SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Electrical Engineering
1.3	Department	Electrotechnics and Measurements
1.4	Field of study	Electrical Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/ Qualification	Electrical System Cluj-Napoca in English language
1.7	Form of education	Full time
1.8	Subject code	41

2. Data about the subject

2.1	Subject name				Quality and Reliability	
2.2	Course responsible/ lecturer				Prof.dr.ing.habil. Radu A. Munteanu; radu.a.munteanu@ethm.utcluj.ro	
2.3	Teachers in charge of Seminars/ Laboratory/ Project				Prof.dr.ing.habil. Radu A. Munteanu; radu.a.munteanu@ethm.utcluj.ro Asoc.Prof.dr.ing. Dan Iudean; dan.iudean@ethm.utcluj.ro	
2.4 Year of study	3	2.5 Semester	6	2.6 Type of assessment *(E – exam, C – colloquium, V – verification)*		E
2.7 Subject category	*DF – fundamental, DD – in the field, DS – specialty, DC – complementary*					DD
	DI – compulsory, DO – elective, Dfac – optional					DI

3. Estimated total time

3.1 Number of hours per week:	3	of which	3.2 Course	2	3.3 Seminar	1	3.3 Laboratory		3.3 Project	
3.2 Total hours per semester	42	of which	3.5 Course	28	3.6 Seminar	14	3.6 Laboratory		3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	24
(b) Supplementary study in the library, online and in the field	2
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	3
(d) Tutoring	2
(e) Exams and tests	2
(f) Other activities	

3.8 Total hours of individual study *[sum (3.7(a) to 3.7(f))]*	33
3.9 Total hours per semester *[sum of 3.4 and 3.8]*	75
3.10 Number of credit points	4

4. Prerequisites (where applicable)

4.1	Curriculum	Physics, Mathematics, Probability Theory, Statistics, Electric Circuit Theory
4.2	Competences	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	

6. Specific competences

Professional competences	1. Ability to identify, formulate, and solve engineering problems in a systemic approach. 2. Ability to apply engineering knowledge. 3. Ability to use modern engineering techniques, skills, and tools necessary for engineering practice. 4. Ability to design and conduct experiments, as well as analyze and interpret the information obtained. 5. Ability to approach and manage specific applications of general electrical engineering
Cross competences	1. Identification of the objectives to be achieved, the available resources, the conditions for their completion, the work stages, the working times, the deadlines and the associated risks. 2. Responsible execution of professional tasks.

7. Discipline objectives (based on specific competencies acquired)

7.1	General objective	The aim of the course is to achieve the student's engineering contact with the techniques and analyses of reliability and quality of industrial products.
7.2	Specific objectives	After completing the course, students will be able to: • Solve technical problems involving concepts of probability theory • Calculate the reliability of a technical system, using the methods of series, parallel, mixed, transfigurable systems and fault trees • Be able to estimate the quality of an industrial product.

8. Contents

8.1. Course (Lectures)		Number of hours	Teaching methods	Additional remarks
1	Introduction to reliability. Notions of mathematical statistics	2	Onsite or online teaching (according to regulations in force), presentation, interactive means	The teaching process uses multimedia presentations (powerpoint), onsite or online interaction (according to regulations in force) with students on the issues addressed, materials
2	Fundamental theorems in probability theory	2		
3	Continuous and discrete random variables. Defects and failures	2		
4	Failure probability density. Failure rate. Failure function	2		
5	Demand analysis in the case of arbitrary distribution laws	2		
6	System reliability concepts. Series, parallel and mixed systems	2		
7	System reliability analysis. Truth table method in calculating system reliability	2		
8	Transfiguration methods for calculating reliability	2		

9	Fault trees	2		distributed to students, consultation hours, case studies.
10	Reliable design of electrical equipment. Calculation of predictive reliability, in the preliminary design phase and in the technical design phase	2		
11	Average operating time. Average uptime. Experimental characteristic of the failure rate	2		
12	Maintainability and Maintenance	2		
13	Distribution of system reliability into component blocks	2		
14	Estimation of industrial product quality. Methods for reducing fault detection time	2		

Bibliography

[1] V. Panaite, R. Munteanu - Statistical Control and Reliability, EDP Bucharest, 1982.

[2] R. Munteanu, F. Drăgan - Statistical Control and Reliability – Laboratory Guide, UTC-N, 1993.

[3] http://www.ptc.com/product/windchill

[4] T. Baron, Al. Isaic-Maniu - Quality and Reliability, Practical Manual, ET Bucharest, 1988.

[5] Gh. Mihoc, A. Muja, E. Diatcu – Mathematical Foundations of Reliability Theory, E. Dacia, 1976.

[6] Ch. E. Ebeling – Reliability and maintainability engineering, McGraw-Hill, 1997.

[7] Reliability: A Practitioner's Guide, Relex Software Corporation, Intellect, 2003

8.2. Applications - Seminar /Laboratory/Project		Number of hours	Teaching methods	Additional remarks
1	Seminar 1. Descriptive statistics: information representation, statistical tables, histograms, graphs	2	Onsite or online teaching (according to regulations in force), presentation, interactive means	The teaching process uses multimedia presentations (powerpoint), onsite or online interaction (according to regulations in force) with students on the issues addressed, materials distributed to students, consultation hours, case studies.
2	Seminar 2. Discrete random variables: distribution function, mean, dispersion, coefficient of variation, probability density, classical distributions	2		
3	Seminar 3. Calculation of probabilities, conditional probabilities, total probability, Bayes' formula	2		
	Seminar 4. Discrete probability laws: binomial, geometric, hypergeometric, Poisson	2		
	Seminar 5. Continuous probability laws: uniform, normal, gamma and beta, exponential	2		
	Seminar 6. System reliability analysis, mathematical models for calculating system reliability, reliability logic diagrams, calculating the reliability of a fault tree	2		
	Seminar 7. Calculating the average uptime of a system	2		

Bibliography

[1] V. Panaite, R. Munteanu - Statistical Control and Reliability, EDP Bucharest, 1982.

[2] R. Munteanu, F. Drăgan - Statistical Control and Reliability – Laboratory Guide, UTC-N, 1993.

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[5] Gh. Mihoc, A. Muja, E. Diatcu – Mathematical Foundations of Reliability Theory, E. Dacia, 1976.
[6] Ch. E. Ebeling – Reliability and maintainability engineering, McGraw-Hill, 1997.
[7] Reliability: A Practitioner's Guide, Relex Software Corporation, Intellect, 2003

9. Alignment of course content with expectations of the epistemic community, professional associations, and representative employers in the field

The content of the discipline is consistent with what is taught in other electrical faculties, both at the Technical University and at other university centers in the country and abroad. In order to better adapt the content of the discipline to the requirements of the labor market, meetings were held with representatives of the Cluj industrial and business environment.

10. Assessment

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade (%)
10.4 Course		Written exam	100
10.5 Laboratory		Consultations	0
10.5 Project			
10.6 Minimum standard of performance: Exam promotion (grade>5)			

Date of completion	**Lecturers**	**Title/ Surname/ Name:**	**Signature**
September 2024	Course	MUNTEANU Radu Adrian	
	Applications Seminar/ Laboratory/ Project	IUDEAN Dan	

Date of approval in the ETHM Department Council

September 2024

Head of Department:
Prof. Eng. MICU Dan Doru, PhD

Date of approval in the Faculty of Electrical Engineering Council

September 2024

Dean:
Assoc. Prof. Eng. CZIKER Andrei, PhD