PROGRAM OF ANALYSIS IV- (FOURIER THEORY AND HILBERT SPACES) FS25 ETH, D-MATH

Lecturer: Francesca Da Lio Coordinator: Thomas Stucker

For the preparation of the **written and oral examinations** you should take as guideline the class content that you find in

https://people.math.ethz.ch/ fdalio/Analysis4FS25

The definitions and results that you should be familiar with for the oral and written exams are listed below; the list is derived from the course lecture notes. We recommend that you also review the class notes from the lectures (which are available in Polybox).

The written examination will consist of three exercises, one of which will include a set of multiple choice questions as in the bonus exercises of the series in FS25. In the written examination you might be asked to provide a <u>definition</u> and/or the <u>statement</u> of a result mentioned below. You will not be explicitly asked for the proof of a result, but you should know how to apply it. In any case, it is always advisable to review the proofs listed below at least once in order to more effectively solve the exercises.

The **oral examination** lasts 20 minutes (the time for the discussion of the grade is included) and you will be asked in general the statement and the proof of two results among those mentioned below. In the case we are not completely satisfied by the answers or if we are not completely sure for the maximal grade we will ask (if the time permits it) a third question. It is very important to be very precise in the statement of a result and to explain clearly and rigorously the key steps of its proof.

CHAPTER 1 : All Definitions, Examples, Remarks and proof of all results in Chapter 1 EXCEPT the proof of Proposition 1.22.

The proofs on which one has to concentrate more for the written examination are: Theorem 1.50, Theorem 1.52, Theorem 1.57, Proposition 1.67, Theorem 1.77.

CHAPTER 2 : All Definitions, Examples, Remarks and proof of all results in Chapter 2 EXCEPT the proof of Theorem 2.5, Theorem 2.9, Theorem 2.22, Corollary 2.25.

The proofs on which one has to concentrate for the written examination are: Theorem 2.4, Corollary 2.7, Lemma 2.32, Theorem 2.34.

CHAPTER 3 : All Definitions, Examples, Remarks and proof of all results in Chapter 3 EXCEPT the proof of Lemma 3.28, Proposition 3.35, Theorem 3.38, and the entire Section 3.7.

The proofs on which one has to concentrate for the written examination are: Theorem 3.3, Theorem 3.41.

CHAPTER 4 : All Definitions, Examples, Remarks and Statements of Chapter 4.

For the **oral examination** one should know the proof of Theorem 4.5, Proof of Theorem 4.9, Theorem 4.15, Theorem 4.21.

For the preparation of the written examination we also advise to look at the exercises you find in the lecture notes, revise **all the bonus exercises** from exercises sheets of FS25 and the following additional exercises (always from Series FS25):

- Serie 1: Ex 2,3,4,5.
- Serie 2: Ex 1,3,5.
- Serie 3: Ex 2,3,4.
- Serie 4: Ex 2,3,4,5.
- Serie 5: Ex 2,4,5.
- **Serie 6:** Ex 2,3,4,5,6.
- Serie 7: Ex 2,3,4,5
- Serie 8: Ex 3,4,5.
- **Serie 9:** Ex 2,3,4,5
- **Serie 10:** Ex 2,3,4,5
- Serie 11: Ex 2,4,5.
- Serie 12: Ex 2,3,4,5.
- Serie 13: Ex 2,3,4.