(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: PROCESS KINETICS	2. Course code
3. Validity of course description: 2018/2019	
4. Level of studies: 2nd cycle of higher education	
5. Mode of studies: intramural studies	
6. Field of study:INDUSTRIAL AND ENGINEERING CHEMISTRY	RCH
7. Profile of studies: -	
8. Programme: PROCESS ENGINEERING FOR GREEN CHEMICAL TECHNOLOGIES	
9. Semester: 2	
10. Faculty teaching the course: Department of Chemical Engineering and Process Design (RCh-3)	
11. Course instructor: Agata Małysiak, PhD	
12. Course classification: field	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: basic knowledge provided in: Mathematics, Fluid Mechanics and Unit Operations	
16. Course objectives: An objective of the course is to acquaint students with modern mathematical methods of modeling and simulation of reactive flows	

17. Description of learning outcomes:

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Student knows principles of laminar boundary layer theory	examination	lecture	K_W01++, K_W03+, K_W04++
2.	Student possesses basic knowledge of turbulence modeling	examination	lecture	K_W01++, K_W04++
3.	Student knows balance equations of heat and mass transfer	examination	lecture	K_W01++, K_W04++
4.	Student is able to calculate prossure drop in multiphase flows	examination	Lecture, seminar	K_W01++, K_U09++, K_U22+
5.	Student knows principles of the theory of similarity	examination	lecture	K_W01++, K_U09++
6.	Student understands the necessity of supplementing his education and improving of his professional and personal competences. Student motivates his co-workers.	observation and discussion	lecture, seminar	K_K01+++

18. Teaching modes and hours

Lecture / BA /MA Seminar / Class / Project / Laboratory

Sem 2 - lecture 30 h, classes 15 h

19. Syllabus description:

Basic turbulence theory. Turbulence models (k-ε model, RSM,ASM).Direct Numerical Simulation and Large Eddy Simulation methods. Boundary Layer Theory and its applications. Multiphase flows

20. Examination: yes (sem.2)

21. Primary sources:

Bird R. Steward W.E., Lightfoot E.N. : Transport Phenomena, J.Wiley N.Y.2001
Schlichting H.: Boundary Layer Theory, McGraw-Hill, N.Y. 1968
Blazek J.: Computational Fluid Dynamics: Principles and Applications, Elsevier 2001
Elsner J.W.: Turbulencje przepływów, PWN, Warszawa 1987
Kembłowski Z., Michałowski S., Strumiłło Cz., Zarzycki R.: Podstawy teoretyczne inżynierii chemicznej i procesowej, WNT, Warszawa 1985
Pohorecki R., Wroński S.: Kinetyka i termodynamika procesów inżynierii chemicznej, WNT, Warszawa 1979
Hobler T.: Ruch ciepła i wymienniki
Hobler T.: Dyfuzyjny ruch masy i absorbery

22. Secondary sources:

Stewart I.: Does God Play Dice? The New Mathematics of Chaos, Wiley, N.Y. 2002
Potter D.: Metody obliczeniowe fizyki, PWN, Warszawa 1982
Gleick J.: Chaos. Narodziny nowej nauki, Zysk i Ska, 1996
Mandelbrot B.: The fractal geometry of nature, N.Y. 1977.

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	30/15
2	Classes	-/-
3	Laboratory	-/-
4	Project	-/-
5	BA/ MA Seminar	15/15
6	Other	5/10
	Total number of hours	50/40

24. Total hours: 90

25. Number of ECTS credits: 3

26. Number of ECTS credits allocated for contact hours: 2

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1

26. Comments:

Approved:

…… *(date, Instructor's signature)*

…… (*date , the Director of the Faculty Unit signature)*