

**INFORMATION ABOUT THE LECTURE COURSE ADVANCED
TOPIC IN TOPOLOGY: K - AND L -THEORY OF GROUP RINGS
(MASTER-STUDIES) – WS 25/26**

NR.: ??

LÜCK, W.

1. PLACE AND TIME

- time: Tuesdays 10:15 -12:00 and Thursdays Do 10.15 -12:00
- place: ??

2. CONTENTS

The lecture course is an introduction to K - and L -theory of group rings and its numerous applications to algebra, geometry, group theory, and topology. We will emphasize the great picture and not technical details. The following topics may be covered. The students will have a say in what we will present in the course.

- Projective class groups and Wall's finiteness obstruction
- Whitehead groups and Whitehead torsion
- The s-cobordism theorem and the classification of lens spaces
- Lower and higher algebraic K -theory
- Algebraic L -theory
- Basics about Surgery Theory
- The Farrell-Jones Conjecture
- Applications:
 - The Novikov Conjecture and the topological invariance of higher signatures
 - The Borel Conjecture on the topological rigidity of closed aspherical manifolds
 - Kaplansky's conjectures about idempotents, zero-divisors, and units in group rings of torsionfree groups
 - Poincaré duality groups;
 - Automorphism groups of aspherical closed manifolds;
 - Hyperbolic groups with spheres as boundary;
 - The stable version of the Cannon Conjecture.
 - Manifolds fibering over S^1 .

3. PREREQUISITES

One needs to know the material presented in the lecture courses *Topology II* from the summer term 24 and *Algebraic Topology I* from the winter term 24/25

4. LITERATUR

We will follow the book [1]

5. (ORAL) EXAMINATIONS

The first round of the oral examination is scheduled for the week
February, 09th – 13th
and the second round of the oral examinations for the week
March 16th – 20th

REFERENCES

- [1] W. Lück. Isomorphism Conjectures in K - and L -theory. to appear in *Ergebnisse der Mathematik und ihrer Grenzgebiete*, Springer Verlag, 2025.

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