

<b>Course title</b> Matematyka/Mathematics		<b>ECTS code</b> 7.2.0615	
<b>Name of unit administrating study</b>  <b>Faculty of Chemistry</b>			
<b>Studies</b>			
<b>Field of study</b>	<b>Type</b>	<b>Form</b>	
Environmental Protection	Bachelor	Full-time studies	
<b>Teaching staff</b> Dr Danuta Jaruszewska-Walczak			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b> 3	
<b>A. Forms of classes, in accordance with the UG Rector's regulations</b> lecture, audytorium classes		classes - 75 h tutorial classes - 30 h student's own work - 145 h TOTAL: 250 h - 10 ECTS	
<b>B. The realization of activities</b> In-class learning			
<b>C. Number of hours</b> lecture 30 h, audytorium classes 45 h			
<b>The academic cycle</b> 2019/2020 winter semester			
<b>Type of course</b> obligatory		<b>Language of instruction</b> Polish	
<b>Teaching methods</b>  Problem lecture Case studies		<b>Form and method of assessment and basic criteria for evaluation or examination requirements</b>	
		<b>A. Final evaluation, in accordance with the UG study regulations</b> Course completion (with a grade), exam	
		<b>B. Assessment methods</b>  Test, written exam with open questions	
		<b>C. The basic criteria for evaluation or exam requirements</b>  Results of exam and tests. Activity during classes.	
<b>Required courses and introductory requirements</b> none			
<b>Aims of education</b>  Introduction of elementary definitions in differential and integral calculus and linear algebra; acquiring the ability to solve basic problems in this field			
<b>Course contents</b>  <b>Limits, continuous functions. Closed, open and connected sets. Weierstrass theorem and Darboux theorem. Derivatives and differential. Interpretations: velocity, acceleration, tangential, elasticity. Monotonicity, d'Hospital principle, Taylor formula, approximations. Local and global extrema, minimum and maximum of real functions on closed intervals. Indefinite and definite integrals, geometric interpretation. Differential calculus of multivariable functions. Gradient, Jacobian matrices, Hessian. directional derivatives. Local extrema, conditional extrema.</b>  <b>Complex numbers. Vector space, basis, linear mappings, multilinear mappings. Matrices, determinants, range, Kronecker-Capelli theorem, method of Gauss elimination. Determinancy, Sylvester criterion.</b>			

### **Bibliography of literature**

#### **A. Literature required to pass the course**

- R. Kowalczyk, K. Niedziałowski, C. Obczyński, *Matematyka dla studentów i kandydatów na wyższe uczelnie*. Repetytorium, PWN.
- R. Kowalczyk, K. Niedziałowski, C. Obczyński, *Granice i pochodne. Metody rozwiązywania zadań*, PWN.
- R. Kowalczyk, K. Niedziałowski, C. Obczyński, *Całki. Metody rozwiązywania zadań*, PWN.
- P. Kajetanowicz, J. Wierzejewski, *Algebra z geometrią analityczną*, PWN.
- W. Krysicki, L. Włodarski, *Analiza matematyczna w zadaniach*. Część 1, PWN.

#### **B. Extracurricular readings**