

Module title		Abbreviation
Molecular structure and spectroscopy		o8-PC-MBS-152-m01
Module coordinator		Module offered by
lecturer of lecture "Molekülbau and Spektroskopie"		Institute of Physical and Theoretical Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
<p>This module provides an introduction to molecular structure, spectroscopy and quantum mechanics. The particle in a box model, quantum mechanical description of the hydrogen atom, atomic orbitals, molecular orbitals, chemical bonds. Analysis of molecules on the basis of the harmonic oscillator and rigid rotor models. As regards spectroscopy, a particular focus will be on UV-VIS spectroscopy, vibrational spectroscopy and microwave spectroscopy.</p>		
Intended learning outcomes		
<p>Students are able to explain key models of quantum mechanics and to apply them to molecules. They are able to describe different spectroscopic methods.</p>		
Courses (type, number of weekly contact hours, language – if other than German)		
V (2) + Ü (2)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
<p>a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English creditable for bonus</p>		
Allocation of places		
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Additional information		
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Workload		
150 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 I Nr. 1		
Module appears in		
<p>First state examination for the teaching degree Grundschule English (2009) First state examination for the teaching degree Grundschule Biology (2009) First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Grundschule Geography (2009) First state examination for the teaching degree Grundschule Protestant Theology (2009) First state examination for the teaching degree Grundschule German (2009) First state examination for the teaching degree Grundschule History (2009) First state examination for the teaching degree Grundschule History (2015) First state examination for the teaching degree Grundschule Catholic Theology (2009)</p>		

First state examination for the teaching degree Grundschule Mathematics (2009)
 First state examination for the teaching degree Grundschule Music (2009)
 First state examination for the teaching degree Grundschule Physics (2009)
 First state examination for the teaching degree Grundschule Social Science (2009)
 First state examination for the teaching degree Grundschule Science of Sport (2009)
 First state examination for the teaching degree Hauptschule English (2009)
 First state examination for the teaching degree Hauptschule Biology (2009)
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 First state examination for the teaching degree Hauptschule German (2009)
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 First state examination for the teaching degree Realschule English (2009)
 First state examination for the teaching degree Realschule Biology (2009)
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 First state examination for the teaching degree Realschule French Studies (2009)
 First state examination for the teaching degree Realschule German (2009)
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 First state examination for the teaching degree Realschule Computer Science (2012)
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 First state examination for the teaching degree Realschule Science of Sport (2009)
 First state examination for the teaching degree Sonderpädagogik Pedagogy of Secondary Education (2009)
 First state examination for the teaching degree Sonderpädagogik Pedagogy of Primary Education (2009)
 First state examination for the teaching degree Sonderpädagogik Teaching at the German Mittelschule (2013)
 First state examination for the teaching degree Mittelschule English (2013)
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 First state examination for the teaching degree Mittelschule Social Science (2013)
 First state examination for the teaching degree Mittelschule Science of Sport (2013)
 Bachelor' degree (1 major) Biochemistry (2015)
 First state examination for the teaching degree Grundschule English (2015)
 First state examination for the teaching degree Grundschule Biology (2015)
 First state examination for the teaching degree Grundschule Chemistry (2015)
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 First state examination for the teaching degree Grundschule Social Science (2015)
 First state examination for the teaching degree Grundschule Didactics in English (Primary School) (2015)
 First state examination for the teaching degree Grundschule Didactics in Biology (Primary School) (2015)
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 First state examination for the teaching degree Realschule Mathematics (2015)
 First state examination for the teaching degree Realschule Physics (2015)
 First state examination for the teaching degree Realschule Science of Sport (2015)
 First state examination for the teaching degree Gymnasium Chemistry (2015)
 First state examination for the teaching degree Sonderpädagogik Pedagogy of Primary Education (2015)
 First state examination for the teaching degree Sonderpädagogik Didactics in German (Primary School) (2015)
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 First state examination for the teaching degree Sonderpädagogik Music Education in Primary School (2015)
 First state examination for the teaching degree Sonderpädagogik Didactics in English (Middle School) (2015)
 First state examination for the teaching degree Sonderpädagogik Ergonomics (Teaching at the German Mittelschule) (2015)
 First state examination for the teaching degree Sonderpädagogik Didactics in Biology (Middle School) (2015)
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First state examination for the teaching degree Mittelschule English (2015)

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First state examination for the teaching degree Mittelschule Social Science (2015)

First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2015)

First state examination for the teaching degree Mittelschule Ergonomics (Teaching at the German Mittelschule) (2015)

First state examination for the teaching degree Mittelschule Didactics in Biology (Middle School) (2015)

First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2015)

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First state examination for the teaching degree Mittelschule Science of Sport (2015)

First state examination for the teaching degree Mittelschule Teaching at the German Mittelschule (2015)

First state examination for the teaching degree Grundschule Protestant Theology (2015)

First state examination for the teaching degree Grundschule Music (2015)

First state examination for the teaching degree Grundschule Didactics in Protestant Theology (Primary School) (2015)

First state examination for the teaching degree Realschule Music (2015)

First state examination for the teaching degree Sonderpädagogik Didactics in Protestant Theology (Primary School) (2015)

First state examination for the teaching degree Mittelschule Music (2015)

First state examination for the teaching degree Realschule French Studies (2016)

First state examination for the teaching degree Grundschule English (2016)
 First state examination for the teaching degree Grundschule Didactics in English (Primary School) (2016)
 First state examination for the teaching degree Realschule English (2016)
 First state examination for the teaching degree Mittelschule English (2016)
 First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2016)
 First state examination for the teaching degree Sonderpädagogik Didactics in English (Middle School) (2016)
 Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
 Bachelor' degree (1 major) Biochemistry (2017)
 First state examination for the teaching degree Grundschule Physics (2018)
 First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2018)
 First state examination for the teaching degree Realschule Physics (2018)
 First state examination for the teaching degree Mittelschule Physics (2018)
 First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2018)
 First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2018)
 Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
 First state examination for the teaching degree Mittelschule Biology (2020 (Prüfungsordnungsversion 2015))
 First state examination for the teaching degree Sonderpädagogik Didactics in Biology (Middle School) (2020 (Prüfungsordnungsversion 2015))
 First state examination for the teaching degree Mittelschule Didactics in Biology (Middle School) (2020 (Prüfungsordnungsversion 2015))
 First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015))
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 First state examination for the teaching degree Mittelschule Music (2020 (Prüfungsordnungsversion 2015))

- First state examination for the teaching degree Mittelschule Music Education in Middle School (2020 (Prüfungsordnungsversion 2015))
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- First state examination for the teaching degree Sonderpädagogik Didactics in Protestant Theology (Primary School) (2020 (Prüfungsordnungsversion 2015))
- First state examination for the teaching degree Sonderpädagogik Didactics in Catholic Theology (Primary School) (2020 (Prüfungsordnungsversion 2015))
- First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2020)
- First state examination for the teaching degree Grundschule Physics (2020)
- First state examination for the teaching degree Realschule Physics (2020)
- First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2020)
- First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2020)
- First state examination for the teaching degree Mittelschule Physics (2020)
- First state examination for the teaching degree Grundschule Political and Social Studies (2020)
- First state examination for the teaching degree Grundschule Didactics in Political and Social Studies (Primary School) (2020)
- First state examination for the teaching degree Sonderpädagogik MS-Didaktik Career and Economics (2020)

First state examination for the teaching degree Sonderpädagogik Didactics in Political and Social Studies (Secondary School) (2020)

First state examination for the teaching degree Mittelschule MS-Didaktik Career and Economics (2020)

First state examination for the teaching degree Mittelschule Didactics in Political and Social Studies (Secondary School) (2020)

First state examination for the teaching degree Mittelschule Political and Social Studies (2020)

First state examination for the teaching degree Grundschule History (2021)

First state examination for the teaching degree Realschule History (2021)

First state examination for the teaching degree Mittelschule History (2021)

First state examination for the teaching degree Grundschule Pedagogy of Primary Education (2021)

First state examination for the teaching degree Sonderpädagogik Pedagogy of Primary Education (2021)

Bachelor' degree (1 major) Biochemistry (2022)

First state examination for the teaching degree Realschule English (2023)

First state examination for the teaching degree Grundschule English (2023)

First state examination for the teaching degree Grundschule Didactics in English (Primary School) (2023)

First state examination for the teaching degree Mittelschule English (2023)

First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2023)

First state examination for the teaching degree Sonderpädagogik Didactics in English (Middle School) (2023)

First state examination for the teaching degree Realschule Geography (2023)

First state examination for the teaching degree Grundschule Geography (2023)

First state examination for the teaching degree Mittelschule Geography (2023)

First state examination for the teaching degree Grundschule German (2024)

First state examination for the teaching degree Realschule German (2024)

First state examination for the teaching degree Sonderpädagogik Didactics in German (Middle School) (2024)

First state examination for the teaching degree Mittelschule Didactics in German (Middle School) (2024)

First state examination for the teaching degree Grundschule Didactics in German (Primary School) (2024)

First state examination for the teaching degree Sonderpädagogik Didactics in German (Primary School) (2024)

First state examination for the teaching degree Mittelschule German (2024)

First state examination for the teaching degree Grundschule Music Education in Primary School (2024)

First state examination for the teaching degree Sonderpädagogik Music Education in Primary School (2024)

First state examination for the teaching degree Mittelschule Music Education in Middle School (2024)

First state examination for the teaching degree Sonderpädagogik Music Education in Middle School (2024)

First state examination for the teaching degree Mittelschule MS-Didaktik Career and Economics (2024)

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First state examination for the teaching degree Grundschule History (2024)

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First state examination for the teaching degree Mittelschule History (2024)

First state examination for the teaching degree Mittelschule Didactics in History (Middle School) (2024)

First state examination for the teaching degree Sonderpädagogik Didactics in History (Middle School) (2024)

First state examination for the teaching degree Grundschule Didactics in History (Primary School) (2024)