Module title	**Design and Analysis of Experiments**
Code	D2
Degree Programme	Master of Science in Life Sciences
Workload	3 ECTS (90 student working hours) - Asynchronous and synchronous distance learning, decentralized teaching: 32 h - Self-study: 58 h (10 h self-study before module starts)
Module Coordinator	**Name**: Dr. Stefanie Feiler **Email:** stefanie.feiler@fhnw.ch **Address**: FHNW School of Life Sciences, Hofackerstrasse 30, 4132 Muttenz
Lecturers	Stefanie Feiler (SLS FHNW), Noëlle Schenk (BFH)
Entry requirements	Advanced knowledge of R (level D1, in particular ggplot2) is required – thus attending the module "Handling and Visualizing Data" is highly recommended. Current versions of R and RStudio must be installed. Moreover, we expect that the subsequent basic statistical concepts are known: statistical tests, p-value, ANOVA I. Some materials to facilitate student preparation will be made available on Moodle approx. three weeks before the start of the module.
Learning outcomes and competences	After completing the module, students will be able to: • Judge given experimental designs with respect to their advantages / disadvantages • Choose an appropriate experimental approach (experimental design and suitable analysis method) in a given research setting, • Perform correct statistical analyses of experimental data (model estimation, testing, and/or confidence regions) • Interpret the respective software outputs • Tackle multiple testing situations using post hoc tests, • Interpret the results and report the findings scientifically, including visualisation.
Module contents	• General principles of experimental design (randomization, blocking) • Aligning experimental design and statistical analysis for answering the research question • Statistical analysis of experimental data (including interpretation of e.g., block effects or interaction effects, adapted to the design), using linear regression / linear mixed models, including: - Model diagnostics - Transformations - Model selection - Prediction (confidence/prediction intervals) • Multiple testing situations: Post hoc tests (e.g., to compare subsets of treatments to each other) • The strategic approach of sequential DoE • Interpretation and visualization of the results
Teaching / learning methods	In the weeks leading up to the module, students are expected to **prepare** by refreshing their knowledge of basic statistical concepts and the course software R.

	A significant portion of the course consists of **guided self-study** including reading assignments/watching videos, completing follow up exercises, or examining case studies. **Central teaching** is conducted in a distance learning format. Live online sessions introduce topics which are then further explored through self-study, guided by materials provided on Moodle. **Local coaching** offers physical presence sessions where students actively solve exercises with assistance from local coaches. These sessions aim to deepen understanding, provide practice opportunities, and explore extensions.
Assessment of learning outcome	• 80% of the final points: Final written individual online exam using the Safe Exam Browser (SEB) on individual laptop computers (open book, no online access, no access to electronic material). • 20% of the final points: Practice: solving exercises & small applied group project (3-4 students) This implies that the maximal mark of 6 can only be reached by participating in all of these activities.
Format	7-weeks
Timing of the module	For ZHAW and FHNW: Autumn semester, CW 45-51 For BFH, FHNW, ZHAW and HES-SO: Spring semester, CW 16-22
Venue	Distance learning (central teaching) and in-presence teaching at respective school (local coaching)
Bibliography	Material will be provided on Moodle.
Language	English
Links to other modules	This module builds on module D1 “Handling and Visualising Data” and complements the module D3 “Modelling and Exploration of Multivariate Data”.
Comments	Material treated during local coaching is relevant for the exam.
Last Update	06.08.2025