in Polish	Wprowadzenie do inżynierii bioreaktorowej							
Course instructors Prof. dr hab. inż. Marcin Bizukojċ Delivery methods and course duration Lacture	Language of instruction	English							
Delivery methods and course duration Lecture Tutorials Laboratory Project Seminar Other Iteaching hours duration Lecture Tutorials Laboratory Project Seminar Other Iteaching hours during semineter	Course level	8 PRK							
Delivery methods course duration	Course coordinator	prof. dr hab. inż. Marcin Bizukojć							
Course objective The course is aimed at 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. The PhD student: Can apply the most important biological models to be used in bioreactor engineering. Can a provide the full model for a bioreactor Assessment methods Outcomes 1-4 - presentation of the project in the written form 100% Prerequisites Basic knowledge of chemical engineering. - basic hydrodynamic balance of a bioreactor - bioreactors Outcomes 1-4 - presentation of the project in the written form 100% Prerequisites Basic knowledge of chemical engineering. - basic hydrodynamic balance of a bioreactor - biomass growth curve - substrate limitation and inhibition - multisubstrate kinetics - product inhibition - maintenance and death rate kinetics - product inhibition - maintenance and feath rate kinetics - product inhibition - maintenance and feath rate kinetics - product inhibition - maintenance and feath rate kinetics - product inhibition - maintenance and feath rate kinetics - product inhibition - maintenance and feath rate kinetics - product inhibition - maintenance and feath rate kinetics - product inhibition - maintenance and feath rate kinetics - product inhibition - maintenance and feath rate kinetics - product inhibition - maintenance and feath rate kinetics - product inhibition - maintenance and feath rate kinetics - product inhibition - maintenan	Course instructors	prof. dr hab. inż. Marcin Bizukojć							
E-learning no no no no no no no	•		Lecture	Tutorials	Laboratory	Project	Seminar	Other	teaching hours during
Assessment circleria O O O 100% O O 100%		Contact hours	0	0	0	5	0	0	5
Course objective The course is aimed at 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. The PTD student: 1. can formulate the hydrodynamic balance of a bioreactor operating in various modes. 2. can apply the most important biological models to be used in bioreactor engineering. 3. can select the valid term to describe product formation kinetics upon the available experimental data. 4. can formulate the full model for a bioreactor Assessment methods Outcomes 1-4 - presentation of the project in the written form Grade - the result of project in the written form 100% Prerequisites Basic knowledge of chemical engineering. Course content with delivery methods - basic hydrodynamic balance of a bioreactor - operation modes of bioreactors - biological model to be used in the bioreactor balance: - biomass growth curve - substrate limitation and inhibition - multisubstrate kinetics - product inhibition - maintenance and death rate kinetics - product inhibition of hydrodynamic balance and biological model of bioreactors for various operation modes Basic reference materials Aiba Sh., Humphrey A.E., Millis N.F. "Biochemical Engineering", Academic Press 1973 Bailey J.E., Ollis D.F. "Biochemical Engineering Pinciples", Plenum Press 2003 Doran P. M "Bioprocess Engineering Principles" Academic Press, 1995		E-learning	no	no	no	no	no	no	no
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. The PhD student: 1. can formulate the hydrodynamic balance of a bioreactor operating in various modes. 2. can apply the most important biological models to be used in bioreactor engineering. 3. can select the valid term to describe product formation kinetics upon the available experimental data. 4. can formulate the full model for a bioreactor Assessment methods Outcomes 1-4 - presentation of the project in the written form Grade - the result of project in the written form 100% Prerequisites Basic knowledge of chemical engineering. Course content with delivery methods - basic hydrodynamic balance of a bioreactor - operation modes of bioreactors - biological model to be used in the bioreactor balance: - 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 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		criteria	0	0	0	100%	0	0	100%
1. can formulate the hydrodynamic balance of a bioreactor operating in various modes. 2. can apply the most important biological models to be used in bioreactor engineering. 3. can select the valid term to describe product formation kinetics upon the available experimental data. 4. can formulate the full model for a bioreactor Outcomes 1-4 - presentation of the project in the written form Grade - the result of project in the written form 100% Prerequisites Basic knowledge of chemical engineering. Course content with delivery methods - basic hydrodynamic balance of a bioreactor operation modes of bioreactors biological model to be used in the bioreactor balance: - 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 Aiba Sh., Humphrey A.E., Millis N.F. "Biochemical Engineering", Academic Press 1973 Bailey J.E., Ollis D.F. "Biochemical Engineering Principles", Plenum Press 2003 Doran P. M "Bioprocess Engineering Principles" Academic Press, 1995		 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. 							
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	Other reference materials	Biotechnology: a	a comprehe	nsive treatis	e in 8 volumes	" ed. H.J. R	ehm and G.	Reed	

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