GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2024-2025

Inorganic Chemistry 1: Structure of Matter (0000078)

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

Credits 5.0 **Study time 150 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	English	Incheon	seminar practical lecture
B (semester 2)	English	Incheon	seminar lecture practical

Lecturers in academic year 2024-2025

Heynderickx, Philippe	KR01	lecturer-in-charge

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Preparatory Semester Ghent University Global Campus	5	B
Bachelor of Science in Environmental Technology	5	A
Bachelor of Science in Food Technology	5	A
Bachelor of Science in Molecular Biotechnology	5	A
Joint Section Bachelor of Science in Environmental Technology, Food Technology and Molecular Biotechnology	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, destillation, 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; solubilty; colligative properties)

Initial competences

Secondary school knowledge of chemistry.

Final competences

1 The student has acquired clear insight into the specific characteristics of chemical processes versus physical ones.
2 The student has 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 is 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

Seminar, Lecture, Practical

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

Study material

Type: Slides

Name: Slides
Indicative price: Free or paid by faculty
Optional: no
Available on Ufora : Yes

References

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

Course content-related study coaching

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

Assessment moments

end-of-term and continuous assessment

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

Written assessment with multiple-choice questions, Written assessment with open-ended questions, Assignment

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

Written assessment with multiple-choice questions, Written assessment with open-ended questions

Examination methods in case of permanent assessment

Participation, Assignment

Possibilities of retake in case of permanent assessment

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 60% (12/20) for the final score. The non-periodic evaluation takes up 40% (8/20). This non-periodic evaluation consists of 20% for practical session reports, and for 20% for pop-up quizzes during practical sessions.
To qualify for passing, both the score of the practical session needs to be higher than 2/4 and the total score needs to be at least 10/20.
During the second examination period, the non-periodic evaluation (maximal 8 pts, see upper paragraph) cannot be retaken.

Calculation of the examination mark

20% Practicals (including attitude)
20% Pop-up quizzes during exercise sessions
60% Written exam with open questions (maximal 5 pts) and written exam with multiple choice questions (maximal 7 pts)