SUBJECT DATASHEET

Risk and reliability

BMEGT20MN63

I. SUBJECT DESCRIPTION

1. SUBJECT DATA

Subject name
Risk and reliability

ID (subject code)	BMEGT20MN63

Type of subject
contact lessons

Course types and lessons

Type	*Lessons*
Lecture	2
Practice	0
Laboratory	0

Type of assessment
exam grade

Number of credits
3

Subject Coordinator

Name	*Position*	*Contact details*
Dr. Benedek Petra	assistant professor	benedek.petra@gtk.bme.hu

Educational organisational unit for the subject
Department of Management and Business Economics

Subject website
https://edu.gtk.bme.hu/

Language of the subject
magyar - HU, English - EN

Curricular role of the subject, recommended number of terms

Direct prerequisites

Strong	Kvantitavív módszerek / Quantitative Methods (Műszaki menedzser szakon/ on Engeneering Management program)
Weak	None
Parallel	None
Exclusion	None

Validity of the Subject Description
Approved by the Faculty Board of Faculty of Economic and Social Sciences, Decree No: 580269/9/2025 registration number. Valid from: 26.03.2025.

2. OBJECTIVES AND LEARNING OUTCOMES

Objectives

Risk and reliability are significant in engineering, technology, and financial management. The course presents economic and reliability analysis of product and process planning and operation. The fundamental objective of this subject is to present the essential reliability theory, decision theory, and compliance approaches that support management problem-solving processes. Risk and reliability play a fundamental role in these areas.

Academic results

Knowledge

1. Students know the basic concepts of reliability theory, maintenance planning, and Total Productive Maintenance (TPM).
2. Students understand the methods of solving problems that arise during plant maintenance.
3. Students know the basic mathematical indicators and methods of testing and modeling the lifetime of products and equipment.

Skills

1. By applying the learned theories and methods, students uncover, organize and analyze facts and fundamental relationships, formulate independent conclusions and critical comments, prepare decision-preparatory proposals, and make decisions.
2. Students can apply techniques for solving plant maintenance problems, considering their application conditions and limitations.
3. Students can calculate product/technology indicators and conclude from them.

Attitude

1. Students are open and receptive to new results of economic science and practice.
2. Students are committed to their profession, know and accept its basic values and standards, and strive to interpret and develop them critically.
3. Students are driven by curiosity, the desire to learn facts and connections during their professional work.

Independence and responsibility

1. Students use a systematic approach in their thinking.
2. Students take responsibility for their analyses, conclusions and decisions.
3. Students are independent, constructive and assertive in cooperation within and outside the institution.

Teaching methodology

Lectures, optional individual and groupwork tasks.

Materials supporting learning

- Kötelező irodalom a tárgyhoz készített jegyzet, a tanuláshoz felhasználandó az előadásokon bemutatott prezentációk. / Mandatory literature is the notes prepared for the subject, and the presentations presented at the lectures.
- Dr. Kövesi J.: Megbízhatóságelméleti alapok. Oktatási segédanyag, 2024.
- Dr. Kövesi J. (szerk): Minőség és megbízhatóság a menedzsmentben. Typotex Kiadó, Budapest, 2011
- Dr. Kövesi J. – Erdei J. – Dr. Tóth Zsuzsanna Eszter: Döntéselmélet és döntésmódszertan. Oktatási segédanyag, 2024.
- Dr. Benedek P. – Dr. Bognár F.: Kockázatértékelés. Oktatási segédanyag, 2024
- David J. Smith: Reliability, Maintainability and Risk: Practical Methods for Engineers

II. SUBJECT REQUIREMENTS

TESTING AND ASSESSMENT OF LEARNING PERFORMANCE

General Rules

The assessment of the learning outcomes set out in point 2.2. The course ends with an exam grade, which can be obtained as a written exam at the end of the semester. The signature requirement is that the student achieves the minimum score (10 points) during the practical
classes held during the semester. An optional partial performance evaluation (active participation) can be used to earn extra points for the exam grade during the semester.

Performance assessment methods

A. Detailed description of performance evaluations during the working period: There will be three practical lessons during the semester, the dates of which will be announced at the beginning of the semester and published on the subject's website. In these classes, students can earn a maximum of 10 points each by solving practical tasks independently or in small groups. The requirement for obtaining the signature is that the student obtains at least 10 points from the tasks. There is no other way to obtain a signature. Due to their nature, the exercises are non-replaceable assessments. Therefore, according to the TVSz, to obtain the signature of the three exercises, we calculate the score of the two most favorable exercises for the student. By actively participating in the contact classes, students can get plus points later added to the exam result. Lecture plus points cannot be included in obtaining a signature. For a student, at most 20% of the maximum score can be taken into account as a plus point. For those students who scored more than the maximum 20 points in the practical classes - which indicates active class work - the part above 20 points is reported as a separate class score in the exam grade. B. Performance evaluation during the exam period (exam): The exam grade can be obtained in the written exam at the end of the semester. The final evaluation also includes the practical score obtained during the semester for obtaining the signature. The exam consists of essay-type theoretical questions, short explanatory questions, possibly tests, and the solution of practical tasks. To solve the tasks, you can use the published collection of formulas and a calculator that does not exceed the level of a scientific calculator. No other aid can be used. The maximum score of the exam is 80 points, to which the maximum 20 points for obtaining a signature
is added. (+ individual points collected by active class participation).

Percentage of performance assessments, conducted during the study period, within the rating

- **1st practice**: 50
- **2nd practice**: 50
- **Active participation**: 20
- **Total**: 100

Percentage of exam elements within the rating

- **mid-year performance evaluation (exercises)**: 20
- **Active participation**: 20
- **Exam**: 80
- **Total**: 100

Conditions for obtaining a signature, validity of the signature

The requirement for obtaining the signature is that the student receives at least 10 points from the 3 tasks.

Issuing grades

Excellent	86
Very good	80-85
Good	70-79
Satisfactory	60-69
Pass	50-59
Fail	0-49

Retake and late completion

1) A failed exam can be repeated according to the study and examination regulations (TVSZ). 2) Due to their nature, active participation
and class exercises cannot be replaced or repeated in any other way.

Coursework required for the completion of the subject

participation in contact classes	24
preparation for classes	26
preparation for exam	40
total	90

Approval and validity of subject requirements

Consulted with the Faculty Student Representative Committee, approved by the Vice Dean for Education, valid from: 03.03.2025.

III. COURSE CURRICULUM

THEMATIC UNITS AND FURTHER DETAILS

Topics covered during the term

The subject consists of the following thematic blocks to achieve the learning outcomes set out in point 2.2. Each semester the syllabus schedules these topics according to the calendar and other conditions.

1 Reliability theory foundations, fault-freeness.
2 Basic reliability distributions.
3 Errors made during sampling and inference.
4 Recoverable elements and systems.
5 Reliability-based maintenance.
6 Decision theory foundations.
7 Ranking methods. Paired comparison.
8 Group decisions. Rank correlation
9 Risk management foundations
10 Risk assessment methods
11 Theoretical distributions used in reliability theory.
12 Parameter estimation and distribution analysis.
13 System reliability.
14 Failure analysis methods.
15 Investigating recoverable systems. Repairability and durability indicators.
16 Basic maintenance strategies.
17 Total Productive Maintenance (TPM)

Additional lecturers

Dr. Kövesi János	professor emeritus	kovesi.janos@gtk.bme.hu
Erdei János	mesteroktató	erdei.janos@gtk.bme.hu
Fatma Aslan, PhD	postdoctor researcher	aslan.fatma@gtk.bme.hu

Approval and validity of subject requirements