



Faculty of Health, Science and Technology
Biology

Syllabus

Meta-analysis

Course code:	7BIO006
Course Title:	Meta-analysis <i>Metaanalys</i>
Subject:	Biology
Credits:	7.5 ECTS
Degree Level:	Doctoral

Course approval

The syllabus was approved by the Faculty of Health, Science and Technology, 4 March 2026 and is valid from the spring semester 2026 at Karlstad University.

Language of instruction

Teaching is in English.

Prerequisites and selection

Admission to a doctoral program in sciences and technology at Karlstad University. Other students can be admitted after special evaluation. The course is primarily for research education students admitted at Karlstad University, and secondarily for research education students admitted at other universities.

Learning outcomes

Upon completion of the course the student should be able to:

1. Conduct a systematic literature review.
2. Critically read and evaluate published meta-analyses.
3. Comprehend and assess the primarily literature in order to evaluate their usability for meta-analysis.
4. Understand the benefits and limitations that the different effect sizes provide.
5. Develop a complete protocol for a meta-analysis, including literature search, inclusion criteria, data extraction and analysis.
6. Perform different statistical analyses specific for meta-analysis.
7. Understand and evaluate the limitations and biases in the data.

8. Report the methods and results of a meta-analysis in a clear and succinct way.

Course content

Meta-analysis is a specific form of literature review in which a statistical synthesis of quantitative data obtained from a set of studies is performed. The aim of this course is to provide an introduction to the theory and practical issues of performing a meta-analysis. This course will start with two weeks of lectures and seminars introducing the general concepts and theory of meta-analysis. During this period the students will deliver two assignments, a critique of a published meta-analysis and a proposal of their own meta-analysis, specifying research question, hypothesis, search terms and inclusion criteria. The course will be followed by six weeks of lectures in which practical aspects of meta-analysis will be introduced, including analysis and reporting, and workshops in which students will apply such concepts in their own data. The course concludes with a written report of the meta-analysis the students develop.

The following themes are included in the lectures:

- Benefits of meta-analysis compared to other forms of data synthesis/critically evaluate meta-analysis.
- Effect sizes, means and variances.
- Literature search/inclusion criteria/evaluating primarily literature.
- Data extraction/dealing with missing data.
- Publication biases.
- Fixed and random effects/estimating heterogeneity.
- Non-independence/hierarchical models.
- Meta-regression.
- Visualization/reporting of meta-analysis.

Reading list

See separate document.

Examination

The course will be examined by three individual written assignments: a critique of a published meta-analysis, a meta-analysis proposal and a final report of the meta-analysis.

Grades

One of the grades Fail (U) or Pass (G) is awarded in the examination of the course.

Quality assurance

A written evaluation is carried out at the conclusion of the course. The result of the evaluation is collated in accordance with *The Higher Education Ordinance*, Chapter 1, § 14.

Course Certificate

Course certificate is issued on request.

Goal matrix

Goals that, after completing the course, are partly fulfilled for the doctoral or licentiate degree are marked with an X.

	Doctoral			Licentiate	
	Knowledge and understanding			Knowledge and understanding	
1a	- demonstrate broad knowledge and systematic understanding of the research field and	X		1a demonstrate knowledge and understanding in the field of research including	X
1b	advanced and up-to-date specialised knowledge in a limited area of this field, and			1b current specialist knowledge in a limited area of this field as well as	
1c	familiarity with research methodology in general and the methods of the specific field of research in particular.	X		1c specialised knowledge of research methodology in general and the methods of the specific field of research in particular	X
	Competence and skills			Competence and skills	
2a	- demonstrate capacity for scholarly analysis and synthesis as well as	X		2a demonstrate the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively and to	
2b	to review and assess new and complex phenomena, issues and situations autonomously and critically			2b plan and use appropriate methods to undertake a limited piece of research and other qualified tasks within predetermined time frames in order to contribute to the formation of knowledge	X
3a	- demonstrate the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively, and to			2c as well as to evaluate this work	X
3b	plan and use appropriate methods to undertake research and other qualified tasks within predetermined time frames and to review and evaluate such work	X		3a demonstrate the ability in both national and international contexts to present and discuss research and research findings in speech and writing and in dialogue with the academic community and	
4	- demonstrate through a dissertation the ability to make a significant contribution to the formation of knowledge through his or her own research			3b society in general	

5a	- demonstrate the ability in both national and international contexts to present and discuss research and research findings authoritatively in speech and writing and in dialogue with the academic community and		4	demonstrate the skills required to participate autonomously in research and development work and to work autonomously in some other qualified capacity.	X
5b	society in general				
6	- demonstrate the ability to identify the need for further knowledge and	X			
7	- demonstrate the capacity to contribute to social development and support the learning of others both through research and education and in some other qualified professional capacity.				
Judgement and approach				Judgement and approach	
8a	- demonstrate intellectual autonomy and disciplinary rectitude as well as	X	5	demonstrate the ability to make assessments of ethical aspects of his or her own research	
8b	the ability to make assessments of research ethics, and		6	demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used	
9	- demonstrate specialised insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used.		7	demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.	X