LAS-Learning

Course Organisers Instructions

EU Module 3.1 - Basic and appropriate biology - Species specific: Rat

Development of interactive e-learning modules on particular areas of the Education & Training framework facilitating implementation of DIR 2010/63/EU

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Suported by:

Partners:

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1. Module Description

a. Overview

This module—*Basic and appropriate biology—Species-specific: Rat*—provides the minimum background information required for understanding the laboratory rat's species-specific behaviour and biology. Emphasis is placed on relating the animal's biology to appropriate husbandry and relevant research practices—the essential factors for ethical, reproducible, and externally valid research when using model organisms.

This document provides guidance and suggestions to support the course organiser's efforts. Each module is aligned with the learning outcomes outlined in the EU Education & Training framework for laboratory animal science.

We recommend consulting the EC Training and Education framework guidance document if you are accessing the site independently. This resource offers an overview of training requirements for individuals with different responsibilities under their relevant national legislation.

Further reading and additional education and training may be necessary to meet national or institutional training requirements. At the end of each module, you will find a list of recommended further readings and references cited throughout the content. Links to these references are provided whenever possible.

This module was developed by Manuel Berdoy and Vootele Voikar, two renowned experts with extensive experience researching, publishing, and training in the behaviour and biology of rodents. The module was revised further by an international Reflection Group panel. Coordination was carried out by Nuno H. Franco.

The module is currently in the testing phase. We appreciate your collaboration in integrating it into your courses and providing feedback. After completing a module, please fill out the form below with your feedback.

b. Learning Objectives

This module will equip participants with essential knowledge and skills to navigate animal research's ethical, legal, and practical aspects. The key learning objectives include:

1. Mice and Rats are Rodents.
2. Rats and Mice Strains.
3. Using Rodent Biology to Inform Research Practice.
4. Rat Biology and Behaviour.

2. Course Program

The module is organised into different chapters, with lessons and learning objectives for the participants as follows:

Chapter	Lesson	Learning objectives
Introduction: Rats and Mice	1	Get to know the learning objectives
Mice and rats are rodents	2-4	What are rodents? Rodents gnaw... Short life span - but why?
Rats and mice strains	5-7	Genetic Background matters Types of Strains The importance of nomenclature
Using rodent biology to inform research practice	8-15	Know your animal Being Active at Night Being a Prey Species Assessing Welfare: the score sheet Prioritising senses differently From a complex world to a simple cage Standardisation vs Reproducibility Rats vs Mice
Rat biology and behaviour	16-25	Wild Rats Laboratory Rats Handling Rats The Life of a Rat in Numbers Sensory Biology Reproduction Feeding Aggression Recognition of Pain and Stress Anatomy and Physiology

Table 1 - Learning objectives per parts and lessons.

a. Progress Tracking

Once learners begin working through a module, their progress is automatically tracked. This allows them to pause and resume their studies at any point. Upon completing the module, learners retain access to all sections, enabling them to revisit and review specific topics to reinforce their understanding.

b. Model Structure and Implementation Guidance

The module is structured into several parts, which were designed to be followed in sequence but can also be taken iteratively based on the learner's needs. Please note that a **certificate of completion** is issued exclusively to learners who finish all parts of the module.

From a pedagogical perspective, each tutor is responsible for deciding which materials to use in face-to-face sessions, which parts learners should complete independently, and whether to mandate their completion. However, it is essential to consider the time required to complete the eModule or its parts to avoid overburdening learners.

We highly recommend completing the module to ensure it aligns with your course's content and scope. Familiarising yourself with the material will also enable you to engage more effectively with students on the various topics covered in the eModule.

c. In-Depth Explanation Lesson by Lesson

Lesson	Title	LO	Explanation
1	Introduction		Short introduction with 3 photos and one list of learning outcomes for the module.
2	What are rodents?	3.1.1	Rodent taxonomy and characteristics represented with 3 photos and 1 diagram.
3	Rodents gnaw...	3.1.1	Rodents gnaw are represented in 1 collapsible of 2 windows with 2 images, and 2 more images outside.
4	Short life span - but why?	3.1.1	Why do rats and mice have a short life span, represented with text.
5	Genetic Background matters	3.1.7 3.1.8	Genetic background represented with 1 diagram and 1 list.
6	Types of Strains	3.1.7 3.1.8	Types of strains represented in 1 line chart, 1 interactive labelled image, 1 collapsable and 1 bar chart.
7	The importance of nomenclature	3.1.7 3.1.8	Nomenclature description represented with 2 photos, 1 diagram and 1 collapsible with 2 windows.
8	Know your animal	3.1.3	"Happy Animals make good science" description represented with 1 collapsible.
9	Being Active at Night	3.1.1	Rodents' activity at night represented in 1 video and 1 tab with 2 windows with 2 line charts.

10	Being a Prey Species	3.1.2 3.1.3 3.1.4 3.1.6	Finding shelter represented with 4 photos and 1 video. How to handle rodents represented with 2 videos. Recognising pain represented with 3 photos and 1 collapsible.
11	Assessing Welfare: the score sheet	3.1.9	Score sheets description represented in 1 table and 4 matching quizzes. Score sheet example represented in a table.
12	Prioritising senses differently	3.1.1	Senses description with 1 video.
13	From a complex world to a simple cage	3.1.4 3.1.6	Environmental enrichment represented in 1 collapsible, a 4-window tab with 2 videos and 2 images. Life in cycles description with 1 interactive labelled image, 1 video and 4 photos.
14	Standardisation vs Reproducibility	3.1.3	Standardisation vs Reproducibility description with text.
15	Rats vs Mice	3.1.4	Differences between mice and rats represented with 1 photo and 6 videos.
16	Wild Rats	3.1.1 3.1.7	Description of the Norway rat with 1 photo.
17	Laboratory Rats	3.1.1 3.1.7	Aspects of rat biology represented in 1 photo, 1 list and 1 video.
18	Handling Rats	3.1.1 3.1.3	Handling demonstrated in 1 video
19	The Life of a Rat in Numbers	3.1.1	Relevant biological data presented in 1 photo and 2 tables.
20	Sensory Biology	3.1.1	Olfaction represented in 1 photo, 2 collapsibles and 1 video. Touch represented with 1 video. Hearing represented with 1 collapsible and 1 video. Vision with a twist description.
21	Reproduction	3.1.1	Description of reproduction with 1 collapsable, 1 photo and 1 figure.
22	Feeding	3.1.5	Description of feeding with 1 video and 1 collapsible.
23	Aggression	3.1.1	Description of aggression with 2 videos.
24	Recognition of Pain and Stress	3.1.2	Signs of stress represented in a collapsible. The rat grimace scale represented in 1 image. Diseases represented in a 3-window tab.
25	Anatomy	3.1.1	Rat skeleton represented in 1 interactive figure. External Genitalia represented in 1 interactive figure. Exercise with flip-cards to distinguish males and females. Digestive system represented in 1 interactive figure.
26	Summary		Module summary
27	References and Further Reading		References for additional materials

28	Rat Knowledge-check		Assesses progress and knowledge acquired about mouse during the module

Table 2 - Explanation lesson by lesson.

3. Participants' Profile

This module is tailored for a diverse audience, including (bio)medical researchers, participants in laboratory animal science courses, university students, biology/medical educators, animal welfare body members, regulators, and individuals seeking a deeper understanding of animal research ethics.

No specific prior knowledge is required to participate. However, familiarity with bibliographic database searches and a foundational background in laboratory animal science or non-animal methods may benefit participants. Organisers should consider this when planning the course structure and support materials.

4. eModule

The eModule provides clear definitions, essential knowledge, and interactive components designed to enhance understanding of key animal ethics theories and develop critical thinking skills. Participants will learn to ethically frame and evaluate animal research from a broad perspective and a case-by-case approach.

The content and references are curated from expert sources, including researchers and information specialists, ensuring high-quality and reliable information. The module is presented dynamically, combining text, images, built-in exercises, and videos to engage learners effectively. It can be integrated into courses as homework or used during a lecture day. Many lessons are designed to deliver comprehensive information and understanding without additional in-class interaction.

a. Limitations

It is impossible to cover every concrete example of animal use for scientific and educational purposes. Additionally, the module cannot address how to establish a Culture of Care in the specific context of every institution or organisation. Furthermore, the module cannot predict future scientific advancements that may expand the Three Rs possibilities nor anticipate societal or regulatory changes after publication. Despite these limitations, we hope this module will equip students with the skills and knowledge to adapt to an ever-evolving scientific, societal, and regulatory landscape.

b. Blended Learning Approach

E-learning modules offer significant advantages, particularly for learners who may find it challenging to attend traditional intensive training sessions spanning several days. Such sessions can disrupt work schedules and limit participants' ability to balance learning with other responsibilities. While this eModule covers all required learning outcomes, we do not advocate entirely replacing face-to-face teaching (or "live" online discussion sessions) with e-learning. Instead, we recommend a blended learning approach (hybrid or mixed-mode learning). This approach combines the flexibility of e-learning with the engagement of interactive, live sessions, ensuring that learners receive the necessary information while accommodating those who require greater flexibility.

The modules are split into short, manageable lessons, allowing participants to integrate learning activities into their daily schedules seamlessly.

5.Implementing Blended Learning Strategies

Flipped Classroom Arrangement

Before face-to-face classes, learners are introduced to the course contents (for example, by completing our e-learning modules). You can recommend that learners take the whole course (and request a certificate of completion) or focus on specific lessons or chapters.

This approach can:

- Familiarise learners with the content in advance, helping them better understand complex concepts.
- Prepare and motivate learners to engage more actively in their learning and during face-to-face classes.
- Harmonise learners' knowledge levels before in-person classes.
- Provide sufficient background knowledge for group work, allowing for more focused and productive discussions.
- Provide a starting point for interactive discussion.

Consolidate Learning and Prepare for Exams

The courses are designed to align with the learning outcomes of traditional laboratory animal science courses. Learners can use each module to study and prepare for the final exam. Additionally, the built-in quizzes allow learners to test their knowledge and track their progress.

Address Expertise Gaps in Your Facility

Gathering expertise across all subjects covered in the EU-functions modules can be challenging, especially in smaller establishments. This may hinder the ability to deliver training that meets all outcomes of the Education and Training framework to a high standard. Using these modules as a basis, tutors and learners can access quality reference material that could mitigate such gaps and ensure education and training are up to standard.

Use Modules as Teaching Resources

Tutors can integrate various components—such as text, videos, images, interactive exercises, and quizzes—into their teaching activities. This not only boosts engagement but also caters to different learning styles. For each module, we provide suggestions for topics that can be incorporated into interactive discussion sessions.

6. Textbooks and Reading Materials

The **"References and Further Reading"** lesson provides most references and readings. They comprise scientific articles, sections of books, websites, and videos. Clicking on any link will open a new window to download or visualise the additional material. Several links to further resources can also be found in the module contents to better guide the reader.

The additional materials provide more information on specific topics, tools, and resources. They are ideal for learners who wish to expand their knowledge or gain a more comprehensive understanding of the issues.