Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
MAT452	Introduction To Functional Analysis	7	4	0	0	4	8

Prerequisites	MAT201, MAT261, MAT262
Admission Requirements	MAT201, MAT261, MAT262

Language of Instruction	French
Course Type	Compulsory
Course Level	Bachelor Degree
Objective	The objective of this course is to study the the basic tools for the functional anlysis
Content	Banach spaces, Hilbert spaces, Hahn Banach theorem integrability, completeness of Lp spaces Applications of functional analysis.
References	Introductory Functional Analysis and Applications, Erwin Kreyszig

Theory Topics

Week	Weekly Contents
1	Metric Spaces: Complete spaces, compactness
2	Definitions and examples of Banach spaces. Continuous and integrable function spaces
3	Banach spaces, compactness and finite dimension, Ascoli’s theorem
4	Duality in Banach spaces
5	Definitions and examples of Hilbert spaces.
6	Orthogonality and projection. Riesz–Fischer theorem
7	Midterm
8	Fundamental theorem of functional analysis: Zorn's Lemma, Hahn Banach's Theorem
9	Fundamental theorem of functional analysis: Zorn's Lemma, Hahn Banach's Theorem
10	Homework
11	Lp spaces, measurement theory and definition of Lp spaces
12	Lp spaces as Banach spaces, Density in Lp spaces
13	Applications of Functional Analysis: Fourier Transformation and Applications
14	Applications of functional analysis: Sobolev spaces and their properties