ACADEMIA ROMÂNĂ - SCOSAAR
DOCTORAL SCHOOL OF ENGINEERING, MECHANICAL, COMPUTER SCIENCES

DISCIPLINE SHEET

Name of discipline: STATISTICS APPLIED IN ENGINEERING
Holder of course activities: CSI dr. ing. Mihaiela ILIESCU
Year of study: 1

Number of hours per week/Checking/Credits:		
Course	**Form of examination**	**Credits**
Experimental course / module 6 / 9	Examination	15

A. DISCIPLINE OBJECTIVES (Objectives are formulated in terms of professional competences):

General objective of the discipline	• Knowledge and understanding of statistical methods – applied in engineering.
Specific objectives:	• Identifying optimal methods for achieving experiments. • Knowledge of data acquisition techniques, selection of significant data. • Statistical representation of data. Statistical data processing techniques. • Application of estimation techniques Regression methods, determination of regression patterns. • Initiation and training with software specific to Applied Statistics • Analysis and interpretation of results, from the point of view of statistical research.

B. CONDITIONS (where applicable)

course development	• computer, projection system, software: DOE KISS ProXL, SPC KISS, ANOVA

C. SPECIFIC COMPETENCES ACCUMULATED (Refers to the competences provided by the study program to which the discipline belongs;)

Professional skills	• Increased ability to analyze, interpret and process data • Ability to elaborate scientific papers and experimental reports • Ability to critically interpret research results • Ability to quickly and correctly understand and evaluate new information • Modeling, simulation, validation capability
Transversal competenţe	• Teamwork skills • Oral and written communication skills • Respecting and developing professional values and ethics • Adaptation to new technologies, professional and personal development, through continuous training

D. CONTENT OF THE DISCIPLINE

a) Course

Chapter	Content	No. of hours
1.	Aspects of probability theory	6
2.	Discrete random variables	9
3.	Continuous random variables	9
4.	United probability distributions	6
5.	Data selection	6
6.	Hypothesis tests	6
7.	Explore analytics	6
8.	Simple regression and correlation	6
9.	Multiple regression and correlation	9
10.	Design of uni-factorial experiments	6
11.	Design of multi-factor experiments	9
12.	Statistical quality control	6
	Total Hours **6 x** 14 (Weeks)	**84**

b) Experimental module - applied statistics

Chapter	Content	No. of hours
1.	Probability theory	9
4.	Random variables. Distributions	18
5.	Data Selection / Exploration	18
8.	Regression	36
9.	Design experiments	27
10.	Case Studies	18
	Total Hours 9 x 14 (Weeks)	**126**

E. EVALUATION (The methods, forms of evaluation and their weight in establishing the final grade are specified. Indicate minimum performance standards in relation to the competences defined in point **A. Objectives of the discipline**)

Activity Type	Assessment criteria	Assessment methods	Share of final grade
Course	-Accuracy and quality of treatment of exam topics	Written exam	55%
Experience mode	- Application of knowledge acquired in the course	Theme - experimental	45%
Minimum performance standard: Knowledge of 70% of the information presented at the course and seminar			

The results of the subject evaluation are quantified in grades, expressed on a scale from 10 to 1, with a minimum threshold of passing grade 5 (five). The stipendium awarded to doctoral students is suspended if they fail to obtain at least grade 8 (eight)

F. METHODOLOGICAL MILESTONES_

Lecture combined with dialogue. Use of modern means of training (ppt). Course support.

G. CORROBORATING THE CONTENTS OF THE DISCIPLINE WITH THE EXPECTATIONS OF REPRESENTATIVES OF THE EPISTEMIC COMMUNITY, PROFESSIONAL ASSOCIATIONS AND EMPLOYERS REPRESENTATIVE IN THE FIELD RELATED TO THE PROGRAM_

1. The discipline provides a wide background of fundamental and practical knowledge on modern methods research, experimentation, data analysis / processing, interpretation of results, etc.
   - The discipline provides basic elements that help the doctoral student in the specialties of Mechanical Engineering in carrying out research.

H. BIBLIOGRAPHY_

1. Chambers J., Cleveland W., Kleiner B., Tukey F., *Graphical Methods for Data Analysis*, Wadsworth & Brooks/Cole, Pacific Grove, CA, 1983.
2. Douglas C. Montgomery, Goerge C. Runger, *Applied Statistics and Probability for Engineers*, John Wiley & Sons, Inc., USA, 2003.
3. Duncan A. J., *Quality Control and Industrial Statistics*, 5th edition, Richard D. Irwin, Homewood, Illinois, 1986.
4. Hines W. W., Montgomery D. C., *Probability and Statistics in Engineering and Management Sciences*, John Wiley & Sons, Inc., USA, 2003.
5. Mihaiela Iliescu „Teoria Probabilităţilor şi Statistică Aplicată", ISBN 978-606-610-044-1, editura BREN, 2013
6. Militaru, C., Iliescu M, *Statistică aplicată în inginerie şi economie*, Editura Bren, Bucureşti, ISBN 943-648-561-7, 2006.
7. Milton, J.S., Arnold, J.C., *Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences*, McGraw-Hill, 1990.
8. Montogomery D. C., *Introduction to Statistical Quality Control*, 4th edition, John Wiley & Sons, Inc., USA, 2001.
9. *NIST/SEMATECH e-Handbook of Statistical Methods*, 2006 http://www.itl.nist.gov/div898/handbook/, date.
10. Stephen R. Schmidt, Robert G. Launsby, *Understanding Industrial designed experiments*, Air Academy Press, Colorado, ISBN 1-880156-03-2, 2005

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