



Doctoral School in Finance and Economics

University of Luxembourg 2021-2022

Course ID Course Title: Experimental Design

1. Course details

Semester:	2
Credit rating:	2ECTS/30 TU
Pre-requisite(s):	
Lecturer(s):	Marc Suhrcke (coordinator)
Administrator:	Roswitha Glorieux
Tutor(s):	
Seminar times and rooms:	Summer semester 2021/2022
Tutorial times and rooms:	
Communications	It is important that students should regularly read their University e-mails, as important information will normally be communicated this way.
Mode of assessment:	Research proposal experimental design
Examination Periods:	June 2022
Course WebPage:	Moodle.uni.lu

2. Aims and objectives

Aims

The aim of this course is to introduce doctoral students of the DTU 3E to the conduct of experiments in multidisciplinary settings. All students should be familiar with the procedures and opportunities offered by the various experimental laboratories in Luxembourg for their individual research projects, and be able to conduct experiments at each of these laboratories and in the field. The rationale is to give visibility to all the labs, bring people to the labs and provide them with a basic training so as to make those labs useful tools for their research. Students will learn how experimental design methods are adapted to different application scenarios such as laboratory environments, study objectives, etc. Students will gain practical experiences on conducting experimental trials in five distinct laboratories at the University of Luxembourg and LISER, online and in the field. This multi-disciplinary approach enables collaborations among students within and across disciplines.

Learning Objectives

Students are introduced to

1. Understand experimental design
2. Understand experimental methods
3. Learn how to conduct economics laboratory experiments
4. Learn how to conduct field experiments
5. Learn how to conduct online experiments
6. Learn how to conduct experiments in cognitive psychology
7. Learn how to conduct experiments in clinical psychology

3. Plan of semester

	Dates	Room	Time	Topic	Lecturer
25	Mar	TBA	11:00-13:00h	TBA	Vincent Koenig
01	Apr	TBA	11:00-13:00h	TBA	Vincent Koenig
19	Apr	TBA	11:00-13:00h	TBA	Francesco Fallucchi
22	Apr	TBA	11:00-13:00h	TBA	Francesco Fallucchi
27	Apr	TBA	11:00-13:00h	TBA	Christine Schiltz
04	May	TBA	11:00-13:00h	TBA	Christine Schiltz
		TBA	11:00-13:00h	TBA	
		TBA	11:00-13:00h	TBA	-
		TBA	11:00-13:00h	TBA	-
		TBA	11:00-13:00h	TBA	-

4. **Course details (by topics)**

The course introduces to experimental design with human subjects from a multi-disciplinary perspective. Students will be introduced to the various methods of experimentation in cognitive sciences, economics, and psychology. Students will collaborate in teams in the design and conduct of experimental trials in distinct laboratories, online and in the field. Each Luxembourg laboratory group will be assigned two sessions to introduce the students to the lab facilities and to explain on how to make use of the lab facilities to conduct experiments including software usage.

The research group at the CNS lab will present behavioral and neuroimaging studies used to study cognitive processes and their development. The course will illustrate (a) how behavioral studies are conducted with school-aged children and (b) how electroencephalography studies are conducted with young healthy adults to investigate processes related to cognitive skills such as numeracy.

At the user laboratory, students will be introduced to a varied of methods for the collection of data with human participants all along the process when designing for user experiences. The methods will include self-reported and observed metrics and we will show the complementarity between field and lab environments. For the collection of high quality data from human participants, biases and ethical considerations will be discussed.

The Clinical Psychophysiology Laboratory (CLIPSLAB) is designed for the experimental investigation of psychophysiological processes that are important for health and the development or maintenance of chronic physical conditions and mental disorders, such as cardiovascular disorders, obesity and disordered eating, eating disorders and anxiety disorders. The aim of this research is to develop strategies for better intervention and prevention by improving our knowledge of bio-behavioural mechanisms and nature-nurture interactions.

CLIPSLAB consists of a suite of 4 custom-built, independent rooms (1 with Faraday cage) for the non-invasive monitoring of psychophysiological responses to a wide range of psychologically relevant stimuli and situations, including pictures, videos, auditory stimuli, and complex social-interactive paradigms. The equipment includes bio-amplifiers for the monitoring of central-nervous-system (4 X 64-channel EEG), cardiovascular (continuous blood pressure, ECG, impedance cardiography, photoplethysmography), electrodermal (skin conductance), respiratory (respiration frequency), gastrointestinal (electrogastrogram), electrooculographical and electromyographical activity. In addition, there are amplifiers for ambulatory monitoring, partially portable amplifier systems (ECG, EMG, EDA), equipment for transcranial magnetic stimulation, including a neuro-navigator and 1 biofeedback/neurofeedback device.

At the LISER lab, researchers use mainly computerized methods to study group decision making and individual choice under uncertainty. The LISER lab includes 30 computer work stations which are connected through a local area network. Decisions are made anonymously and individually. All communication occurs through the computer network. Students will be introduced to setting up a session, including preparing the server and client computers, conducting the sessions and collecting data.

Furthermore, students will be introduced to the practices of field and online experimentation.

5. Reference list/ Bibliography

There are many books and contributions about experimental methods. The focus is on hands on experience. Here are some books that are useful to read about the methods. A more complete list of recommended readings will be posted on moodle.

Bendoly, E., van Wezel, W., & Bachrach, D. G. (Eds.). (2015). *The handbook of behavioral operations management: Social and psychological dynamics in production and service settings*. Oxford University Press.

Friedman, D., & Sunder, S. (1994). *Experimental methods: A primer for economists*. Cambridge university press.

Ward, J. (2020). *The student's guide to cognitive neuroscience*. 4th edition. *The electrophysiological brain* (Chapter 3). Routledge.

6. Further information about assessment

Examination(s)	Written research proposal / paper and oral presentation	
Weighting:	50% written	50% oral
Date:		
Length:		
Structure:	Pass/Fail	Pass/Fail