

COURSE SYLLABUS

Course number: 1974

Title in Swedish: Fenotypning av genetiskt modifierade möss

Title in English: Phenotyping of genetically engineered mice.

Language: English

Responsible KI department: Comparative Medicine

Level: Doctoral students

Credits: 2

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

Grading: Pass/fail.

Purpose of the course: The course is aimed at doctoral students and postdocs who are in the initial phase of setting up animal experiments using mice. Researchers are introduced to the concept of integrative, comprehensive phenotype analysis with attention to international harmonization of experimental approach and reporting. Emphasis will be focused on morphological phenotype analysis in relation to age, development and *in vivo* physiological and behavioral parameters. Students will need to prepare oral presentations, which encourage them to reflect on the application of the course content in their own research area, and encourages them to discuss and explain their work with other participants.

Intended learning outcomes: After completion of the course the students should be able to 1) describe systematic and standardized phenotype analysis of transgenic mice and mice carrying targeted mutations; 2) present and review strategies for production and breeding of genetically engineered mice, with attention to accurate selection of controls; 3) practically handle techniques for analysis of general parameters, experiment termination and organ selection and sampling; 4) select more specialized approaches for evaluation of (neuro)behavioral, physiological and pathomorphological parameters.

Contents of the course: The course provides instrumental knowledge for strategic select of endpoints and controls so as to maximize experimental outcome and rationalize the use of experimental animals. Attendees will be presented with theory on breeding, and schedules will be practiced with attention for selection of appropriate controls. Basic knowledge of mouse comparative biology and systematic evaluation of mouse phenotype will be presented during the course, and approaches for experiment termination and organ sampling (necropsy) will be discussed and practically trained. Specialized approaches for evaluation of (cardiovascular) physiology, (neuro)behavioral parameters, and non-invasive as well as post mortem morphological analysis will be presented.

Teaching and learning activities: The course will consist of lectures, demonstrations and practical necropsy training. Lectures and demonstrations will be interactive with attention to specific research areas as requested by the participants. Participants will practice with breeding schedules for complex genetic modifications and prepare a presentation overviewing application of acquired insights to their area of research. The course is 5 days full-time. Presentations/practical exercises are during office hours, time will be provided to interact with team task-group members during office hours but the necessity for some homework is expected.

Compulsory elements: All scheduled sessions (lectures, demonstrations, practical training and oral presentations/discussions) and active student participation are compulsory if the student is to be provided with certification of the successful completion of the course. Missed parts of the course as a consequence of a well-justified absence will need to be compensated after agreement with the course director e.g. with written assignment.

Examination: To pass the course the student must actively participate in the lectures and group seminars, and pass the examinations: 1) Individual examination of multiple choice questions during the course; 2) Satisfactorily demonstrate a completed necropsy during the practical; 3) Presentation and discussion of group work summarizing the presented information as relevant for the area of research predominating in the group (3-4 participants per group). A pass/fail criteria will be used as a global rate for this course.

Literature and other teaching material:

Virginia E Papaioannou and Richard R. Behringer. *Mouse Phenotypes: A Handbook of Mutation Analysis*. Cold Spring Harbor Laboratory Press 2004.

Recommended reading:

1. Lee M Silver. *Mouse Genetics*. <http://www.informatics.jax.org/silver/>
2. Margaret J. Cook. *The Anatomy of the Laboratory Mouse*. <http://www.informatics.jax.org/cookbook/>
3. Janet Rossant and Patrick PL Tam. *Mouse Development: Patterning, Morphogenesis, and Organogenesis*. Academic Press 2002.
4. P Popesko, V Rajtova and J Horak. *A Colour Atlas Anatomy of Small Laboratory Animals: Volume Two: Rat, Mouse, Hamster*. Academic Press. ISBN: 0-7020-2699-9
5. Hans Hedrich. *The Laboratory Mouse (Handbook of Experimental Animals)*. Academic Press 2004. ISBN: 0123364256
6. Peggy Danneman, Mark Suckow, and Cory Brayton. *The laboratory mouse*. CRC Press 2012. ISBN: 9781439854211
7. Robert Maronpot. *Pathology of the Mouse: Reference and Atlas*. Cache River Press 1999. ISBN: 188989902X
8. Jacqueline N. Crawley. *What's Wrong with My Mouse?: Behavioral Phenotyping of Transgenic and Knockout Mice*
9. Walter F. Loeb and Fred W. Quimby. *Clinical Chemistry of Laboratory Animals*
10. Piper Treuting and Suzanne Dintzis. *Comparative Anatomy and Histology- a mouse and human atlas*. Elsevier 2012. ISBN: 978-0-12-381361-9

Internet resources:

1. Mouse Phenome Database: Phenotypes and Biology of Genetically-Engineered Mice: <http://phenome.jax.org/>
2. European Mouse Phenotyping Resource of Standardised Screens (EMPreSS): <http://empres.har.mrc.ac.uk/>
3. Revised guidelines for organ sampling and trimming in rats and mice: <http://reni.item.fraunhofer.de/reni/trimming/>

COURSE OCCASION

Language: English.

Date: December 4-8, 2017.

Number of students: 8-16

More information: This course is a collaboration between Laboratory Animal Science Education and Training Unit, Comparative Medicine, Karolinska Institutet, and the Department of Laboratory Medicine FENO, F52, Karolinska University Hospital Huddinge. Invited speakers include both local and international specialists in their field of animal research.

Selection of students: Applicants must have completed an appropriate course in laboratory animal science (e.g. to carry out scientific procedures on animals). If necessary, priority will be given to applicants using mouse models in their research project (explained according to a written motivation) and to applicants with an earlier registration date as doctoral students.

Course address: At the Learning Lab, Comparative Medicine, Karolinska Institutet, Solna.

Course responsible:

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