

Scientific Methods and Bachelor Dissertation (C003187)

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 9.0 Study time 240 h Contact hrs 210.0 h

Course offerings and teaching methods in academic year 2020-2021

Offering	Language	Location	Teaching Method	Hours
A (semester 2)	Dutch	Gent	lecture	10.0 h
			self-reliant study activities	200.0 h
B (semester 2)			lecture	10.0 h
			self-reliant study activities	130.0 h

Lecturers in academic year 2020-2021

Verbeken, Annemieke	WE11	lecturer-in-charge
Braeckman, Johan	LW01	co-lecturer

Offered in the following programmes in 2020-2021

Programme	crdts	offering
Bachelor of Science in Biology	9	A, B

Teaching languages

Dutch

Keywords

Scientific method, scientific reports, scientific literature, hypothesis driven research, independent research, analysis of research results, oral and written presentation of research results

Position of the course

The student is aware of the different steps of the scientific method, and is thus capable to translate scientific questions into testable hypotheses and to develop the experimental design (in consultation with a promoter). The student knows the principles of scientific reports. All theoretical principles of the scientific method and conducting scientific research are put into practice while the student is working at the bachelor dissertation.

The aim of this bachelor dissertation is to give the student practical research experience by active participation in ongoing research. This also implies integration of earlier in the training acquired knowledge and research skills. The bachelor dissertation also offers the possibility to function independently (although under supervision) and responsibly in a research group. Projects can be performed individual or in small groups, depending on the subject, but it always has to be possible to evaluate the individual contribution of each student.

Contents

In the lectures attention is given to the scientific method in all its aspects: to formulate testable hypotheses, to take into account assumptions, to develop suitable experimental design and associated predictions, logical scientific thinking (PEL method, deductive versus inductive logic), structure and rationale of scientific reports (abstract, introduction, material and methods, results, discussion, conclusion), to align reporting on target audience, organization and practical aspects of academic writing, basic principles of oral presentation. The acquired knowledge about scientific method and scientific reports is put into practice, hereby relying on the chosen topic of the bachelor dissertation. The research groups participating in the Biology education propose topics for these dissertations. The practical implementation differs depending on the topic but always contains a literature study, definition of the problem and working assumption(s), practical work (laboratory or field), analysis and synthesis of the results.

The promoters must ensure that the necessary material (incl. basic literature) and the necessary infrastructure is available, and that the project is feasible within the required time. The activities include four weeks research (4 to 5 afternoons per week), while in the fifth week the interpretation of the results is carried out which are then processed in a preliminary report. In addition, an oral presentation is prepared and given to members of a reading committee. Evaluation is based on both the oral presentation and the written report. After the Easter holidays the final report must be submitted, relying on the feedback received after the presentation.

Initial competences

Basic knowledge in biological and supporting disciplines.

Final competences

- 1 The student can logically build a scientific report with the necessary elements of scientific reporting and shall establish the necessary links between the various components.
- 2 The student is able to communicate clearly and transparently to the target audience and consistently uses scientific language and correct terminology.
- 3 The student is able to synthesize and critically approach the scientific literature and to draw the necessary conclusions concerning the scientific question and problem.
- 4 The student can clearly translate the problems into research questions and testable hypotheses.
- 5 The student is able to do solid empirical research, to collect critically reliable data and to present these data clearly and scientifically. He manages the practical skills to work in a lab or in the field and demonstrates scientific attitude.
- 6 The student integrates the literature study in the own research and is approaching the hypotheses based on the own research to finally put the results in a broader context.
- 7 The students has the ability to report orally, to express himself clearly, to adapt to the audience and to critically deal with questions about the research.
- 8 Students is able to cooperate within the research group and initiates scientific interactions with members of the research group. The student defines priorities and works according to plan.
- 9 The student uses feedback obtained to arrive at a scientific and technical growth. The student demonstrates a good critical attitude to the research and interpretation of scientific information.

Conditions for credit contract

This course unit cannot be taken via a credit contract

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, self-reliant study activities

Learning materials and price

Lecture notes are available and downloadable from Ufora.

References

- Scientific Papers and Presentations - Martha Davis (2nd edition, 2005) – Academia Press (San Diego, ISBN 0-12-088424-0).
- Asking Questions in Biology - Chris Barnard, Francis Gilbert & Peter McGregor (3rd edition, 2007) - Pearson Education Limited (Essex, ISBN 978-0-3-222435-2).
- Successful scientific writing - Janice R. Matthews, John M. Bowen & Robert W. Matthews (2nd edition, 2006) - Cambridge University Press (Cambridge, ISBN 0-521-78962-1).
- Practical Skills in Biology - Allan Jones, Rob Reed & Jonathan Weyers (4rd edition, 2007) - Pearson Education Limited (Essex, ISBN 978-0-13-175509-3).
- Experimental Design for the Life Sciences - Graeme D. Ruxton & N. Colgrave (2nd edition) - Oxford University Press (Oxford, ISBN 0-19-928511-X).
- Scientific Method in Practice - Hugh G. Gauch, Jr (2007) - Cambridge University Press (ISBN 978-0-521-01708-4)

Course content-related study coaching

Interactive support through Ufora, email and oral consultations with the promoter / supervisor of the bachelor thesis. Teachers and scientific staff accompany the student on an ongoing basis through regular contacts.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination, oral examination, report

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

Written examination, oral examination, report

Examination methods in case of permanent evaluation

Participation

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Calculation of the examination mark

The total score is the final score based on the evaluation of the bachelor thesis, both the oral presentation and the final written report, following an evaluation by the reading committee of the thesis. The distribution of the subscores is in accordance with the sections: written report (general, scientific content), Oral presentation and Scientific attitude. The evaluation form with the subscores is available at the Biology website.