Laboratory Animal Science for Researchers (MDV6003)

Target group
Ph.D. candidates, researchers and others who are planning to work with research animals.

Course content
The course follows the requirements in the Norwegian regulation on animal experimentation (FOR-2015-06-18-761) §25 and annex E. Additionally, the course aims to follow the Education and Training Framework by the European Commission to fulfil the requirements for functions (a) (persons who carry out procedures on animals) and (b) (persons who design procedures and projects). After completion of this course, you will most likely be able to bring your diploma to other European countries and work with research animals. Please note that other countries might ask for additional training and have different national requirements.

The course covers the following topics:
Legislation; ethics, animal welfare and the 3Rs; views within society relating to the scientific use of animals; species-specific biology of research animals; care and accommodation; microbiological qualities; genetically modified animal models; environmental factors that may influence animal experiments; health hazards; assessment of pain; humane endpoints; severity classification; humane euthanasia; public administration; design and statistics; principles of minimally invasive procedures; anesthesia and analgesia for short-lasting and long-lasting procedures; basic surgery.

The course is divided into one general section and two special sections. All students must complete the general section. The special sections will focus on traditional laboratory animals (rodents and pigs) and fish/aquatic animals, respectively. The course participants must select one of these special sections. The choice of a special section should be based on the animals the participants will work with after the course.

The general section will focus on these topics:
The national and international legislation, design and statistics, public administration, ethics, 3Rs, views and attitudes within society regarding the scientific use of animals, humane endpoints, severity classification, humane euthanasia, health hazards.

The special section on traditional laboratory animals will focus on these topics:
Biology of laboratory animals, anesthesia and analgesia, genetics, genetically modified animal models, microbiological health monitoring, handling and minimally invasive procedures, accommodation, environmental factors, basic surgery.

The special section on fish and aquatic animals will focus on these topics:
Legislation concerning fish, experimental conditions, stress, biorhythms, acclimatization, pain and suffering in fish, identification methods, aggression and hierarchy, health surveillance and microbiological qualities, genetically modified fish.

After the course is completed, the students should be able to transfer their acquired knowledge into practical activities with research animals. Working with research animals must happen under supervision until the candidate can demonstrate the requisite skills and competence.

Learning outcome
After completing the course, the students should be able to:
- Identify and describe the national and European legislation which regulate the scientific use of animals
- Describe the authorisation that is needed before acting as a user, breeder or supplier of laboratory animals, and especially the authorisation required for projects
- Indicate who bears primary responsibility for the animals undergoing procedures
- Describe the differing views within society concerning the scientific use of animals
- Identify ethical and animal welfare issues in their own work
- Demonstrate a comprehensive understanding of the principle of the 3Rs, list examples of how the 3Rs can be implemented in research projects and list sources of information related to the 3Rs
- Describe the severity classification system and give examples of each category
- Describe basic biology of relevant animal species; specifically their anatomy, physiology, reproduction and behaviour, and recognize the importance of considering biological and behavioural needs
- Describe suitable environmental and housing conditions for laboratory animals, and describe how the animal facility is organized to maintain an appropriate health status for the animals
- Describe how genetically altered animals can be used for scientific research and the importance of monitoring such animals very carefully
- List potential human health hazards associated with contact with laboratory animals and how these can prevented or reduced
- Recognize abnormal behaviour and signs of discomfort, pain, suffering or distress
- Discuss methods available for assessing and recording the welfare of animals
- Describe the principle of implementing early humane endpoints and how this implementation can influence animal health and welfare during the course of an experiment
- Describe the principles of humane killing and list the appropriate euthanasia methods for the relevant animal species
- Recognise that the choice of a euthanasia method may influence the scientific outcome
- Describe the biological impact of procedures and restraint on physiology
- Describe the biological consequences of acclimatisation, habituation and training
- Describe appropriate methods and principles for handling animals, and describe common techniques / procedures, including administration and sampling techniques
- Describe how to find relevant, up-to-date information on refinement of experiments
- List the different types of formal experimental designs
- Identify the experimental unit
- Describe the variables affecting significance, including the meaning of statistical power and the “p-value”
- Describe how to monitor the microbiological health of laboratory animals
- Define sedation, local anesthesia and general anesthesia
- Describe the components of pain physiology and list the types of analgesic drugs that are effective at the different components
- Define balanced anesthesia and indicate how this can be achieved
- Describe how to do pre-operative, intraoperative and post-operative evaluation of research animals
- Describe different methods to optimise post-anesthetic recovery
- Indicate some of the problems associated with pain recognition and pain management in animals

Learning methods and activities

The theoretical teaching will happen partly as self-studies using e-based learning tools with tests and assignments, and partly as auditorium lectures and auditorium activities.

The general part will consist of e-based learning using study material available in Blackboard. There will be tests and other assignments to each course module. Completion of tests and assignments is mandatory.

The special section for traditional research animals will consist of e-based learning tools using study-material available in Blackboard. There will be tests and other assignments to each course module. Completion of tests and assignments is mandatory.
The special section for fish and aquatic animals will consist of auditorium lectures given intensively during two days. Attendance to lectures is mandatory.

A course certificate will be issued when the following has been completed: completed e-based learning, attendance to theoretical lectures for students who select the special part for fish and aquatic animals, completion of tests and assignments, passed the written exam and the home exam. This certificate should be supplemented with a practical training document. The course does not cover the practical training. You must arrange the practical training yourself. The training must be supervised by a person who has appropriate and up-to-date knowledge and is skilled and competent in the procedures. The practical training must be documented.

**Compulsory assignments**

- Self-studies
- Individual assignments and tests
- Lectures

**Specific conditions**

Exam registration requires that class registration is approved in the same semester, or that compulsory activities are approved in a previous semester.

**Recommended previous knowledge**

Basic knowledge in anatomy and physiology, competence in statistics, knowledge about literature searches on the internet and in libraries.

**Required previous knowledge**

A 3-year education on university or college level is a prerequisite in order for the participant to plan and design procedures and projects (Function (b) in the EU Directive 2010/63).

**Course materials**

The compendium "Laboratory Animal Science" is included in the course fee. In addition, students in the fish specialization will get "Laboratory Animal Science for Fish Researchers". Other course material will be distributed to the students through Blackboard.

**Course fee**

6000 NOK, incl. compendium

**Time and place**

Autumn 2018
November 21st to 23rd at NTNU, Trondheim.

Announcements in Blackboard will give information about the time and place for the auditorium activities.

Application deadline

October 1st 2018

Lecturer/Course coordinator

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