Functional Analysis - BMEEOTMDT71

I. Subject Specification

1. Basic Data

1.1 Title

FUNCTIONAL ANALYSIS

1.2 Code

BMEEOTMDT71

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	Kovács Flórián
academic rank	Associate professor
email	kovacs.florian@emk.bme.hu

1.8 Department

Department of Structural Mechanics

1.9 Website

https://epito.bme.hu/BMEEOTMDT71
https://edu.epito.bme.hu/course/view.php?id=4906

1.10 Language of instruction

english

1.11 Curriculum requirements

Ph.D.

1.12 Prerequisites

1.13 Effective date

1 September 2017

Functional Analysis - BMEEOTMDT71

2. Objectives and learning outcomes

2.1 Objectives

The aim of the subject is to give mathematical formulation for concepts widely used in engineering, more specifically, in structural analysis: proving the existence and uniqueness of solutions to problems that are intuitively accepted in the procedure of the design.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. knows the definitions of some basic mathematical concepts (linear space, operator, norm, convergence, distribution, boundary value problem).

B. Skills

1. is able to identify mathematical structures beyond engineering problems,
2. is able to use the concepts of strong and weak solutions to a BVP in structural analysis,
3. is able to consider mechanical problems in an abstract approach.

C. Attitudes

1. aims at strict logical problem-solving.

D. Autonomy and Responsibility

1. is able to individually think over boundary value problems.

2.3 Methods

1. Lectures with theoretical knowledge and computational examples

2.4 Course outline

Hét	Előadások és gyakorlatok témaköre
1.	Vector spaces, subspaces, linear manifolds
2.	Dimension, spanning sets, and (algebraic) basis
3.	Linear operator
4.	Normed spaces
5.	Convergence, complete spaces
6.	Continuous and bounded linear operator
7.	Dense sets, separable spaces
8.	Inner product, Hilbert space
9.	Sets of measure zero, measurable functions
10.	The space L2
11.	Generalized derivatives, distributions, Sobolev spaces
12.	Weak (or generalized) solutions
13.	Orthogonal systems, Fourier series
14.	The projection theorem, the best approximation

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

- Popper, Gy.: Some concepts of functional analysis using Mathematica.
- Lecture notes, BME (2006).

2.6 Other information

2.7 Consultation

The instructor is available for consultation during office hours. Special appointments can be requested via e-mail: kovacs.florian@emk.bme.hu

This Subject Datasheet is valid for:

2025/2026 semester I

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
		A.1; B.1-B.3; 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

Jele	Részarány
Összesen	**100%**

3.4 Requirements and validity of signature

3.5 Grading system

Érdemjegy	Pontszám (P)
jeles (5)	
jó (4)	
közepes (3)	
elégséges (2)	
elégtelen (1)	

3.6 Retake and repeat

3.7 Estimated workload

Tevékenység	Óra/félév
Összesen	

3.8 Effective date

1 September 2017

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