

**FS****UNIVERSITY OF LJUBLJANA**
Faculty of Mechanical Engineering

Design of Advanced Systems (6026-M)

5 ECTS**Lecturer: J. Klemenc, M. Nagode**

Lectures: 30h

| Tutorials: 6h

| Labs: 24h

| Project: 0h

| Lang. :



Objectives

1. To acquire a thorough insight in advanced design methods that enable consequent R&D processes of complex products.
2. To learn a thorough theoretical basics of selected statistical methods for product design.
3. To train approaches for solving design challenges in the case of random operating and environmental conditions.
4. To acquire skills of searching for additional design information in the case of limited input data and/or information.
5. To acquire team-work skills.

Programme

Prerequisites for design of complex systems. Effectiveness and value of product. Statistical analysis of complex systems (basics). Assuring the functional performance of a complex system. Failure modes and failure models for complex systems and their components. Design of advanced and complex systems. Product maintainability as a prerequisite for its availability. Case study of a R&D process for a complex high-series and low series products - selected topics from a passenger-car development process and from the development of an injection-molding tool.

Prerequisites

In order to successfully achieve this course, the students must have:

- Meeting the enrolment conditions for the Master's study programme of Mechanical Engineering - Research and Development program.

Learning outcomes

Knowledge:

Thorough theoretical, methodological and analytical knowledge with elements of a research work that form a basis for very demanding professional work:

- Understanding a relationship between the operating conditions, environment and function of the complex product.
- Understanding a random nature of the product's effectiveness and value.
- Understanding a theoretical background of the design methods for complex products that are based on a statistical approach.

Skills:

Mastering very demanding and complex work processes and methodological tools in specialised professional fields:

- Ability of analytical and numerical prediction of the product's operation in an unpredictable operating conditions.

Ability of unique innovations and critical reflections:

- Ability of research in the field of the complex-product effectiveness

Assessment

- Theoretical knowledge (written colloquia and exam with an optional oral examination): 50%,
- Auditorial exercises (seminar reports with presentations): 30%,
- Written examination of practical knowledge that was acquired in exercises: 20%.

Literature

1. Ebeling C.E. An introduction to reliability and maintainability engineering – 2nd edition. Waveland press inc., 2010.
2. Andrews J.D., Moss T.R. Reliability and risk assessment - 2nd edition. John Wiley & Sons, 2002.
3. Pahl G., Beitz W., Feldhusen J., Grote K.H. Engineering Design - A Systematic Approach. Springer Verlag, 2007
4. Part and Mold Design - A Design Guide. Bayer Corporation, 2000.