University: University of Žilina	
Faculty: Faculty of Mechanical Engineering	
Course ID: 2Y015	**Course name:** Experimental Methods in Mechanics
Course obligation: Electorial **Completion:** Exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 2 classes Seminars: 0 classes Lab.exercises: 2 classes
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	**Lectures:** motivational speaking, problem as motivation, presentation, description, narration, brainstorming **Laboratory:** demonstration, update of curriculum content, peer learning, practical exercises, problem solving, brainstorming, evaluation of paper solutions
Number of credits: 6	
Study workload: 130 hours;	
Recommended semester/term of study: summer, 1. year	
Study degree: 2	
Required subsidiary courses: Prerequisites: Co-requisites:	

Course requirements:

Continuous assessment / evaluation:

Evaluation of student activity and correctness of procedures of solving examples in exercises.

Final assessment /evaluation:

The test is in the form of presentation of the results of solving the given examples, max 60 points.
In particular, an understanding of the physical nature of the problems solved and a critical assessment of the results are evaluated. Results processing and output quality, logical structure and graphical processing are also evaluated.

Resulting subject classification:

Grade A: minimum 93 points
Grade B: minimum 85 points
Grade C: minimum 77 points
Grade D: minimum 69 points
Rating E: minimum 61 points
FX rating: less than 61 points
To enroll for an exam the student must have at least 20 points.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 continuous test	20	Professional knowledge
interim reports, presentation and active participation in exercises	20	professional knowledge, self-study and work with information, presentation skills, ability to solve a problem independently
semester work	20	professional knowledge, work with information, processing, analysis and interpretation of data, self-study, ability to discuss and defend achieved results, individual/team work
answering questions	40	professional knowledge

Course outcomes:

By completing the subject, the student will be able to:

- know and understand the basic principles of solving relationships and regularities in the processing of data from experimental measurements,
- derive, compile and use the necessary relationships and procedures, apply your professional knowledge to solve both simple and more complex tasks of technical practice,
- analyze processed data from static and dynamic events,
- interpret the obtained results from processed measurements from the point of view of analytical and numerical calculation procedures used in statics, dynamics, flexibility and strength,
- include the results of probabilistic processing in calculation procedures taking into account the random nature of input data, with an understanding of the risk of using deterministic calculation procedures,
- using the acquired knowledge, apply the methods of creating a virtual measurement system and post processing, when analyzing random processes, recognize the appropriateness of using individual methods and use them independently,
- analyze, describe, evaluate, document and defend the obtained results and create a final evaluation independently and in a team.

Emphasis is placed on solving problems of technical practice and interpreting the results. The acquired knowledge can be used in all engineering disciplines and forms a strong basis for comparing the results of calculation and experimental procedures, as well as for further active expansion of the acquired professional knowledge.

Course scheme:

1. Random vector, multidimensional distributions. Random processes, distribution, properties.
2. Probability of reaching the limit state. Interference theory of reliability.
3. Pseudorandom number generator. Simulation of fault conditions. Monte Carlo method.
4. Probabilistic interpretation of test results. Point and interval estimates. Estimates of distribution parameters.
5. Censored data sets. Probability papers.
6. Introduction to the NI LabVIEW program system, philosophy, sample examples and their modification.
7. Signal generation, processing, documentation in the LabVIEW SignalExperess system.
8. Processing of the generated data in the NI DIADEm environment.
9. Programming in the LabVIEW development environment. Basic features of the language.
10. Processing realizations in the time domain.
11. Processing realizations in the frequency domain.
12. Processing the implementation of non-stationary processes.
13. Use of virtual tools to manage data collection.

The contents of the exercises correspond to the lecture outline of the subject

Literature:

1. SÁGA, M. a kol.: Vybrané metódy analýzy a syntézy mechanických sústav. VTS pri Žilinskej univerzite, Žilina, 2009, ISBN ISBN 978-80-89276-17-2
2. DEKÝŠ, V. – SÁGA, M. – ŽMINDÁK, M.: Dynamika a spoľahlivosť mechanických sústav, VTS pri Žilinskej univerzite, Žilina, 2009, ISBN 80-969165-2-1
3. KROPÁČ, O.: Náhodné jevy v mechanických soustavách, SNTL, Praha 1987
4. SEDLÁČEK, J.: Teorie spolehlivosti mechanických systému. ČVUT, Praha 1982
5. Introduction to LabVIEW 8 in 3 Hours. www.ni.com
6. LabVIEW User Manual, www.ni.com

Instruction language: english

Notes:

Course evaluation:
Total number of evaluated students: 53

A	B	C	D	E	FX
75.47 %	18.87 %	3.77 %	1.89 %	0.00 %	0.00 %

Course teachers:
Lecture: doc. Ing. Vladimír Dekýš, CSc.
Laboratory: doc. Ing. Vladimír Dekýš, CSc.

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Approved by: doc. Ing. Vladimír Dekýš, CSc.