Course Specifications
Valid as from the academic year 2016-2017

Nanoporous Materials (C002964)

Course size

<table>
<thead>
<tr>
<th>Credits</th>
<th>Study time 75 h</th>
<th>Contact hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td></td>
<td>15.0 h</td>
</tr>
</tbody>
</table>

Course offerings and teaching methods in academic year 2017-2018

A (semester 1)
- lecture 5.0 h
- self-reliant study activities 10.0 h

Lecturers in academic year 2017-2018
- Van Der Voort, Pascal WE06 lecturer-in-charge
- De Canck, Els WE06 co-lecturer

Offered in the following programmes in 2017-2018

<table>
<thead>
<tr>
<th>Course</th>
<th>crdts</th>
<th>offering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master of Science in Chemistry</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Chemical Engineering</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Sustainable Materials Engineering</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Chemical Engineering</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>Exchange Programme in Chemistry (master's level)</td>
<td>3</td>
<td>A</td>
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</tbody>
</table>

Teaching languages
- English

Keywords
- Mesoporous, support material, ordered, material science, silicate, heterogeneous catalysis, zeolites

Position of the course
- Master of chemistry.
- Advanced study of the state of the art of the developments in the ordered mesoporous materials.

Contents
- The development of microporous zeolites from 1950 till now. The first zeolites, the synthetic zeolites, the zeotypes and the Metal Organic Frameworks. Concept: from mimicking nature to "molecular designed synthesis".
- The first generation of mesoporous ordered materials: MCM-materials. Advantages and disadvantages, stability
- The next generations of mesoporous materials (SBA, HMS, FSM, ...)
- Developments in the third millennium: Periodic Mesoporous Organosilicates (PMO) and mesoporous polymers, MOFs (Metal Organic Frameworks) and COFs (Covalent Organic Frameworks)
- Typical analysis techniques for the evaluation of porous solid materials: nitrogen adsorption, X-Ray Diffraction, DRIFTS, FT-Raman, with a special emphasis on pore evaluation models.

Initial competences
- The student has the degree of bachelor in chemistry
- The student has followed the course "solid state chemistry" (masterprogramme) or has similar starting competences.

Final competences
- The students will be asked to investigate recent developments in the area of mesoporous materials by an independent literature survey, and to present their findings both written as orally, by means of a small tutorial/lecture, presented by the student to
his/her peers.

**Conditions for credit contract**
Access to this course unit via a credit contract is determined after successful competences assessment

**Conditions for exam contract**
This course unit cannot be taken via an exam contract

**Teaching methods**
Lecture, microteaching, self-reliant study activities

**Extra information on the teaching methods**
CLASSICAL LESSONS: 8 hours
PRESENTATIONS by the students: 30 minutes per student, followed by discussion

**Learning materials and price**
A syllabus will be available, together with a list of recommended books. A list of journals will also be made available (most of them electronically available), a.o. "Microporous and Mesoporous Materials". A this course intends to focus on very recent developments, the list of references will be updated on a yearly basis.

Cost: 0 EUR

**References**
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**Course content-related study coaching**
The possibility of a daily contact with the professor and the PhD-students that are performing research on these materials.

**Evaluation methods**
end-of-term evaluation and continuous assessment

**Examination methods in case of periodic evaluation during the first examination period**
Oral examination

**Examination methods in case of periodic evaluation during the second examination period**
Oral examination

**Examination methods in case of permanent evaluation**
Report

**Possibilities of retake in case of permanent evaluation**
examination during the second examination period is possible

**Extra information on the examination methods**
Permanent evaluation: written and oral presentation of the project of the student, the defence and the discussion of the presented results

**Calculation of the examination mark**
Periodical evaluation (50%) + permanent evaluation (50%)

(Approved)