

STEM in preschool and primary education (H002168)

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

Credits 6.0 Study time 180 h Contact hrs 50.0 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 2)	English	demonstration	2.5 h
		seminar	5.0 h
		group work	7.5 h
		self-reliant study activities	0.0 h
		on-line discussion	2.5 h
		group fieldwork	5.0 h
		lecture: plenary exercises	2.5 h

Lecturers in academic year 2018-2019

Aesaert, Koen	PP06	lecturer-in-charge
De Backer, Liesje	PP06	co-lecturer

Offered in the following programmes in 2018-2019

	crdts	offering
Bachelor of Science in Educational Sciences (main subject Pedagogy and Educational Sciences)	6	A
Exchange Programme in Educational Sciences	6	A
Linking Course Master of Science in Educational Sciences (main subject Pedagogy and Educational Sciences)	6	A
Preparatory Course Master of Science in Educational Sciences (main subject Pedagogy and Educational Sciences)	6	A

Teaching languages

English

Keywords

Instructional strategies, learning materials, early number sense, STEM-education, motivation & differentiation, approaches towards STEM education, Design-based research.

Position of the course

This course contributes to the development of the following competencies in the programme Bachelor Educational Sciences

- *B.1.4. Being able to situate and analyze pedagogical, educational and orthopedagogical issues in practice, research and policy.*
- *B.1.5. Have insight into pedagogical, educational and orthopedagogical processes and situations.*
- *B.2.1. Identify scientific literature, judge its scholarly added value and use it.*
- *B.3.2. Critically reflect on one's own thinking and actions and adjust these as a result.*
- *B.3.6. Approach a pedagogical, educational or orthopedagogical problem from multiple perspectives (multi perspectivism).*
- *B.4.1. Communicate orally on pedagogical, educational or orthopedagogical actions both to specialists and non-specialists.*
- *B.4.3. Communicate in writing on scientific research.*
- *B.4.5. Being able to collaborate in team in straightforward contexts.*
- *B.5.3. Have insight in and follows social debates and trends in pedagogical, educational and orthopedagogical contexts.*
- *B.5.4. Have insight in cultural differences and integrate respect for diversity in*

pedagogical, educational and orthopedagogical contexts.

- B.6.3. Have insight in pedagogical, educational or orthopedagogical interventions and treatments.

Contents

In this course the following - potential - topics are covered:

- Conceptual framework about teaching mathematics: **national and international** foundations and perspectives: analysis of STEM **curricula** and the **Principles & Standards**
- Theoretical and empirical analysis of the development of STEM literacy (Propensity-Opportunity hypothesis)
- **Learning theories** within STEM education and implications for teaching
- **Teaching through Problem Solving and inquiry** in relation to **STEM**-education
- The importance of **metacognitive regulation, self regulation and inquiry learning**
- Actual **debates** about teaching STEM
- **Motivation & differentiation** (SDT, PCM, ...)
- STEM **learning materials and learning activities** in primary school: analysis of school practice (content, teaching aids, formats, ..) and innovative practices (e.g. **educational technology**)
- **(Design-based) Research** within STEM education.

Initial competences

This course builds on the following course:

- Instructional sciences (1st Ba Educational Sciences).

Final competences

- 1 Selecting and using an adequate theoretical framework when discussing STEM education.
- 2 Being acquainted with developing STEL literacy.
- 3 Being acknowledged with STEM standards.
- 4 Developing adequate interventions for particular STEM education objectives.
- 5 To respect the foundations of STEM education when tackling an instructional objective.
- 6 To build up a partnership with other learners and teachers in view of tackling STEM learning objectives.
- 7 Acknowledging the society dimension in discussing STEM education.
- 8 Selecting adequate instructional approaches for the teaching of STEM.
- 9 Working respectfully together with key players in the field of STEM education.
- 10 To develop and design for problem-based learning, integrate this in educational practice and evaluate this activity from theoretical perspectives.

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

Demonstration, group work, on-line discussion group, fieldwork, seminar, self-reliant study activities, lecture: plenary exercises

Extra information on the teaching methods

- Seminar: during seminars, students explore the theoretical base about STEM learning and instruction. They are introduced to the evidence that grounds the theory and practices of STEM education. Compulsory presence and participation.
- Self-directed learning / online discussion groups based on the Flipped Classroom principle
- Demonstration / Excursion: as preparation for their group work, students get a professional training session in collaboration with for example Fyxxilab (Ghent). Compulsory presence and participation.
- Group work / Field work: students work semi-independently to create learning activities based on the available tools, instruments, protocols, theoretical frameworks, ... Subsequently, students implement the developed learning activity in an authentic classroom and evaluate this intervention from theoretically and empirically.
- Plenary exercises: in plenary exercises students solve instructional STEM problems in a guided way and get demonstrations by the teaching staff.

Learning materials and price

The handbook will be released at a later stage.

Additional materials (tools, instruments, protocols) are - freely - made available via Minerva.

Estimated costs: 60 EUR.

References

A state-of-the-art list of references is distributed via Minerva.

Course content-related study coaching

- via Minerva;
- make an appointment.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination

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

Written examination

Examination methods in case of permanent evaluation

Participation, assignment, peer assessment, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

- Written exam with open questions in which student should discuss and solve case-based problems on the base of the learning materials provided during the courses and their own materials and their experiences during the exercises and practicals
- Individual and group report. A reporting format is made available via Minerva. Also a checklist is available that presents the criteria to judge the quality of the report sections.
- Peer assessment to judge the group processes during group work

Calculation of the examination mark

A combination of permanent (50%) and periodic (50%) assessment. A valid score is based on the condition that students participated in both evaluations.

Students who eschew one or more parts of the evaluation can no longer pass the course. Final scores will be reduced to the highest non-deliberative quotation (7/20) in case the final score is higher.

In order to pass the course students have to obtain a final score of at least 10/20 and have to obtain at least the equivalent of 8/20 on all parts of the evaluation. In that case, final scores of 10/20 and above will be reduced to the highest fail quotation (9/20).

Students will not be deliberated if they obtain an equivalent of 8/20 on at least one part of the evaluation. In that case final scores of 8/20 and above will be reduced to the highest non-deliberative quotation (7/20).