

Chemical Structures (C003943)

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 size (nominal values; actual values may depend on programme)
Credits 5.0 Study time 134 h Contact hrs 54.5 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	Dutch	Gent	teaching method	hours
			online lecture	0.0 h
			lecture	22.5 h
			practicum	20.0 h
			seminar: coached exercises	12.5 h
			online seminar: coached exercises	0.0 h

Lecturers in academic year 2020-2021

Martins, José WE07 lecturer-in-charge

Offered in the following programmes in 2020-2021

programme	crdts	offering
Bachelor of Science in Biochemistry and Biotechnology	5	A

Teaching languages

Dutch

Keywords

atoms and molecules, spatial structure, electronic structure, chemical bond, quantum mechanics (descriptive), conformation, stereochemistry

Position of the course

The course is an introductory course taught in the first semester of the bachelor's programme.

The aim of the course is to provide students insight in the characteristic features of chemical structures, the chemical bond and in continuation thereof to offer them a survey of the most important spatial and conformational properties of molecules with a focus on organic compounds.

The following competences are relevant: B.1.1, B.1.2, B.2.2

Contents

Theoretical part:

- Chemical Structures = an introduction
- Electrons in atoms: introduction and the hydrogen atom
- Electrons in atoms: atoms with more than one electron
- From atoms to molecules: molecules from elements in the first period.
- Electrons in molecules: diatomic compounds of the 2nd period
- Electrons in molecules: polyatomic compounds
- The chemical bond and the Periodic System
- Isomerism, presentation and nomenclature of chemical structures
- Resonance
- Stereochemistry
- Conformational Analysis
- Symmetry and Chemical Structures

Practical part:

Basic experimental procedures (filtration, drying, recrystallization, distillation, extraction) in the context of a series of theme's with relevancy to life processes: ethanol and fermentation, chemistry of vision (chromatography of spinach), polymer chemistry (nylon), saponification, chemical resolution of phenylbutanediacid

Initial competences

None

Final competences

- 1 Insight in the description of atoms, molecules and the chemical bond on the basis of correct use of terms and accompanying quantum chemical concepts underlying these.
- 2 Understand how the previous allows to explain the structure of the Periodic System.
- 3 To be able to draw correct Kekulé-Lewis structures of organic molecules.
- 4 To be able to recognize hybridization states in molecules.
- 5 To be able to deduce relevant resonance structures of molecules.
- 6 To be able to generate structural formulas of organic compounds.
- 7 To be able to recognize and name the most important functional groups.
- 8 To be able to derive the IUPAC name of simple (organic) compounds.
- 9 To be able to determine the absolute configuration of (organic) stereocenters.
- 10 To be able to analyze the symmetry of a molecule.
- 11 Master the concept of conformation and executing simple conformational analysis from which the dynamic behavior of molecules can be derived and understood.
- 12 To be able to discuss theories and models within the field.
- 13 To be aware of the importance of prevention and the associated regulations when working in a chemistry laboratory.
- 14 To be energy- safety-and environment-conscious.
- 15 To perform experimental procedures in the context of the above theme's in a well thought-out way.

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

Learning materials and price

Dutch syllabus. Approximate price: 40 euro.
Chemical Structure and Reactivity – an integrated approach, James Keeler and Peter Wothers, Oxford University Press, 2nd Edition ISBN 978-0-19-960413-5 (ongeveer 50 €) – recommended

References

Molecular models, such as: Chem-Tutor (Student Modeling System for Organic Chemistry), Aldrich (introductory); Framework Molecular Model Student Sets, Prentice Hall, ISBN 0-13-330076-5 (advanced).

Course content-related study coaching

Theoretical knowledge is transferred by the lecturer during classroom lectures. Theory is subsequently practised in seminars (coached exercises) under guidance of a lecturer and/or of an assistant. Practical exercises are always performed under the supervision of a teaching assistant.

Individual coaching by the lecturer or an assistant is possible after the classroom lectures, during the seminars or practical classes or after electronic consultation.

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

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

Written examination with open questions

Examination methods in case of permanent evaluation

Participation, job performance assessment, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

Theoretical part: written examination. One short question in relation to each one of the final objectives 1-8, one substantial question in relation to final objective 9. Three questions in relation to final objective 10. >Practical part: permanent evaluation of final objectives 1, 2 and 3 at each practical session.

Calculation of the examination mark

The theoretical part determines 90% of the examination mark.

The practical part determines 10% of the examination mark. This evaluation occurs during each practical class with particular attention for attitude in the laboratory (presence, observation of safety- and environmental regulations). The mark of the practical part is maintained in the following examination session.

A student that was absent without valid reason or that did not participate in all evaluation forms of the non-periodic evaluations (in particular here, the practicals) will receive a final score preventing them to pass for the course