

## Inorganic Chemistry 1: Structure of Matter (O000078)

Course size (nominal values; actual values may depend on programme)

Credits 5.0      Study time 150 h      Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2019-2020

A (semester 1)	English	practicum	16.0 h
		lecture	30.0 h
		seminar: coached exercises	14.0 h
		B (semester 2)	seminar: coached exercises
		lecture	30.0 h
		practicum	16.0 h

Lecturers in academic year 2019-2020

Verpoort, Francis      KR01      lecturer-in-charge

Offered in the following programmes in 2019-2020

	crdts	offering
<a href="#">Credit contract within Ghent University Global Campus</a>	5	B
<a href="#">Bachelor of Science in Environmental Technology</a>	5	A
<a href="#">Bachelor of Science in Food Technology</a>	5	A
<a href="#">Bachelor of Science in Molecular Biotechnology</a>	5	A
<a href="#">Joint Section Bachelor of Science in Environmental Technology, Food Technology and Molecular Biotechnology</a>	5	A

Teaching languages

English

Keywords

Atom, Ion, Molecule, Periodic system, Chemical reaction, Chemical bonding, State of matter

Position of the course

To acquire a general overview of and the necessary insight in the basic concepts of the structure of matter which is needed as basic knowledge for the future bachelor in life sciences and bioscience engineering and as a prerequisite for more specialized and applied chemistry courses. To gain insight in the fundamental differences between physical and chemical processes is a main objective. As the emphasis is made on physical 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. Stoichiometry: element, compound, chemical reaction, mole, titration
2. Atomic structure: Bohr model, introduction to wave mechanical model, electron configurations
3. Chemical bonding: ionic bonding, covalent bonding (Lewis theory, valence bond theory, introduction to molecular orbital theory), metallic bonding
4. Intermolecular forces of attraction: states of matter, condensed phases, vapour pressure, phase diagram
5. Solutions: concentration, vapour pressure of solutions, distillation, osmosis

Week 1 : Introduction (Classification of Matter, handling numbers, properties of matter)

Week 2 : Atoms, Molecules and Ions ( structure, periodic table, chemical formulas)

Week 3 : Stoichiometry (composition of compounds ; empirical formulas ; chemical reactions)  
Week 4 : Reactions in aqueous solution ( precipitation reaction ; acid-base reaction ; redox reaction ; concentration)  
Week 5 : The Electronic Structure of atoms (from classical physics to quantum theory ; quantum numbers ; orbitals ; electron configuration)  
Week 6 : Gases ( Gas Laws ; Kinetic molecular theory ; deviation of ideal behavior)  
Week 7 : Energy Relationships in chemical reactions ( Energy changes ; introduction Thermodynamics ; Calorimetry)  
Week 8 : The Periodic Table (Classification of elements ; Ionization energy ; electron affinity ; variation in chemical properties)  
Week 9 : Chemical bonding I (Ionic bond ; covalent bond ; Lewis structures ; octet rule)  
Week 10 : Chemical bonding II (Molecular geometry and hybridization of atomic orbitals ; molecular orbital theory)  
Week 11 : Intermolecular forces, liquids and solids (properties of liquids and solids ; crystal structure ; phase changes and phase diagrams)  
Week 12 : Physical properties of solutions (types of solutions, concentration units ; solubility ; colligative properties)

#### Initial competences

Secondary school knowledge of chemistry.

#### Final competences

- 1 The student must have acquired clear insight into the specific characteristics of chemical processes versus physical ones.
- 2 The student must have acquired the necessary insight into the fundamental concepts governing the organization and the structure of matter.
- 3 The student has started to master a scientific engineer attitude.
- 4 The student must be able to analyze chemical problems and to propose appropriate strategies for their solution.

#### Conditions for credit contract

Access to this course unit via a credit contract is unrestricted: the student takes into consideration the conditions mentioned in 'Starting Competences'

#### Conditions for exam contract

Access to this course unit via an exam contract is unrestricted

#### Teaching methods

Lecture, practicum, lecture: plenary exercises, seminar: coached exercises

#### Extra information on the teaching methods

Lectures are combined with ppt and where possible videos.

Lectures contain plenary exercises

The exercise sessions provide typical examples of chemical problems and should help generate a scientific engineer attitude

The practicals provide hands-on experiments

#### Learning materials and price

powerpoint slides will be provided

#### References

"Chemistry" by Raymond Chang (Mc Graw-Hill)

#### Course content-related study coaching

Students can contact the student counsellor or directly contact the professor.

#### 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, written examination with multiple choice questions

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

Written examination with open questions, written examination with multiple choice questions

#### Examination methods in case of permanent evaluation

Participation, report

#### Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

#### Extra information on the examination methods

*During the first and second examination period, the periodic evaluation accounts for*

(Approved)

80% (16/20) for the final score. The non-periodic evaluation takes up 20% (4/20). This non-periodic evaluation consists of 20% attitude during practicals, and for 80% on reports to be made during practicals.

To qualify for passing, both the score of the practical session needs to be higher than 2/4 and the total score (= summation of the score for periodic evaluation, maximal 16 pts, and the non-periodic evaluation) needs to be at least 10/20.

During the second examination period, the non-periodic evaluation (maximal 4 pts, see upper paragraph) cannot be retaken.

#### Calculation of the examination mark

20% practicals (including attitude)

80% Written exam with open questions (maximal 8 pts) and written exam with multiple choice questions (maximal 8 pts)