Name of the course: Foundations of Industrial Mathematics	Total credits: 2+2+1=5

IPM-AUTEFIMEG

Type: Optional

Total hours of per semester:

lecture: 26

practice: 26

consultation: 13

Other: project

Type of testing: exam

Other: project, tests

Semester: 1, 2, 3, 4th

Description

Basic probability theory, basics of mathematical statistics. Thorough understanding of data analysis using statistical software: analysis of static and dynamic data, plotting, programming in statistical software packages. Introduction to mathematical and probabilistic modelling through examples using mathematical software: discrete models and networks in modelling complex systems, Bayesian analysis, Kalman filters. Practical aspects of using mathematical tools in an industrial environment.

Literature

Compulsory

- Matthias Kohl: **Introduction to statistical data analysis with R**. bookboon.com, London, 2015. ISBN: 9788740311235

Recommended

- Thomas Rahlf: **Data Visualisation with R.** Springer International Publishing, New York, 2017. ISBN 978-3-319-49750-1
- Mark Meerschaert: **Mathematical Modeling.** Academic Press, 2013. ISBN: 9780123869128

Competencies

Knowledge

- Up-to-date knowledge of statistical and mathematical software packages.
- Solid understanding of basic probability theory and statistics.
- Familiarity with software used in mathematical modeling.
- Familiarity with the mathematical tools used in industrial environments, especially in the automotive industry.

Competencies

- Ability to create mathematical models for industrial systems or subsystems
- Ability to use statistical tools for analyzing or designing systems in industrial applications
- Ability to participate in the design of a complex system with a mathematical awareness.
- Expertise in the design, development, operation and management tasks in the domain of complex software systems and database management systems.
- Skills for cooperation and team work, and ability to take leading role.
- Ability for written and oral communication in English, using the technical terms and

expressions of computer science. Ability to argue, to prepare reports, to read, understand and exploit scientific and technical material (e.g. books and papers).
- Expertise in utilizing sources of technical information, their critical interpretation and evaluation, and the extraction of information relevant to the solution of a specific problem.
- Ability to perform supervised scientific research, and skills required for post-graduate studies.

Attitude
- Attends professional, technological development related to their qualification.
- Commitment to critical feedback and self-assessment.
- Commitment to lifelong learning and receptivity to new IT competencies.
- Adopts and coordinates the ethical principles of work, organizational culture and research.
- Shares professional knowledge, mediates professional results.
- Mediates and implements eco-conscious behavior and social responsibility, helping them with IT tools.
- Commitment to quality standards and its IT tools.
- Open to initiate collaboration with IT and other specialists.

Autonomy and responsibility
- Takes responsibility for his professional decisions taken during his professional activities.
- Takes responsibility for observing and enforcing deadlines.
- Takes responsibility for own and fellow workers' work.
- In the case of operational critical IT systems, he/she can be assigned responsibility for development and operation, according to his/her professional competencies.