

<b>Modulbezeichnung:</b> Technical Chemistry (CE1) (Technical chemistry)	<b>15 ECTS</b>
Modulverantwortliche/r: Peter Wasserscheid	
Lehrende: Hannsjörg Freund, u.a., Karl J. J. Mayrhofer, Wilhelm Schwieger, Peter Schulz, Peter Wasserscheid, Jakob Albert, Alexandra Inayat	
Startsemester: WS 2019/2020	Dauer: 2 Semester
Präsenzzeit: 195 Std.	Eigenstudium: 255 Std.
	Turnus: halbjährlich (WS+SS)
	Sprache: Deutsch oder Englisch

### Lehrveranstaltungen:

#### **A. Chemical reaction engineering I / Reaktionstechnik I (2L, 1Ex)**

Reaktionstechnik / Chemical Reaction Engineering (SS 2020, Vorlesung, 2 SWS, Hannsjörg Freund)  
 Übungen zu Reaktionstechnik / Exercises to Chemical Reaction Engineering (SS 2020, Übung, 2 SWS, Patrick Schühle et al.)

Tutorium zur Vorlesung Reaktionstechnik / Tutorial Chemical Reaction Engineering (SS 2020, optional, Tutorium, 1 SWS, Hannsjörg Freund et al.)

#### **B. Choose one unit in the field of chemical engineering / Wahl einer Vorlesung (mit Übung) aus dem Bereich der technischen Chemie (2L, 1Ex):**

##### **B1: Chemical reaction engineering II / Reaktionstechnik II (WS 2L, 1Ex)**

Chemische Reaktionstechnik (WS 2019/2020, Vorlesung, 2 SWS, Hannsjörg Freund)

Übungen zur Chemischen Reaktionstechnik (WS 2019/2020, Übung, Konrad Fischer et al.)

Reaktionstechnik, Tutorium / Tutorial Chemical Reaction Engineering (WS 2019/2020, optional, Tutorium, 1 SWS, Stephan Mrusek et al.)

##### **B2: Solvent concepts for catalytic processes / Lösungsmittelkonzepte für katalytische Verfahren (WS 2L, WS 1Ex)**

Lösungsmittelkonzepte für katalytische Verfahren (WS 2019/2020, Vorlesung, 2 SWS, Peter Schulz)

Lösungsmittelkonzepte für katalytische Verfahren (WS 2019/2020, Übung, 1 SWS, Peter Schulz et al.)

##### **B3: Nachhaltige Erzeugung von Plattformchemikalien (NachErz) (WS 2L, 1Ex)**

Nachhaltige Erzeugung von Plattformchemikalien (WS 2019/2020, Vorlesung, 2 SWS, Jakob Albert)

##### **B4: Spectroscopy of industrial Catalysts / Spektroskopische Charakterisierung von technischen Katalysatoren (WS 2L, 1Ex)**

Porous Materials: Preparation principles, production processes and spectroscopic characterization (WS 2019/2020, Vorlesung, 2 SWS, Alexandra Inayat et al.)

Praktikum Porous Materials: Preparation principles, production processes and spectroscopic characterization (WS 2019/2020, Praktikum, Alexandra Inayat et al.)

##### **B5: N.N.**

##### **B6: Process Technologies / Fabrikationsverfahren (SS 2L, 1Ex)**

Process Technologies (SS 2020, Vorlesung, 2 SWS, Hannsjörg Freund et al.)

Process Technologies Exercises (SS 2020, Übung, 1 SWS, Markus Kaiser et al.)

##### **B7: Advanced electrochemistry - from fundamentals to applications (WS)**

Advanced electrochemistry - from fundamentals to applications (WS 2019/2020, Vorlesung, Karl J. J. Mayrhofer et al.)

Tutorial Advanced electrochemistry - from fundamentals to applications (WS 2019/2020, Übung, 1 SWS, Karl J. J. Mayrhofer et al.)

#### **C. Lab course reaction engineering / Praktikum Reaktionstechnik (7LAB)**

2 weeks fulltime during the free period or 4 weeks half a day during the lecture period

(More information: Dr. Peter Schulz, peter.schulz@fau.de)

compulsory attendance!

### Inhalt:

**Recommended choices (based on mandatory elective modules):**

For **Molecular Life Science**: (5 L, 7 Lab, 3 S) or (8 L, 0 Lab, 1 S\*)

- Molecular Biology or

- Medicinal Chemistry (Option A) or
- Medicinal Chemistry (Option B)
- Molecular Synthesis
- Bioinorganic Chemistry (from M.Sc. Chemistry)

For **Molecular Nanoscience**: (5 L, 7 Lab, 3 S) or (8 L, 0 Lab, 1 S\*)

- Molecular Synthesis
- Theory
- Physical Chemistry
- or parts of the respective modules

\*= Elective module without a LAB Course

- Introduction to actual research challenges in technical chemistry
- Fundamentals of chemical reaction engineering (especially intrinsic kinetics, mass transfer limitations, types of reactors, modeling of reactors) on a master course level
- Gaining deep knowledge of one specialty chosen by the students and represented by a lecturer/faculty of the department
- Practical studies to selected topics of technical chemistry on advanced level

### Lernziele und Kompetenzen:

The students gain:

- extension of the knowledge in special research focused topic
- soft skills

übernommen aus Prüfungsordnungsmodul *Wahlmodul Molecular Science*

Students

- acquire knowledge and competence to theoretically and practically find solutions for challenges in technical chemistry and the development of chemical processes.
- are capable to produce and evaluate kinetic data. In combination with measured residence time distributions chemical reactors can be designed and scaled up for a variety of applications.
- are capable to discuss and work independently on actual research topics of modern catalytic materials (ionic liquids, thin coatings, hierarchically structured materials).

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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): 1-3. Semester**

(Po-Vers. 2013 | NatFak | Molecular Science (Master of Science) | Wahlmodul Molecular Science)

Dieses Modul ist daneben auch in den Studienfächern "Chemie (Master of Science)" verwendbar.

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### Organisatorisches:

**Intended stage in the degree course:** Preferred is an attendance in the 3rd term of the master program. If necessary due to schedule collisions an attendance in the 2nd term is possible.

**Duration of the module:** 1 - 2 semester

### Bemerkungen:

Module of the student's choice and approval by the representative of the study course or the students' dean. The chair offering the module and the courses has to appoint a responsible person, who will be one of the two examiners and ascertain the handling of the module of approximately 15 semester hours. Please note: 2/3 of the courses of the elective module must be topically related to the study program, **5 ECTS** from soft skills or key qualifications will be accepted! Another **Mandatory elective module from M.Sc. Molecular Science (MSM-ME1 - MSM-ME6)** or **Mandatory elective module (CME1 - CME5)** or **Elective module (CE1 - CE10) from M.Sc. Chemistry** may be chosen, too - however, there **must** be no overlap with other courses from selected Mandatory module or Mandatory elective module!

**Module compatibility:** M.Sc. Chemistry (Mandatory elective module or Elective module) / M.Sc. Molecular Science (Elective module)

**Language:** German/English; will be determined at the beginning of the lecture