Faculty of Mechanical Engineering / MECHANICAL ENGINEERING / RELIABILITY

Course:	RELIABILITY			
Course ID	**Course status**	**Semester**	**ECTS credits**	**Lessons** (Lessons+Exercises+Laboratory)
1627	Mandatory	6	4	2+2+0
Programs	MECHANICAL ENGINEERING			
Prerequisites	No conditions for login and listening subject			
Aims	In this subject is taught reliability as a higher degree of accuracy of calculations in relation to degree of safety. Is taught methodology which yourself based on experimental data gain the legality of allocation operating and critical condition.			
Learning outcomes	Upon completion of this course the student will be able to: 1. determine reliability indices (the frequency of appearance demission, cumulative the frequency of appearance demission, reliability and intensity demission), as well as that determine a statistical reliability indices (mean, mediana, mod, varians and standard deviation) 2. determine distribution law demission (normal distribution, log-normal distribution or weibull distribution), on the basis of an experimental questioning and statistical planning questioning and analytical the method 3. determine reliability of the system with serially connected elements, with the system parallel connected elements and with specific connection elements (quasi serially connected and quasi parallel connected) 4. calculating the reliability of machine elements, based on knowledge of allocation working stress and critical stress, using the general equation for analytical determination of reliability 5. execute the calculation of machine elements on the basis of the reliability, based on considerations of reliability in the design process, by treating the each parameter as random variable size which belongs to the normal distributions			
Lecturer / Teaching assistant	Prof. Dr Radoš Bulatović			
Methodology	Lectures, exercises, homeworks, colloquiums and laboratory exercises			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	The effectiveness of the system. The definition of reliability. Reliability and the life cycle of the system. Notion effectiveness of the system. Effectiveness as part of the value system. Concepts effectiveness of the system. Parameters effectiveness of			
I week exercises	The effectiveness of the system. The definition of reliability. Concepts effectiveness of the system. Parameters effectiveness of the system.			
II week lectures	Time categories. Connection between parameters effectiveness of the system and temporal category.			
II week exercises	Connection between parameters effectiveness of the system and temporal category.			
III week lectures	The functions of reliability. The function of allocation demission. The function of the intensity demission. Expected time work without failure.			
III week exercises	The functions of reliability. The function of allocation demission. The function of the intensity demission. Expected time work without failure. Homework.			
IV week lectures	Distributions that are used in reliability theory. Exponential distribution. Normal distribution. Log-normal distribution. Weibull distribution. Gamma distribution.			
IV week exercises	Exponential distribution. Normal distribution. Log-normal distribution. Weibull distribution. Gamma distribution.			
V week lectures	Models the intensity of demission. Assessment indicators of proper operation. A small sample. The method of ranking. Rank 5% and rank 95%. Medijalni rank 50%. The large sample. Using Weibull paper.			
V week exercises	Models the intensity of demission. Assessment indicators of proper operation. A small sample. The method of ranking. Rank 5% and rank 95%. Medijalni rank 50%.			
VI week lectures	I Colloquium			
VI week exercises	The large sample. Using Weibull paper. Homework.			
VII week lectures	Reliability of the system. Models of system reliability. The system serially connected elements. The system parallel connected elements. Systems with partially parallel connections.			
VII week exercises	The system serially connected elements. The system parallel connected elements. Systems with partially parallel connections.			
VIII week lectures	Systems with unladen and facilitated a spare elements. Systems with a mix of related elements.			

VIII week exercises	Systems with unladen and facilitated a spare elements. Systems with a mix of related elements.
IX week lectures	Working and critical condition machinery and parts. Working load and stresses in conditions exploitation. Critical stress for constant working stress. Dynamic endurance for constant amplitude working stress (basic endurance). Dynamic endurance for a varia
IX week exercises	Working load and stresses in conditions exploitation. Critical stress for constant working stress. Dynamic endurance for constant amplitude working stress (basic endurance). Dynamic endurance for a variable amplitude working stress (working endurance).
X week lectures	Determination of reliability elements machine systems. Causes of occurrence demission and malfunctioning elements machine systems. Possible mode determining reliability. Determining failure probability based on anticipated wastage working and critical loa
X week exercises	Possible mode determining reliability. Determining failure probability based on anticipated wastage working and critical loads. Application of calculation and check reliability. Homework.
XI week lectures	Reliability in the process designing. Methodology designing on based on reliability. The equation for analytical determination of reliability. Graphical determination of reliability.
XI week exercises	The equation for analytical determination of reliability. Graphical determination of reliability.
XII week lectures	Method partial excerpts. Determination of reliability for various combinations distribution working and critical loads.
XII week exercises	Method partial excerpts. Determination of reliability for various combinations distribution working and critical loads.
XIII week lectures	Reliability in the designing process machine elements. Elements of the system force. The center of gravity. Moment of inertia. Elements exposed stretching.
XIII week exercises	Elements of the system force. The center of gravity. Moment of inertia. Elements exposed stretching.
XIV week lectures	Beam elements exposed to the activities concentrated loads and continual loads. Consoles and both sides wedged beams. Elements exposed compressive force. Elements exposed torsion. Homework.
XIV week exercises	Beam elements exposed to the activities concentrated loads and continual loads. Consoles and both sides wedged beams.
XV week lectures	II Colloquium
XV week exercises	Elements exposed compressive force. Elements exposed torsion.
Student workload	2 hours of lectures and 1 hour exercises

Per week	**Per semester**
4 credits x 40/30=5 hours and 20 minuts 2 sat(a) theoretical classes 0 sat(a) practical classes 2 excercises **1 hour(s) i 20 minuts** of independent work, including consultations	Classes and final exam: **5 hour(s) i 20 minuts x 16 =85 hour(s) i 20 minuts** Necessary preparation before the beginning of the semester (administration, registration, certification): **5 hour(s) i 20 minuts x 2 =10 hour(s) i 40 minuts** Total workload for the subject: **4 x 30=120 hour(s)** Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) **24 hour(s) i 0 minuts** Workload structure: **85 hour(s) i 20 minuts (cources), 10 hour(s) i 40 minuts (preparation), 24 hour(s) i 0 minuts (additional work)**
Student obligations	Students are required to attend classes and exercises, to work and surrender homeworks and working both colloquiums.
Consultations	2 hours for individual work and consultations
Literature	1. Nikola Vujanovic, Teorija pouzdanosti tehničkih sistema, 2. Svetislav Jovičic, Osnovi pouzdanosti mašinskih konstrukcija, 3. Dragan Milčić, Pouzdanost mašinskih sistema, 4. Milosav Ognjanović, Metodika konstruisanja mašina, Radoš Bulatović, Pouzdanost,
Examination methods	Attendance at lectures 4%, homeworks 4% each (total 16%), colloquiums 15% each (total 30%) and are prerequisite for final exam. Final exam 50%. Grading Scale: 100% - 90% A; 90% - 80% B; 80% - 70% C; 70% - 60% D; 60% - 50% E; 50% - 0% F
Special remarks	
Comment	For addtional information on subject contact proffesor

Grade:	F	E	D	C	B	A

Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points