

## Teaching Methodology: Sciences (H002175)

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

**Credits 6.0**

**Study time 180 h**

**Course offerings and teaching methods in academic year 2024-2025**

A (Year)

Dutch

Gent

independent work

lecture

seminar

**Lecturers in academic year 2024-2025**

Strubbe, Katrien

WE06

lecturer-in-charge

wyffels, Francis

TW06

co-lecturer

**Offered in the following programmes in 2024-2025**

Bachelor of Science in Biochemistry and Biotechnology

6

**offering**

A

Bachelor of Science in Biology

6

A

Bachelor of Science in Chemistry

6

A

Bachelor of Science in Computer Science

6

A

Bachelor of Science in Geography and Geomatics

6

A

Bachelor of Science in Geology

6

A

Bachelor of Science in Mathematics

6

A

Bachelor of Science in Physics and Astronomy

6

A

Linking Course Master of Science in Biochemistry and Biotechnology

6

A

Preparatory Course to Master of Science in Teaching

6

A

Master of Science in Teaching in Science and Technology (abridged programme)(main subject Biochemistry and Biotechnology)

6

A

Master of Science in Teaching in Science and Technology (abridged programme)(main subject Biology)

6

A

Master of Science in Teaching in Science and Technology (abridged programme)(main subject Chemistry)

6

A

Master of Science in Teaching in Science and Technology (abridged programme)(main subject Computer Science)

6

A

Master of Science in Teaching in Science and Technology (abridged programme)(main subject Geography and Geomatics)

6

A

Master of Science in Teaching in Science and Technology (abridged programme)(main subject Geology)

6

A

Master of Science in Teaching in Science and Technology (abridged programme)(main subject Mathematics)

6

A

Master of Science in Teaching in Science and Technology (abridged programme)(main subject Physics and Astronomy)

6

A

Master of Science in Teaching in Science and Technology (abridged programme)

6

A

**Teaching languages**

Dutch

**Keywords**

Powerful learning environment, science education didactics, inquiry-based learning, STEM, computational thinking, ethics, misconceptions

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**Position of the course**

This course unit contributes to the realization of the basic competencies for teachers and the

training competencies of the educational master program UGent, as included in the program description and concretized in the competence matrix, to be consulted on [www.ugent.be/educatievemaster](http://www.ugent.be/educatievemaster). The subject Science didactics is a first introduction to didactics of science education. The course is composed of modules which, all together, provide almost all the information to design and organize activating and motivating lessons, albeit at a beginners level and serves as a basis for the specific subject didactics in which the modules are further elaborated. In the subject, students from different disciplines in sciences and engineering sit together for a large number of modules, assignments are carried out interdisciplinarily.

### Contents

- The subject is composed of several modules, following topics are covered:
  - Objectives of science education and the teacher's role
  - Scientific literacy vs. Science for science disciplines
  - reference framework of science education
  - Designing activating and motivating lessons in the student's field of study
  - ICT and multimedia in science education, apps, physical computing
  - STEM
  - design thinking
  - Science popularisation
  - Reflection and self-reflection

The lessons are a combination of interactive lectures, application/exercise of the concepts introduced through assignments and tasks. To carry out the assignments, students work in (interdisciplinary groups) that vary in size depending on the assignment.

### Initial competences

Students are very strongly advised, for the sake of content alignment between the orientation internship and the cluster science course, to take these courses concurrently. If the student chooses to take this course without the accompanying orientation internship, then this student is expected to independently process the learning content introduced in orientation science that is essential for some assignments. Students are expected to possess the necessary skills to work independently and collaborate in a multidisciplinary team.

### Final competences

- 1 Choosing and formulating goals. (The teacher as facilitator of learning and development processes)
- 2 Selecting the learning content/learning experiences. (The teacher as facilitator of learning and development processes)
- 3 Structuring the learning content/ learning experiences and translating them into learning activities. (The teacher as facilitator of learning and development processes)
- 4 Determine appropriate forms of work and grouping. (The teacher as facilitator of learning and development processes)
- 5 Individually and in team choose and adapt learning resources, including ICT and multimedia. (The teacher as facilitator of learning and development processes)
- 6 Achieve a powerful learning environment, with attention to heterogeneity within the learning group. (The teacher as facilitator of learning and development processes)
- 7 Master, broaden, and deepen domain-specific knowledge and skills. (The teacher as content expert)
- 8 Apply the acquired domain-specific knowledge and skills. (The teacher as content expert)
- 9 Properly perform administrative tasks. (The teacher as organizer)
- 10 Employing and applying innovative elements. (The teacher as innovator-researcher)
- 11 Knowledge of accessible results of educational research relevant to one's own practice. (The teacher as innovator-researcher)
- 12 Form own opinions based on facts and reflection about scientific concepts in the media (science vs. pseudoscience)

### 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

Group work, Seminar, Lecture, Independent work

### Extra information on the teaching methods

A variety of didactic forms are provided, with the emphasis on active participation of the students. The knowledge and insights gained are tested and practiced in individual and interdisciplinary group assignments.

For STEM, a project is conducted, in which interdisciplinary groups seek an answer to a scientific question or a solution to a scientific/technological problem. Students are coached through the various phases of the project.

For all modules the physical presence of the students in the classes is mandatory. If problems arise here, the subject teaching team should be contacted before the first lesson to discuss the specific situation. Two legitimate absences are allowed during the academic year.

LIO students take the course in exactly the same way as the non-LIO students

This course assumes the responsible use of generative artificial intelligence (GAI). During the lessons, what this means will be explained.

### Study material

Type: Slides

Name: vakdidactiek wetenschappen

Indicative price: Free or paid by faculty

Optional: no

Language : Dutch

Available on Ufora : Yes

Online Available : Yes

Type: Laptop

Name: vakdidactiek wetenschappen

Indicative price: € 500

Optional: no

Available through Student Association : No

Usability and Lifetime within the Course Unit : regularly

Usability and Lifetime within the Study Programme : regularly

Usability and Lifetime after the Study Programme : regularly

Type: Project

Name: vakdidactiek wetenschappen

Indicative price: € 20

Optional: yes

Additional information: material needed for the STEM project, depends on choice project by students

### References

see ELO

### Course content-related study coaching

There is opportunity for feedback during the contact moments, Feedback on the projects is done during the contact moments and through the electronic learning platform.

For feedback on the STEM projects, interactive moments are included in the schedule

By appointment with members of the subject teaching team.

The assignments are given and/or supervised by different members of the team, depending on the content of the module and/or the student's subject area.

### Assessment moments

continuous assessment

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

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

### Examination methods in case of permanent assessment

Skills test, Participation, Peer and/or self assessment, Assignment

### Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

### Extra information on the examination methods

Continuous evaluation based on assignments, cooperation and attitudes. The STEM project is

evaluated on the basis of continuous evaluation during implementation (by subject teaching team) and during the final lesson through an interactive poster presentation evaluated by the subject teaching team, fellow students and teachers from the field.

Students are expected to have adequate subject matter knowledge. This will be permanently evaluated during the various assignments and, if necessary, reference will be made to remedial opportunities.

Frequency: attendance at lessons and exercises is mandatory, some lessons. All tasks/assignments must be completed. Students who are absent during a lesson carry out the assignment given in this lesson and submit it by the agreed deadline. If there are problems in being present in some classes, the subject teaching team should be contacted to find a solution in consultation.

Second examination opportunity: a second examination opportunity is possible. It should be taken into account that some exercises or labs cannot be compensated by a replacement assignment.

Feedback: by appointment.

The student-teachers in a LIO job do the same assignments as the other students,

#### **Calculation of the examination mark**

Ramifications of the unfounded absence or non-participation in (part of) the permanent evaluation: students who eschew periodic and/or permanent evaluations for the course unit concerned are given a non-deliberative final quotation (7/20 at the most).

#### **Facilities for Working Students**

to be discussed with the teaching team.