Course Specifications

Valid as from the academic year 2020-2021

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course offerings and teaching methods in academic year 2020-2021

<table>
<thead>
<tr>
<th>Semester</th>
<th>Language</th>
<th>Lecture</th>
<th>Online Lecture</th>
<th>Seminar: Coached Exercises</th>
<th>Practicum</th>
<th>Online Seminar: Coached Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (semester 1)</td>
<td>Dutch</td>
<td>30.0 h</td>
<td>0.0 h</td>
<td>10.0 h</td>
<td>8.75 h</td>
<td>0.0 h</td>
</tr>
</tbody>
</table>

Lecturers in academic year 2020-2021
Van Hecke, Kristof  WE06  lecturer-in-charge

Offered in the following programmes in 2020-2021

<table>
<thead>
<tr>
<th>Programme</th>
<th>Credits</th>
<th>Offering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Science in Physics and Astronomy</td>
<td>5</td>
<td>A</td>
</tr>
<tr>
<td>Preparatory Course Master of Science in Physics and Astronomy</td>
<td>5</td>
<td>A</td>
</tr>
</tbody>
</table>

Teaching languages

Dutch

Keywords

Atom, ion, molecule, chemical bonding, organic compounds, kinetics, chemical equilibrium, acids and bases, chemical thermodynamics, electrochemistry.

Position of the course

This course unit belongs to the educational curriculum "Interdisciplinarity & Broadening". To acquire a general overview of and the necessary insight in the basic concepts of the structure and the reactivity of matter (see Contents), which is needed as basic knowledge for the future physicist and as a prerequisite for more specialized physics courses (solid-state physics, atom and molecule physics). Because of the logic composition of chemistry, the course is well suited to attribute to the development of scientific skills such as analytical reasoning, ability to critical reflection and problem solving capability.

Contents

1. Chemical terminology (element, compound, atom, ion, molecule, chemical reaction).
2. Basic structure of matter: atoms and ions (elementary introduction to the wave mechanical model, atomic orbitals, electron configurations), chemical bonding (ionic, covalent and metallic bonding), organic compounds (C-C bond), molecules (sigma and pi bonding, molecular geometry, polarity).
3. Behavior of large collections of molecules: solid, liquid, gas and solution phases (intermolecular forces of attraction, phase diagram of a pure substance).
5. The driving force, the final state and the speed of chemical changes: chemical thermodynamics (changes in internal energy, enthalpy, entropy and Gibb's free energy accompanying chemical processes), chemical equilibrium (Le Châtelier's principle), chemical kinetics (reaction order, reaction mechanisms and catalysts).
7. Electrochemistry: Galvanic cells, batteries

Initial competences

The chemical education from secondary school of starting physics students is usually

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sufficient, but rather superficial and lacking general insight. As a consequence, this chemistry course starts at an elementary level.

Final competences

1. Understanding of the fundamental concepts of the composition of matter, standard techniques and models of chemistry and the ability to apply these within relevant areas of application (by specific, simple examples).
2. Development of scientific attitude: efficient selection of data, schemes, and processing of these in a structured manner.
3. Autonomous understanding and processing of chemical literature on a Bachelor level (also in scientific English).
4. Knowledge of chemical methodology and analytical reasoning for scheduling complex processes, finishing and correcting these.
5. Showing accuracy, physical/chemical intuition, creativity and critical reflection.
6. Application of the correct chemical terminology (also in English).
7. Scheduling complex assignments as a team.
8. Written and orally reporting on chemistry-related projects.
9. Pay attention to industrial aspects of chemistry.

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, practicum, seminar: coached exercises, online lecture, online seminar: coached exercises

Extra information on the teaching methods

Lectures, seminars and practical exercises, ELO (https://Ufora.UGent.be) for additional documentation, FAQ’s.

Because of COVID19 changed working methods can be rolled out when proven necessary.

Learning materials and price

- Dutch syllabus (price: ± € 20-)
- Academia Press Wetenschappelijke Uitgeverij (through study praeses WiNA)
- Lectures slides (available through Ufora)

References


Course content-related study coaching

- Seminars to develop the chemical problem solving skills
- Individual learning assistance by lecturer or assistant
- Interactive assistance by ELO: frequently asked questions, fora, ...

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination with open questions, oral examination

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

Written examination with open questions, oral examination

Examination methods in case of permanent evaluation

Job performance assessment, report

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Open questions: insight test for the basic concepts (see Contents) by application oriented theory questions; test for acquisition of the basic concepts in chemical problem solving by integrative exercises.

Because of COVID19 changed evaluation methods can be rolled out when proven necessary.

Calculation of the examination mark

- Oral exam: 7 points;

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• Written exam: 10 points,
• Practical Exercises: 3 points

(Approved)