Course code: **Plan position:**

A. INFORMATION ABOUT THE COURSE

B. Basic information

Name of course	***Mathematical methods in chemical engineering***
Field of studies	Chemical Technology
Level of studies	Second degree
Profile of studies	General academic
Form of studies	Stationary
Specialty	1. Waste material engineering 2. Industrial Biotechnology 3. Chemical and Foodstuff Analytics 4. Modern Materials Technologies
Unit responsible for the field of studies	Faculty of Chemical Technology and Engineering / Department of Chemical and Biochemical Engineering
Name and academic degree of teacher(s)	Sylwia Kwiatkowska-Marks, BEng PhD, Justyna Miłek, BEng, PhD, Ilona Trawczyńska, BEng, PhD Sławomir Żak, BEng, PhD
Introductory courses	Mathematical Analysis, Fundamentals of Chemical Engineering
Introductory requirements	Basic knowledge on Mass,- Momentum- and Energy Transfer

C. Semester/week schedule of classes

Semester	Lectures (W)	Auditorium classes (Ć)	Laboratory classes (L)	Project classes (P)	Seminar (S)	Field classes (T)	Number of ECTS points
Summer	15		30				5

2. LEARNING OUTCOME

No.	Learning outcomes description	The reference to the learning outcomes of specific field of study	The reference to the learning outcomes for the area
KNOWLEDGE			
W1	On successful completion of the course student can apply mathematical methods useful to solve a simple engineering problems dealing with chemical engineering and technology.	P6S_WG	P6S_WG
SKILLS			
U1	On successful completion of the course student can use the knowledge in the field of mathematics and computer programs supporting the implementation of the problems typical for technology and chemical engineering.	K_U09	P7S_UW
SOCIAL COMPETENCES			

K1	On successful completion of the course student is supposed to understand the need for lifelong learning, he can inspire and organize the learning process of the others.	K_K01	P7S_KK P7S_KO

3. TEACHING METHODS

A. Traditional methods used

Standard lecture with presentation. Calculation exercises in computer laboratory under supervision of academic staff.

4. METHODS OF EXAMINATION

Individual solution of the engineering problem and preparing a calculation report.

5. SCOPE

Lectures	An introduction to Mathematical Modelling basic terms; Numerical solutions for linear and non-linear systems of algebraic equations; Numerical solutions for linear and non-linear systems of ordinary differential equations; Numerical calculation of definite integrals Numerical solution of partial differential equation; Statistical analysis of mathematical models: Linear and non-linear regression, Numerical calculations in chemical engineering.
Computer Laboratory	Solving the engineering problems covering the lecture content during the classes.

6. METHODS OF VERIFICATION OF LEARNING OUTCOMES

LEARNING OUTCOME	Form of assessment					
	Oral examination	Written exam	Colloquium	Project	Presentation	Reports
W1				×		
U2				×		
K1				×		

7. LITERATURE

Basic literature	1. Rasmuson A., Anderson B., Olsson L., Anderson R. Mathematical Modeling in Chemical Engineering. Cambridge University Press, New York, 2014. 2. Seinfeld J.H., Lapidus L. Mathematical methods in chemical engineering, Vol. 3, Process modeling, estimation, and identification. Prentice-Hall, 1974.
Supplementary literature	1. Aliev A.V., Mishchenkova O.V., Lipanov A.M. Mathematical modeling and numerical methods in chemical physics and mechanics. Apple Academic Press: CRC Press/Taylor & Francis Group, 2016.

8. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE EXPECTED LEARNING OUTCOMES EXPRESSED IN TIME AND ECTS CREDITS

Student's activity		Student workload– number of hours
Classes conducted under a direct supervision of an academic teacher or other persons responsible for classes	Participation in classes indicated in point 1B	45
	Supervision hours	20
Student's own work	Preparation for classes	30
	Reading assignments	10
	Other (preparation for exams, tests, carrying out a project etc)	20

Total student workload	**125**
Number of ECTS points	**5**