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**Modulbezeichnung:** **Molecular Nanoscience I (Nano-1)** **15 ECTS**  
 (Molecular Nanoscience I)

Modulverantwortliche/r: Andreas Hirsch

Lehrende: Franziska Gröhn, Rainer Fink, Andreas Hirsch, Julien Bachmann

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|-----------------------------|------------------------|-----------------------|
| Startsemester: WS 2020/2021 | Dauer: 1 Semester      | Turnus: jährlich (WS) |
| Präsenzzeit: 150 Std.       | Eigenstudium: 300 Std. | Sprache: Englisch     |

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#### Lehrveranstaltungen:

**1. Supramolecular Chemistry & Molecular Materials (Seminar 2SWS):**

Information/registration: <https://www.studon.fau.de/crs3388402.html>

Supramolecular Chemistry and Molecular Materials (WS 2020/2021, Seminar, 2 SWS, Andreas Hirsch)

**2. From 2D assemblies to bulk (Lecture 2 SWS):**

Information/registration: <https://www.studon.fau.de/crs3369939.html>

From 2D assemblies to bulk (WS 2020/2021, Vorlesung, 2 SWS, Julien Bachmann)

**3. Nanoprobes I (Seminar 2SWS):**

Information/registration: <https://www.studon.fau.de/crs3436786.html>

Nanoprobes (WS 2020/2021, Seminar, Rainer Fink)

**4. Self-assembly: molecular, particulate and hybrid nanostructures (Lecture 2SWS):**

Self-assembly (WS 2020/2021, Vorlesung, Franziska Gröhn)

**5. Molecular Nanoscience (Seminar 2SWS):**

Molecular Nano Science (WS 2020/2021, Seminar, Franziska Gröhn et al.)

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#### Inhalt:

- Concepts in supramolecular chemistry; host-guest chemistry; energetics of supramolecular complexes: experimental methods; templates and self-assembly. Molecular devices. Supramolecular catalysis: principles of supramolecular catalysis, supramolecular metal catalysis, self-assembled catalysts, metal-free catalysis, enzyme mimics, antibodies, imprinted polymers.
- Nanoscaled systems, general issues of microscopic techniques; experimental techniques with nanometer resolution: resolution determination; image processing techniques, light microscopic techniques with light in the visible and IR range, confocal techniques, scanning probes (STM, AFM and related scanning probes).
- Specific topics in synthesis and analysis of specific molecule-based nanoscale objects
- 2D film fabrication techniques (PVD, ALD, etc.)

#### Lernziele und Kompetenzen:

The students are capable ...

- to explain the fundamental chemical and physical properties of nano-scale materials
- to distinguish and to compare some properties, structure and applications of different nanomaterials
- to describe and to evaluate the major concepts in supramolecular chemistry, molecular self-assembly and nano-scaled 2D materials and transfer knowledge to related topics
- to judge on potential nano-analytical tools with optimized image contrast

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#### Verwendbarkeit des Moduls / Einpassung in den Musterstudienplan:

Das Modul ist im Kontext der folgenden Studienfächer/Vertiefungsrichtungen verwendbar:

**[1] Molecular Science (Master of Science): ab 1. Semester**

(Po-Vers. 2020w | NatFak | Molecular Science (Master of Science) | MolSc Module NANO | Studienrichtung Molecular Nanoscience | Molecular Nanoscience I)

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#### Studien-/Prüfungsleistungen:

Molecular Nanoscience I (Prüfungsnummer: 30711)

Prüfungsleistung, mündliche Prüfung, Dauer (in Minuten): 30

Anteil an der Berechnung der Modulnote: 100%

weitere Erläuterungen:

O30(PL): Oral examination (30 minutes) or alternative examination according to the FAU Corona Statutes!

Prüfungssprache: Englisch

Erstablingung: WS 2020/2021, 1. Wdh.: SS 2021

1. Prüfer: Julien Bachmann

1. Prüfer: Rainer Fink

1. Prüfer: Franziska Gröhn

1. Prüfer: Andreas Hirsch

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### Organisatorisches:

Please note:

- **Molecular Nanoscience I (Nano-1)** is taught online and in winter term only! Please note:
- Students have to register for the module (check registration period on MeinCampus)!
- Registration/further information via StudOn: see lectures in UnivIS!

1) <https://www.studon.fau.de/crs3388402.html>

2) <https://www.studon.fau.de/crs3369939.html>

3) <https://www.studon.fau.de/crs3436786.html>

4) <https://www.studon.fau.de/crs3291362.html>

5) <https://www.studon.fau.de/crs2762707.html>

### Bemerkungen:

This module represents one out of two lecture modules within the **Core Module "Molecular Nanoscience"** within the M.Sc. degree programme Molecular Science: Molecular Nanoscience I (only in winter term) + II (only in summer term)