Name of the course: Numerical Methods for Optimization	Total credits: **2+2+1=5**
IPM-18AUTNMEG	
Type: Obligatory	
Total hours per semester: lecture: 26 practice: 26 consultation: 13	
Type of testing: Practical grade Other: tests, project work	
Semester: 2nd	
Subject requirement: Software Technology	

Description

The goal of this course is to present a number of commonly-used algorithms and how they can be used to solve practical problems related to computer engineering. Numerical solution of nonlinear equations, unconstrained minimization algorithms, linear/nonlinear parameter estimation methods. Newton method, Quasi-Newton methods, method of continuation, gradient, conjugate gradient method, Gauss-Newton method.

Literature

- A. Ben-Tal, A. Nemirovski, Lectures on Modern Convex Optimization - 2000, Book version: MPS-SIAM Series on Optimization, SIAM, Philadelphia, 2001
- A. Nemirovski, Optimization II: Standard Numerical Methods for Nonlinear Continuous Optimization, Lecture Notes, Israel Institute of Technology Minerva Optimization Center
- Jorge Nocedal, Stephen J. Wright, Numerical Optimization, ISBN: 978-0-387-30303-1 (Print) 978-0-387-40065-5 (Online)

Competencies

Knowledge

- Possession of complex and up-to-date knowledge in the following areas: control theory, numerical methods, optimization methods.
- Practice in Matlab based numerical solution of optimization problems.
- Detailed and expert-level knowledge of the technical terms and expressions of computer science in English.

Competencies

- Ability of construction proper models for various problems in the field of numerical optimization.
- Expertise in designing the method of solutions.
- Expertise in design, development, operation and management tasks in the domain of numerical optimization problems.
- Skills for cooperation and team work, and ability to take leading role.
- 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.