

<b>Study program: Production engineering</b>			
<b>Type and level of studies:</b> Master studies (second level of studies) - vocational studies			
<b>Course unit: Modeling of a complex product</b>			
<b>Teacher in charge: Jovanović R. Jelena</b>			
<b>Language of instruction: English</b>			
<b>ECTS: 6</b>			
<b>Prerequisites: -</b>			
<b>Semester:</b> Winter			
<b>Course unit objective:</b> Introduction students to the methods and techniques for modeling a complex product			
<b>Learning outcomes of Course unit:</b> Mastering methods and techniques for describing a complex product in the conditions of modern production and easier application of modern software tools			
<b>Course unit contents:</b>			
<b>Theoretical classes</b>			
<u>Introduction to Graph Theory:</u> The graph, concept, definition and main characteristics. Graph tree (tree). Root tree.			
<u>Modeling of structure of the complex product:</u> Product and complex product. A complex product design composition. Graph of the technological structure of complex product (unoriented, oriented and oppositely oriented).			
<u>Application of the technological structure of complex product:</u> Transformation of graphs of the technological structure of the complex product; Gantt charts (earliest and latest beginning); Network planning techniques (CPM, PERT and PDM).			
<u>Development of programs for modeling complex product and application of appropriate software tools.</u>			
<b>Practical classes</b>			
Exercises include the application of the course material in solving practical problems (tasks) with appropriate software support.			
Application of set theory and graph theory to describe the production program and structure of complex product. Case study: Introduction to the technical-technological and production-planning documentation of the complex product which are in the production program of the "Sloboda" Co., Čačak. Application of developed theoretical models to describe the structure of the selected complex product. Application of Mathematica software package.			
<b>Literature:</b>			
1. J. Jovanović, Investigation of the production cycle management process of a complex product, Doctoral dissertation, Faculty of Mechanical Engineering, University of Belgrade, Serbia, 2015.			
2. R. Đukić, J. Jovanović, Organization production, Technical College of Applied Studies Cacak, Cacak, 2010.			
3. R. Đukić, J. Đukić, Production planning, Technical College of Applied Studies Cacak, Cacak, 2007.			
4. R. Đukić, J. Jovanović, Production process management - Practicum, Technical College of Applied Studies Cacak, Cacak, 2011.			
5. R. Diestel, Graph Theory, Springer-Verlag Heidelberg, New York, 2005.			
6. D. Stevanović, S. Simić at all., Discrete Mathematics-Fundamentals of Combinatorics and Graph Theory, Mathematical Society of Serbia, Beograd, 2008.			
7. J. Jovanović, D. D. Milanović, Ž. Adamović, R. Đukić, Models for describing the structure of product and projection of manufacturing cycle, 16th International research/expert Conference, TMT 2012, Dubai, UAE, 2012.			
8. J. Jovanović, D. Milanović, M. Radović, R. Đukić, Investigations of time and economic dimensions of the complex product production cycle, Journal of Applied Engineering Science, vol. 10, no. 3, p153-160, Institute for Research and Design in Economics, Beograd, 2012.			
9. S. Wolfram, The Mathematica Book, 5th ed., Wolfram Media, 2003.			
<b>Number of active teaching hours: 6</b>		<b>Lectures: 3</b>	<b>Practice: 3</b>
<b>Teaching methods:</b> Verbal, documentary and demonstration methods. Methods of practical work and verbal methods (dialogue) during the preparation of the project task (case studies). Testing knowledge, assessment and the method of examinations. Exam is written and / or oral.			
<b>Examination methods ( maximum 100 points)</b>			
<b>Exam prerequisites</b>	<b>No. of points: 40</b>	<b>Final exam</b>	<b>No. of points: 60</b>
Student's activity during lectures	<b>10</b>	written examination	<b>60</b>
Practical classes/tests	<b>10</b>		
Project	<b>20</b>		