

**Course number:** 2995

**Title in Swedish:** Systematiska översiktstudier och meta-analyser i djurforskning – en introduktion.

**Title in English:** Systematic reviews and meta-analyses in animal research – an introduction.

**Language:** English

**Responsible KI department:** Comparative Medicine

**Level:** Doctoral students

**Credits:** 1

**Specific entry requirements:** ~~Prior education and training in laboratory animal science is advised, but not required.~~

**Grading:** Pass/fail.

**Purpose of the course:** Systematic reviews are routinely used for scientific purposes in clinical studies, and are also currently rapidly gaining more attention in the field of animal research. Systematic overviews of all scientific literature on a well-defined specific research question are an important tool to improve the scientific quality of animal experiments, to improve translation of data generated from animals into the clinical situation, and to avoid unnecessary duplication of animal experiments, which are both an ethical and legal obligation. The aim of systematic reviews is to provide a comprehensive, objective, evidence-based and up-to-date overview of the current knowledge, which can be quantitatively summarized by means of a meta-analysis. Therefore, systematic reviews may result in new insights without having to use new animals. Systematic reviews can actually replace and refine animal experiments by better understanding the problems and limitations in previous experiments and by reducing the number of animals needed. This course objective is to encourage the use and conduct of systematic reviews and meta-analysis in animal research in order to 1) increase scientific quality, 2) to improve translation of animal data to the clinical situation, and 3) to prevent unnecessary duplication of animal studies.

**Intended learning outcomes:** After completion of the course the students should be able to: 1) Understand and demonstrate the value, principles and the different concepts related to systematic reviews and meta-analyses in animal studies; 2) Understand the difference between a classical review (so-called narrative) and systematic reviews; 3) Identify the strengths, limitations and pitfalls of systematic reviews and meta-analysis in animal research; 4) Interpret and apply basic methods of meta-analyses in animal studies.

**Contents of the course:** Key contents of the course include 1) Basic concepts in systematic reviews and meta-analyses, 2) strengths, problems and limitations of systematic reviews and meta-analyses, 3) conducting a systematic literature search, 4) data-extraction and quality assessment of included studies, 5) Statistical methods used in meta-analyses and interpretation. The course consists of two parts. The first part is “flipped-classroom” consisting of the mandatory course literature (see below) and the e-learning module “Introduction to systematic reviews and meta-analysis of animal studies”, developed by our collaborators in SYRCLE (Systematic Review Centre for Laboratory Animal Experimentation; Radboud

University Medical Center, Nijmegen, The Netherlands). The second part will be a two-day workshop during which we will build upon the acquired knowledge – with a clear focus on practical aspects of conducting systematic searches and meta-analyses, including the systematic literature search, data-extraction and quality assessment, and the statistical analyses (introducing the free software developed by Cochrane: RevMan).

**Teaching and learning activities:** This is a hands-on course based on active learning. The course will cover theoretical concepts mainly through the e-learning module and reading the mandatory course literature. Discussions in group and practical sessions will be used to facilitate deeper understanding, and to acquire the necessary skills to perform the different steps in systematic reviews and meta-analyses.

**Compulsory elements:** The e-learning module needs to be completed before the course starts (certificates of completion need to be sent to the course organizer before the face-to-face workshop), and the students need to read the mandatory course literature. The face-to-face two-day workshop is mandatory (entire days). In case of well-justified circumstances, missed parts of the workshop may be replaced by a written assignment as approved by the course director.

**Examination:** To pass the course the student must 1) complete the e-learning module, 2) read the mandatory course literature before the workshop, 3) actively participate during the two-day workshop, and 4) pass the final written examination (home exam/self-reflection) to consolidate the acquired knowledge.

#### **Literature and other teaching material:**

E-learning module:

"Introduction to systematic reviews and meta-analysis of animal studies."

<https://syrcle.ekphost.nl> Registration code: syrcle

Mandatory course literature:

1. Leenaars M et al. A step-by-step guide to systematically identify all relevant animal studies. *Laboratory Animals* 2012; 46: 24-31.
2. Hooijmans CR, Leenaars M and Ritskes-Hoitinga. A gold standard publication checklist to improve the quality of animal studies, to fully integrate the Three R's and to make systematic reviews more feasible. 2010. *ATLA* 38, 167-182.
3. Hooijmans CR, Ritskes-Hoitinga. Progress in using systematic reviews in animal studies to improve translational research. *PLOS Medicine* 2013: 10(7):e1001482.
4. De Vries RBM et al. A protocol format for the preparation, registration and publication of systematic reviews of animal intervention studies. *Evidence-based preclinical medicine* 2015, 1 (1), 19, e00007.
5. Hooijmans CR et al. Meta-analyses of animal studies: an introduction of a valuable instrument to further improve healthcare. *ILAR J.* 2014: 55(3):418-26
6. Hooijmans CR et al. SYRCLE's risk of bias tool for animal studies. *BMC Med Res Methodol.* 2014: 14:43.
7. Berlin JA, Golub RM. Meta-analysis as evidence: Building a better pyramid. *JAMA* 2014:312(6):603-605.
8. De Vries RB et al. A search filter for increasing the retrieval of animal studies in Embase. *Lab Anim* 2011: 45(4)268-70

9. De Vries RB et al. Updated version of the Embase search filter for animal studies. Lab Anim. 2014; 48(1):88.

Recommended reading:

BOOKS:

1. Systematic Reviews in Health Care: Meta-analysis in context (2nd edition, 2008, Egger et al, BMJ publishing group): (<http://ije.oxfordjournals.org.proxy.kib.ki.se/content/31/3/697.1>)(free online as e-book via KI library)  
Chapter 1: Introduction; Chapter 3: Problems and limitations in conducting systematic reviews; Chapter 9: Why and how sources of heterogeneity should be investigated
2. Introduction to meta-analysis. (2009, Borenstein et al) (free online as e-book via KI library) (<http://onlinelibrary.wiley.com.proxy.kib.ki.se/book/10.1002/9780470743386>)  
Part 3 - Fixed-effect versus random-effects models; Part 4 - Heterogeneity: chapter 15,16; Part 9 - Meta-analysis in context
3. Cochrane handbook (free online) (<http://handbook.cochrane.org/>)

**Number of students:** 8-16

**Date:** November 22-23, 2017.

**Selection of students:** Preference will be given to applicants where the benefits of this course will be greatest. Date of registration as a doctoral student, suitability of doctoral project, and the motivation to attend the course given will be used in the selection process.

**Other information:**

Prior education and training in laboratory animal science is advised, but not required. Face-to-face teaching and hands-on training will take place during Wednesday and Thursday between 9am and 5 pm. Location: at computer room available at KI Library facilities in Solna. This course is arranged by the Laboratory Animal Science Education and Training Unit, Comparative Medicine, This course is a collaboration between Laboratory Animal Science Education and Training Unit, Comparative Medicine, Karolinska Institutet, and the course leaders and instructors on "How to conduct systematic reviews and meta-analysis" in clinical studies at Karolinska Institutet.

This course is arranged by the Laboratory Animal Science Education and Training Unit, Comparative Medicine, Karolinska Institutet, with the special collaboration of SYRACLE (Systematic Review Centre for Laboratory Animal Experimentation), Radboud University Medical Center, Nijmegen, The Netherlands, and the course team of the KI doctoral course "How to conduct systematic reviews and meta-analysis" in clinical studies.

**Course responsible:**

Rafael Frías | DVM, MSc (LAS), PhD  
Director, LAS Education & Training Unit  
Comparative Medicine | Karolinska Institutet  
171 77 Stockholm, Sweden | Von Eulers väg 4A, 4th floor  
T: +46 8524-86660 | M: +46 737 874-103  
[rafael.frias@ki.se](mailto:rafael.frias@ki.se) | [internwebben.ki.se/las-courses](http://internwebben.ki.se/las-courses)

**Contact person:**

Nele Brusselaers  
Institutionen för mikrobiologi, tumör- och cellbiologi

0761516212  
nele.brusselaers@ki.se

CTMR - Nobelsvag 16 - KISolna

17177  
Stockholm