

Recommendation

**Minimal Educational Program at the Bachelor Level on
Replacement, Reduction and Refinement (3Rs Principle)**

The Swiss 3RCC recommends a minimal educational program dedicated to the replacement, reduction and refinement of animal experimentation (the 3Rs Principle) as part of the core courses at the Bachelor level in the following degrees: life sciences, bioengineering, medical and veterinary sciences, environmental sciences, agricultural sciences, pharmacy, and any other degree teaching evidence derived from animal research.

The 3RCC Executive Board identified 34 topics as relevant for 3Rs education, six of which were ranked as a high priority for a minimal set for bachelor's education.

A minimum 3Rs Principle dedicated course shall help students to:

- i) Understand the purposes of animal experimentation, and who performs it.
- ii) Gain an overview of the concept and examples of implementation of the 3Rs Principle in animal experimentation.
- iii) Get awareness of the Swiss animal welfare legislation.

The recommended course duration should consist of a minimum of 4 hours of theoretical teaching. The course would benefit from an additional 2 hours practical part based e.g., on case studies and/or articles to be discussed.

Minimum recommended intended learning outcomes:

- To demonstrate the ability to associate the 3Rs principle within the context of ethical responsibility and scientific rigor.
- To demonstrate knowledge on replacement, reduction and refinement principles based on examples.
- To demonstrate knowledge on the relationship between the 3Rs principle and good science & animal welfare.
- To demonstrate knowledge on which animals and which aspects are protected (e.g., their dignity and their welfare).
- To demonstrate knowledge on what justifies animal experimentation (indispensability, balance of interest: animal constraint versus benefits for the health of human beings or animal/fundamental research/environmental protection) -> harm benefit assessment.
- To demonstrate the ability to provide examples of alternative methods and/or strategies that can replace, reduce or complement the use of animal experimentation.

A suggested set of slides covering this essential knowledge is available upon request. Existing courses in Swiss HEIs prior to these recommendations that include 3Rs concepts are presented in **Table 1**.

Table 1. Available courses in Swiss HEIs including notions on the 3Rs principle before the recommendation on 17th of May 2021. Credits of the full course in which the 3Rs notions are embedded are also provided.

HEI	Course name	Target audience	Level (year)	Credit points (ECTS)
UniBE / UZH	Introduction to animal welfare and ethology	Veterinary Medicine	1	5
Universität Basel	Animal Experimentation & 3R	Biology	2	3
UniBE	Clinical microbiology: bacteriology	Biology	3	3
UniBE	Ethics and philosophy of biology	Biology, Pharmacy, Biochemistry, Philosophy	2-3	2
ETH	Ethical Issues in Animal Research	Natural and Health Sciences, Pharmacology, Philosophy	1-6	2
ETH	Ethics in research and drug development	Pharmacology	3-6	1
ETH	Translational animal models	Medicine	3	2
UZH	Ethics, theory and law in medicine	Medicine	1-6	2
UZH	Introduction to ethics and philosophy of biology	Biology, Biochemistry and Biomedicine	1	2
UZH	Experimental design	Biology, Biomedicine	4-6	1
UZH	Animal ethics and 3Rs	no restrictions	1-4	1
UNIL	Science and society	Biology	2	1