

MODULE INFORMATION SHEET

Name of Module Unit	Reliability, Safety and Risk of Engineering Systems
Name in polish language	Niezawodność, bezpieczeństwo i ryzyko systemów inżynierskich
Module type	compulsory / elective
Form of studying	full-time day courses
Level of study	graduate course (M.Sc. level)
Type of study (for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environment Protection Engineering
Responsible department	Dept. of Water Supply and Wastewater Management
Responsible person	dr inż. Katarzyna Miszta-Kruk

Semester	Lectures(E)	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
1	-	30	-	-	-	2

Learning outcomes (knowledge, skills, competences)

To introduce students to the fundamentals of reliability, safety and risk in engineering systems and facilities. To apply scientific applications in reliability theory and safety and risk assessment methods to solve problems that arise in the design, construction, maintenance and operation of engineering facilities.

Student has detailed, theoretically underpinned knowledge of, modeling, design, construction, modernization and operation of facilities and networks using reliability theory. Student knows and understands the current directions of development and modernization of water and wastewater systems in terms of increasing their reliability, safety and risk. Has the established knowledge necessary to conduct reliability studies and analysis of water and wastewater facilities and networks.

Can obtain data and independently perform rate calculations and assess the reliability of water and wastewater facilities and networks. He is skilled in the use of experimental methods in the study of reliability, safety and risk of engineering facilities under operating conditions.

He understands the need for continuous training and improvement of professional and personal competencies. He is aware of the importance of non-technical aspects and consequences of engineering activities, including their impact on the environment, and the associated responsibility for decision-making. He is aware of the need to observe professional ethics and respect the law including copyright.

Prerequisites

Basic knowledge of mathematics, network systems i.e.: water supply, sewerage. Proficiency in performing basic engineering calculations. Reliability, accuracy and punctuality. Willingness to think independently, logically, draw conclusions and make decisions responsibly. Knowledge of basic computer programs of the MSOffice type program.

Rules for integrated grade setting

The examination mark

Recommended readings

1. E. Zio: An Introduction to the basics of Reliability and Risk Analysis (Series on Quality, Reliability and Engineering Statistics Vol. 13), World Scientific, 2007 New Jersey-London
2. M.T. Todinov: Reliability and Risk Models: Setting Reliability Requirements. John Wiley & Sons, Chichester 2005
3. E. Zio: Computational Methods for Reliability and Risk Analysis (Series on Quality, Reliability and Engineering Statistics Vol. 14), World Scientific, 2009 New Jersey-London
4. Kwietniewski M., Roman M., Kłoss-Trębaczekiewicz H.: Niezawodność wodociągów i kanalizacji, Arkady, Warszawa 1993
5. Rak J., "Bezpieczeństwo systemów zaopatrzenia w wodę.", Wyd. Instytut Badań Systemowych PAN. Warszawa, 2009
6. Ajit Kumar Verma, Ajit Srividya, Durga Rao Karanki: Reliability and Safety Environmental Engineering. 2010 Springer,
7. Web pages: Springer Series in Reliability Engineering - <https://www.springer.com/series/6917> - on-line access

Contents of tutorials (syllabus)

	Topics	Time (hrs.)	Scope (S / Ex)
1	Introduction to reliability theory. Reliability models of engineering systems. Reliability measures and indicators. Methods for assessing the reliability of plumbing, heating and cooling systems.	10	S
2	Reliability tests. Functional criteria for reliability of engineering systems. Engineering facilities. Basics of risk assessment of malfunctioning systems.	10	S
3	Conditions and methods of safety assessment. Fundamentals of risk and safety management.	10	S
Total		30	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Teachers of tutorials

dr inż. Katarzyna Miszta-Kruk; dr inż. Jarosław Chudzicki; dr inż. Klara Ramm

Assessment method

Written credit, colloquium - at least 60% of the required number of points.