Functionalanalysis for Engineers

1. Subject name	Functionalanalysis for Engineers				
2. Subject name in Hungarian	Funkcionálanalízis mérnököknek				
3. Code	**BMEKOVJD018**	4. Evaluation type	**exam grade**	5. Credits	**4**
6. Weekly contact hours	**2 (0) Lecture**	**0 (0) Practice**	**0 (0) Lab**		
7. Curriculum	**PhD Programme**	8. Role	**Basic course**		
9. Working hours for fulfilling the requirements of the subject					**120**
Contact hours	28	Preparation for seminars	30	Homework	0
Reading written materials	30	Midterm preparation	0	Exam preparation	32
10. Department	**Department of Aeronautics and Naval Architectures**				
11. Responsible lecturer	Dr. Zobory István				
12. Lecturers	Dr. Zobory István				
13. Prerequisites					

14. Description of lectures

Linear normed spaces, operators and functionals on linear spaces. Operations among operators. Metric spaces. The Baire-theorem. Semi-norm. Compactness. Continuity of linear operators. Contraction operators. Complementary concepts. The geometry of Hilbert-spaces. Complete ortonormal systems. The Gram-Schmidt ortogonalization. The projection theorem. The ortogonal complementer. Direct-sum of Hilbert spaces. The representation theorem of Frigyes Riesz. The dual space of a linear space. Unitary and izometric operators. Fourier transform, Fourier operator. The Hahn-Banach theorem. Application of functional analysis in the numerical methods. The Ritz-process.

15. Description of practices

16. Description of labortory practices

17. Learning outcomes

A. Knowledge B. Skills

- Students must know comprehensively, interpret in a constructive way and apply in his research activities in an innovative way the following elements of analysis methods: theory of linear functionals and operators; application of the functional analysis in numerical methods.

C. Attitudes D. Autonomy and Responsibility

- Students must pursue to get knowledge of the new scientific results, the latter are applied with responsibility and initiates new resource activities in new fields of knowledge in an innovative way.

18. Requirements, way to determine a grade (obtain a signature)

Regular participation at the lectures and written exam.

19. Opportunity for repeat/retake and delayed completion

According to the TVSZ.

20. Learning materials

1. Zobory I.: Funkcionálanalízis mérnököknek. Egyetemi jegyzet. Vasúti Járművek Tanszék, Budapest, 2007.
2. Máté László: Funkcionálanalízis műszakiaknak. Műszaki Könyvkiadó. Budapest, 1976.
3. Reddy, J.N.: Applied Functional Analysis and Variational Methods in Engineering. Krieger Publishing Company, Malabar, Florida, 1991.
4. Mikolás M.: Valós függvénytan és ortogonális sorok. Tankönykiadó, Budapest, 1978

Effective date	27 November 2019	This Subject Datasheet is valid for	Inactive courses