

Module Handbook

TUK MODHB Homepage

Module MAT-49-15-M-6

Introduction to Tensor Categories (M, 3.0 LP)

Module Identification

| Module Number | Module Name | CP (Effort) |
|---------------|--|---------------|
| MAT-49-15-M-6 | <i>Introduction to Tensor Categories</i> | 3.0 CP (90 h) |

Basedata

| | |
|---------------------------|--|
| CP, Effort | 3.0 CP = 90 h |
| Position of the semester | 1 Sem. irreg. |
| Level | [6] Master (General) |
| Language | [EN] English |
| Module Manager | Thiel, Ulrich, Prof. Dr. (PROF DEPT: MAT) |
| Lecturers | Thiel, Ulrich, Prof. Dr. (PROF DEPT: MAT) + further Lecturers of the department Mathematics |
| Area of study | [MAT-AGCA] Algebra, Geometry and Computer Algebra |
| Reference course of study | [MAT-88.105-SG] M.Sc. Mathematics |
| Lifecycle-State | [NORM] Active |

Courses

| Type/SWS | Course Number | Choice in Module-Part | SL | PL | CP | Sem. |
|----------|---------------|-----------------------|----|-----|-----|--------|
| 2V | MAT-49-15-K-6 | P | - | PL1 | 3.0 | irreg. |

- About [MAT-49-15-K-6]: Title: "Introduction to Tensor Categories"; Presence-Time: 28 h; Self-Study: 62 h

Examination achievement PL1

- Form of examination: **oral examination (20-30 Min.)**
- Examination Frequency: each semester
- Examination number: 84156 ("Introduction to Tensor Categories")

Evaluation of grades

The grade of the module examination is also the module grade.

Contents

From [MAT-49-15-K-6] Introduction to Tensor Categories:

- categories, functors, additive and Abelian categories,
- monoidal categories and functors,
- Grothendieck ring, categorisation, example of categorisation of group rings.

In addition, a selection of the following topics:

- Hopf algebras and quantum groups,
- graphic calculus for morphisms,
- braided tensor categories, band categories and knot invariants,
- modular tensor categories and topological quantum field theories.

Competencies / intended learning achievements

Upon successful completion of this module, the students have learned the fundamentals of category theory, categorical thinking and categorisation. They understand both - the theoretical principles and proofs as well as examples and applications - and are able to understand and explain them.

Literature

From [MAT-49-15-K-6] Introduction to Tensor Categories:

- P. Etingof, S. Gelaki, D. Nikshych, V. Ostrik: Tensor Categories,
- B. Bakalov, A. Kirillov: Lectures on Tensor Categories and Modular Functor,
- V. Turaev: Quantum Invariants of Knots and 3-Manifolds.

Materials

Further literature will be announced in the lecture.

Requirements for attendance of the module (informal)

Modules:

- [MAT-10-1-M-2] Fundamentals of Mathematics (M, 28.0 LP)

Courses

- [MAT-12-11-K-2] Algebraic Structures (2V+2U, 5.5 LP)

Requirements for attendance of the module (formal)

None

References to Module / Module Number [MAT-49-15-M-6]

| Course of Study | Section | Choice/Obligation |
|---|---|--------------------------|
| [MAT-88.105-SG] M.Sc. Mathematics | [Core Modules (non specialised)] Pure Mathematics | [WP] Compulsory Elective |
| [MAT-88.706-SG] M.Sc. Mathematics International | [Core Modules (non specialised)] Pure Mathematics | [WP] Compulsory Elective |
| Module-Pool | Name | |
| [MAT-GM-MPOOL-5] | General Mathematics (Introductory Modules M.Sc.) | |