Numerical Methods - BMEEOTMDT73

I. Subject Specification

1. Basic Data

1.1 Title

Numerical Methods

1.2 Code

BMEEOTMDT73

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	2

1.5 Evaluation

Exam

1.6 Credits

3

1.7 Coordinator

name	Dr. Németh Róbert
academic rank	Associate professor
email	nemeth.robert@emk.bme.hu

1.8 Department

Department of Structural Mechanics

1.9 Website

https://epito.bme.hu/BMEEOTMDT73
https://fiek2.mywire.org/course/view.php?id=2556

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Ph.D.

1.12 Prerequisites

1.13 Effective date

5 February 2020

2. Objectives and learning outcomes

2.1 Objectives

Extend the knowledge of linear algebra by understanding the algorithmic properties of typical numerical methods

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. knows the basic methods for the solution of typical civil engineering problems

B. Skills

1. is able to formulate the basic algorithms

C. Attitudes

1. ready to learn

D. Autonomy and Responsibility

1. is autonomous

2.3 Methods

Lecture presentation of the deivation of algorithms

2.4 Course outline

Week	**Topics of lectures and/or exercise classes**
1.	Review of linear algebra 1.
2.	Review of linear algebra 2.
3.	Non-homogeneous linear equations - Factorization methods 1.

4.	Non-homogeneous linear equations - Factorization methods 2.
5.	Non-homogeneous linear equations - iterative methods 1.
6.	Non-homogeneous linear equations - iterative methods 2.
7.	Eigenvalue problems - manual solution, power iteration
8.	Eigenvalue problems - inverse iteration, subspace iteration
9.	Eigenvalue problems - Rayleigh-Ritz method, polynomial iteration
10.	Eigenvalue problems - transformation methods
11.	Nonlinear equations - minimization in 1D, Newton-type methods
12.	Nonlinear equations - gradient-type methods
13.	Nonlinear equations - Gaussian section, Quasi-Newton methods, Implicit Function Theorem
14.	Summary

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

- Gene H. Golub - Charles F. Van Loan: Matrix Computations, The Johns Hopkins University Press, Baltimore, 2013

2.6 Other information

2.7 Consultation

The instructors are available for consultation during their office hours, as advertised on the department website. Special appointments can be requested via e-mail: nemeth.robert@epito.bme.hu.

This Subject Datasheet is valid for:

Inactive courses

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

There is an oral exam, where the student presents the solution of a numerical problem from his/her research, then related questions must be answered.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
Oral exam	E	A.1; B.1; C.1; D.1

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Abbreviation	Score
E	100%
Sum	**100%**

3.4 Requirements and validity of signature

Presence on the lectures

3.5 Grading system

Grade	Points (P)
excellent (5)	90=P
good (4)	75<=P<90
satisfactory (3)	65<=P<75
passed (2)	50<=P<65
failed (1)	P<50

3.6 Retake and repeat

There is no retake

3.7 Estimated workload

Activity	Hours/semester
participation on the lectures	14×2=28
homeworks	14×0.5=7
preparation for the exam	55
Sum	**90**

3.8 Effective date

5 February 2020

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