

Course title: Numerical Methods I.	Neptun code: GEMAK411-a
Course coordinator: Attila Körei, associate professor, PhD	
type and number of lesson: 28 lectures / semester	
method of accountability: colloquium	
curriculum location of the subject: spring	
pre-study conditions: GEMAN402-a	
The task and purpose of the subject:	
Building and testing mathematical models of engineering problems. The role of numerical methods in solving continuous mathematical problems. Computer solution of numerical problems in engineering practice.	
Course description:	
The modelling process. Sources and types of error.. Direct and iterative methods for solving systems of linear equations. LU and Cholesky decomposition, QR factorization. Solving the eigenvalue problem using the power and QR methods. Function approximation by interpolation and splines. Solving linear least squares problems in discrete and continuous cases. Newton-Cotes integration formulas. Root finding for nonlinear equations. Newton and quasi-Newton methods for solving nonlinear systems of equations. Application of Matlab in solving numerical problems.	
Required literature:	
<ol style="list-style-type: none"> 1. Steven C. Chapra and Raymond P. Canale: Numerical Methods for Engineers, McGraw-Hill Education, 2015. 2. Holly Moore: MATLAB for Engineers, Pearson, 2018. 	
Recommended literature:	
<ol style="list-style-type: none"> 1. Todd Young and Martin J. Mohlenkamp: Introduction to Numerical Methods and MATLAB Programming for Engineers, Ohio University (2021) 2. Abdelwahab Kharab and Ronald B. Guenther: An Introduction to Numerical Methods, Chapman & Hall, 2023. 3. Brian H. Hahn and Daniel T. Valentine: Essential MATLAB for Engineers and Scientists, Elsevier, 2017. 	