# Module description

## Module title
Topological Effects in Solid State Physics

## Abbreviation
11-TEFK-Int-201-m01

## Module coordinator
Managing Director of the Institute of Theoretical Physics and Astrophysics

## Module offered by
Faculty of Physics and Astronomy

## ECTS
8

## Method of grading
Numerical grade

## Only after succ. compl. of module(s)
--

## Duration
1 semester

## Module level
Graduate

## Other prerequisites
--

## Contents
1. Geometric phase in quantum systems  
2. Mathematical basics of topology  
3. Time-reversal symmetry  
4. Hall conductance and Chern numbers  
5. Bulk-boundary correspondence  
6. Graphene (as a topological insulator)  
7. Quantum Spin Hall insulators  
8. Z2 invariants  
9. Topological superconductors

## Intended learning outcomes
In-depth theoretical understanding of the topological concepts in quantum physics related to solid state systems. Ability to connect their knowledge with different research activities at the Department of Physics and Astronomy at Würzburg University.

## Courses
(V 4) + (R 2)  
Module taught in: English

## Method of assessment
(a) written examination (approx. 90 to 120 minutes) or (b) oral examination of one candidate each (approx. 30 minutes) or (c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or (d) project report (approx. 8 to 10 pages) or (e) presentation/talk (approx. 30 minutes).

If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest.

Assessment offered: In the semester in which the course is offered and in the subsequent semester

Language of assessment: English

## Allocation of places
--

## Additional information
--

## Referred to in LPO I
(examination regulations for teaching-degree programmes)

## Module appears in
Master’s degree (1 major) Physics International (2020)  
Master’s degree (1 major) Quantum Engineering (2020)

JMU Würzburg • generated 23.08.2021 • Module data record 110420