Fire University of Warsaw, Poland
Faculty of Security Engineering and Civil Protection
Syllabus 2018 -

Safety engineering of firefighting machines and facilities

UWAGA: conducted in the winter semester

profile	general academics
degree	first degree
programme	ERASMUS
semester	1
part time / full time	full time
ECTS	5
coordinator	mł. bryg. dr inż. Agata Walczak

form of the activity: exercise

hours	30
prerequisites	Basic knowledge of mathematics and physics (a secondary school level), knowledge of mechanics, strength of materials and materials science, principles of technical drawing
objectives	The main aim of the course is to familiarise students with the broad subject of safety engineering of machines and facilities, especially those used in firefighting. Provided classes are to make students be able to determine and predict failures that occur as a result of exploitation of machines and facilities
methods	Students solve problems through calculation, students complete three practical projects
own work	The student must gain theoretical and practical knowledge from exercises
basic literature	1. Szopa T: Niezawodność i bezpieczeństwo. Oficyna Wydawnicza politechniki warszawskiej, Warszawa 2016. 2. RAMS analysis of railway vehicles' lifecycle. Szkoda M., Kaczor G. Journal of KONBiN 41(2017). 3. PN-EN 61703:2016-12. Mathematical expressions for reliability, availability, maintainability and maintenance support terms
supplementary literature	1. B.Bertsche: Reliability in Automotive and Mechanical Engineering Determination of Component and System Reliability, Series: VDI-Buch Springer Verlag 2008.

contents	hours
Reliability of non-renewable objects. Reliability models, empirical reliability characteristics	3
Reliability of renewable objects. Reliability models, empirical reliability characteristics	3
Reliability structures of complex objects	2
Analyses of renewable objects	6

The structure and importance of a fault tree	4
Properties of construction materials used in firefighting machines and facilities considering maintenance conditions - determination of essential parameters, research planning	6
Properties of firefighting machines and facilities - strength and fatigue	6

form of the activity: exercise

hours	30
prerequisites	Basic knowledge of mathematics and physics (a secondary school level), knowledge of mechanics, strength of materials and materials science, principles of technical drawing
objectives	The main aim of the course is to familiarise students with the broad subject of safety engineering of machines and facilities, especially those used in firefighting. Provided classes are to make students be able to determine and predict failures that occur as a result of exploitation of machines and facilities
methods	Visualized lectures (Power Point)
own work	The student must gain theoretical and practical knowledge from lectures
basic literature	1. Szopa T: Niezawodność i bezpieczeństwo. Oficyna Wydawnicza politechniki warszawskiej, Warszawa 2016. 2. RAMS analysis of railway vehicles' lifecycle. Szkoda M., Kaczor G. Journal of KONBiN 41(2017). 3. PN-EN 61703:2016-12. Mathematical expressions for reliability, availability, maintainability and maintenance support terms. 4. Fatigue of structures and materials. J. Schijve. Springer Science & Business Media, 2008.
supplementary literature	1. Tribology. Friction and wear of engineering materials. I. Hutchings, P. Shipway. Butierworth-Heinemannc, 2017.

contents	hours
Technical engineering safety. Human-technology-environment system. The role of particular elements.	2
Losses, adverse events, risk, danger, safety. Risk, reliability and hazard measures.	3
Types and properties of construction materials used in firefighting machines and facilities.	4
Rules related to choosing construction materials depending on various technical applications.	2
Technical objects. The classification of machines and facilities, life cycles of technical objects, models of maintenance and operation systems, properties of renewable and non-renewable objects.	4
Usability and non-usability. Failures of machines and facilities.	2
Reasons for failures. Destruction mechanisms. Tribological and non-tribological wear.	2
Reasons for failures. Destruction mechanisms. Fatigue, ageing, deformations.	4
Reliability of non-renewable and renewable objects. Reliability, availability and maintainability	4
Studes of fire fighting machines and facilities properties	3