

# COURSE DESCRIPTION

**1. Course title:** THEORY OF RELIABILITY AND SAFETY  
**2. Course code:** MK2_9

**3. Validity of course description:** 2015/2016

**4. Level of studies:** BA, BSc programme / MA, MSc programme lub 1st cycle / 2nd cycle of higher education

**5. Mode of studies:** intramural studies / extramural studies

**6. Field of study:** Transport  
(FACULTY SYMBOL) RT

**7. Profile of studies:** general academic

**8. Programme:**

**9. Semester:** 1

**10. Faculty teaching the course:** Chair of Traffic Engineering

**11. Course instructor:** Wiesław Pamuła DSc PhD Eng

**12. Course classification:** common courses

**13. Course status:** compulsory / elective

**14. Language of instruction:** English

**15. Pre-requisite qualifications:** applied mathematics, statistics

**16. Course objectives:** gain basic skills and competence in reliability analysis of technical systems

**17. Description of learning outcomes:**

<table>
<thead>
<tr>
<th>Nr</th>
<th>Learning outcomes description</th>
<th>Method of assessment</th>
<th>Teaching methods</th>
<th>Learning outcomes reference code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>identifies basic concepts in the field of reliability theory and understands their relations with statistics</td>
<td>written test</td>
<td>lecture</td>
<td>K_W11(++) K_U23(++)</td>
</tr>
<tr>
<td>2</td>
<td>identifies the reliability model of a technical system and is able to evaluate the model’s parameters</td>
<td>written test</td>
<td>lecture</td>
<td>K_W11(++) K_U23(++)</td>
</tr>
<tr>
<td>3</td>
<td>is able to assess which parts of a complex system contribute to failures and how the parts reliability determine the systems resultant reliability</td>
<td>written test</td>
<td>lecture</td>
<td>K_W11(++) K_U23(++)</td>
</tr>
<tr>
<td>4</td>
<td>is able to indicate methods for enhancing systems reliability</td>
<td>written test</td>
<td>lecture</td>
<td>K_W11(++) K_U23(++)</td>
</tr>
</tbody>
</table>

**18. Teaching modes and hours**  
Lecture / BA / MA Seminar / Class / Project / Laboratory  
Lecture - 30 h.

**19. Syllabus description:**  
**Lecture:** Definition and discussion of basic terms used for reliability evaluation. Basic life time distribution models used for non-repairable populations. Basic repair rate models used for repairable systems. Reliability block diagrams and fault trees. Complex systems. Redundancy. Analysis of repairable systems by Markov methods. System failure analysis based on FMECA. Safety and critical systems. Analysis of safety using HAZOP.

**20. Examination:** none

**21. Primary sources:**  
2. Standard PN-EN 60812:2006 FMECA.  

**22. Secondary sources:**  
23. **Total workload required to achieve learning outcomes**

<table>
<thead>
<tr>
<th>Lp.</th>
<th>Teaching mode</th>
<th>Contact hours / Student workload hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
<td>30/30</td>
</tr>
<tr>
<td>2</td>
<td>Classes</td>
<td>/</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory</td>
<td>/</td>
</tr>
<tr>
<td>4</td>
<td>Project</td>
<td>/</td>
</tr>
<tr>
<td>5</td>
<td>BA/MA Seminar</td>
<td>/</td>
</tr>
<tr>
<td>6</td>
<td>Other</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>Total number of hours</td>
<td>30/30</td>
</tr>
</tbody>
</table>

24. **Total hours:** 60

25. **Number of ECTS credits:** 2

26. **Number of ECTS credits allocated for contact hours:** 1

27. **Number of ECTS credits allocated for in-practice hours (laboratory classes, projects):** 0

26. **Comments:**