Functional Analysis

Type of Module	Module Code
Advanced Module	AM-FA

Identification Number	Workload	Credit Points	Term	Offered Every	Start	Duration
MSc-M-FA	270 Hours	9 CP	1. – 3. Semester	SoSe	Summer semester	1 Semester

1	Course Types	Contact Time	Private Study	Planned Group Size
	a) Lecture	56 h	112 h	b) 30 Students
	b) Exercise	28 h	56 h	
	Exam Preparation		18 h	

2 Module Objectives and Skills to be Acquired

Knowledge of the basic concepts and methods in functional analysis and skills in the application of different solution methods. Basics for advanced lectures in analysis.

In addition to in-depth specialist knowledge, lectures and exercises also provide advanced skills for classifying, recognizing, formulating and solving problems and training in conceptual, analytical and logical thinking. In addition to deepening the lecture material, the exercises also serve to acquire communication and presentation skills.

3 Module Content

- Metric spaces, Banach and Hilbert spaces
- Operators and Functionals
- Fredholm's alternative, dual spaces
- Spectral theorem for compact operators
- Hahn-Banach sentences
- Riesz 'representation theorem, theorem of the open mapping
- Weak topologies

Literature e.g. H.Heuser or H.W.Alt, functional analysis

For further literature see the current annotated course catalog.

4 Teaching Methods

A four-hour lecture will be supplemented by a two-hour exercise with homeworks, response comes by comments and corrections

5 Prerequisites (for the Module)

Formally: None

Regarding the Contents: Contents of the lectures Analysis I, II and III, Lineare Algebra I, II

6 Type of Examination

Written or Oral Examination

7	**Credits Awarded** The module is passed and credit points are awarded if the 180-minute final exam is passed or the 30-45-minute oral final exam is passed. The prerequisite for admission to the exam is regular successful completion of the exercises. The respective lecturer announces the exact requirements at the beginning of the event. Registration is required to take the final exam; A resit examination is offered at the beginning of the following semester. Repeated participation in the lecture and the exercises to prepare for a repetition of the final examination is possible. The module is graded.
8	**Compatibility with other Curricula** The module is usable in the master courses “Mathematik” and “Wirtschaftsmathematik”
9	**Proportion of Final Grade** 9/114
10	**Module Coordinator** Prof. Dr. M. Kunze, Prof. Dr. G. Marinescu, Prof. Dr. G. Sweers
11	**Further Information** The modules of the Master course in Mathematics are normally hold in german, some lecturers agreed to hold their lectures in English upon request.