

Study program: Mechanical engineering			
Type and level of studies: Doctoral studies			
Course unit: Design of Experiments			
Teacher in charge: Prof. Dr Mišo Bjelić			
Language of instruction: English			
ECTS: 5			
Prerequisites: None			
Semester: Summer			
Course unit objective: Introduction to the mathematical theory of modern concepts of planning and analysis of experiments and possibilities of application of the methodology DOE (Design of Experiments) to solve the problem of optimization technology and manufacturing processes.			
Learning outcomes of the course unit Mastering complex statistical methods and procedures for planning and analysis of experiments in order to solve practical engineering and scientific problems.			
Course unit contents			
<i>Theoretical classes</i>			
<ul style="list-style-type: none"> • Experiment as an object of scientific investigation. • Basis of statistical concepts. The role of statistics in the design and analysis of experiments. Mathematical and statistical modeling. Statistical inference. • Basic methods in the theory of experiments. The division of experimental plans. Analysis of variance (ANOVA). One-factor plans. Two-Factor plans. Multifactor plans. • Regression analysis. Basic concepts. Simple linear regression model. Simple curvilinear regression. Model of a multiple linear regression. Models of multiple nonlinear regressions. • Experiments with mixtures (experiments with mixtures). The properties of the mixture. Simplex plan. Scheffe's simplex plan. Draper-Lawrence plan. The basic regression models. The graphical representation of the model in a triangular coordinate system. • Special plans for process improvement. Taguchi methods. 			
<i>Practical classes</i>			
The practical realization of experiments in the laboratory			
Literature			
Douglas C. Montgomery, <i>Design and Analysis of Experiments</i> , Eight Edition, A John Wiley&Sons, 2013. R.L.Mason, R.F.Gunst, J.L.Hess, <i>Statistical Design and Analysis of Experiments, With Applications to Engineering and Science</i> , Second Edition, A John Wiley&Sons Publication, Hoboken, New Jersey, 2003. G.P.Box, N.R.Draper, <i>Response Surfaces, Mixtures, and Ridge Analyses</i> , Second Edition, A John Wiley&Sons Publication, Hoboken, New Jersey, 2007. J. Cornell, <i>A Primer on Experiments with Mixtures</i> , A John Wiley&Sons Publication, Hoboken, New York, 2011. R.H. Myers, D.C. Montgomery, C.M. Anderson-Cook, <i>Response Surface Methodology</i> , 4th Edition, Wiley, 2016.			
Number of active teaching hours			Other classes
Lectures: 3	Practice: 1	Other forms of classes: Independent work: 1	
Teaching methods Lectures. Numerical computational exercises. Seminar. The practical realization of experiments in the laboratory.			
Examination methods (maximum 100 points)			
Exam prerequisites	No. of points:	Final exam	No. of points:
Student's activity during lectures		oral examination	
practical classes/tests	40	written examination	
Seminars/homework		
Project	60		
Other			
Grading system			
Grade	No. of points	Description	
10	91-100	Excellent	
9	81-90	Exceptionally good	
8	71-80	Very good	
7	61-70	Good	
6	51-60	Passing	
5	Less than 51	Failing	