3rd Aachen International Summer School
In Research Methods and Data Science (ACISS)

Introduction to Lab and VR Experiments

Prof. Dr. Özgür Gürerk

School of Business and Economics
MOE Research Area | Experimental Economics (ExpEcon)

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Summer 2017
# 1 COURSE OVERVIEW

<table>
<thead>
<tr>
<th>Course Name:</th>
<th>Introduction to Lab and VR Experiments</th>
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</table>
| Degree Programmes: | 1. Post-Docs and PhD students  
2. Master BWL (all specializations): MSBW10, MSBW13  
Master Wirtschaftswissenschaften (all specializations): MSW1W10, MSW1W14  
Master Wirt.-Ing. (MSWiBau, MSWiEET, MSWiWPT, MSWiMB, all specializations): MSWi10, MSWi15 |
| Lecturer: | Prof. Dr. Özgür Gürerk |
| Contact: | ozgur.gurerk@rwth-aachen.de |
| Location and Time: | Templergraben 64, Room 518 (WiÜ)  
11 to 15 September, 9:30-13:00 and 14:30-16:00 |
| Content Description: | This course focuses on design and execution of economic experiments in the classic lab setting, as well as in virtual environments. It covers also some basic data analysis. |
| Qualification Objectives: | Students learn key methodological aspects for designing economic experiments, in the classic lab setting, as well as in virtual reality. Students also learn the organizational aspects of conducting an experiment, and the basics of data analysis. |
| Literature: | See readings below |
| Course Examination: | The final grade will be based on (1) class participation/discussion, and (2) a group presentation. |
| Participation Requirements: | Command of English language, basic understanding of social science research practices; willingness to think about a research experiment that you would like to conduct. The course is specifically designed for Ph.D. students interested in conducting experimental research, but is also open to advanced master students meeting the above criteria. |
| Group Size: | 18 participants (max) |
| Workload: | 30 hours of lecturing and group work  
120 hours of additional individual and group preparation |
| Type of Teaching Event: | Lecture with integrated individual and group work |
| Language: | English |
| Credits: | 5 |
2 SCOPE OF THE COURSE

This course provides students with an overview of and experience with experimental research methods to design and conduct an economic experiment in the lab, or in a virtual environment. We will cover such topics as defining a research question, setting up the research hypothesis and the corresponding experimental design, how to plan and conduct experimental sessions, and some basic data analysis methods. The course also provides exposure to some examples of z-Tree programs, a standard software to code experimental treatments. We will examine conventions for ensuring that experiments are properly designed, and tips for preparing experimental research for publication.

The course also introduces to the newly emerging experiments in virtual reality. We will learn the potential of this experimental method for behavioral research. During a visit in our VR lab, participants will experience some demos in immersive virtual environments. We will learn the advantages of VR experiments and discuss potential issues, too.

3 PARTICIPANTS AND REQUIREMENTS

Participants
1. Post-Docs and PhD students
2. Master BWL (all specializations): MSBWL10, MSBWL13
   Master Wirtschaftswissenschaften (all specializations): MSWiWi10, MSWiWi14
   Master Wirt.-Ing. (MSWiBBau, MSWiEET, MSWiWPT, MSWiMB, all specializations): MSWI10, MSWI15

Due to the interactive teaching format, the number of participants is limited to 18. Advanced master students are invited to participate, but preference will be given to Ph.D. students

Requirements
Command of English language, basic understanding of social science research practices. The course is specifically designed for Ph.D. students interested in conducting experimental academic research studies, but is also open to advanced masters’ students meeting the above criteria.

We recommend that you think about your research question that you would like to investigate with an experiment before the course starts!

As a preparation for the course, the participants are recommended to think about a research experiment they would like to do. It is useful for the participants to write down answers to the following questions, as proposed by Professor Shyam Sunder (Yale University), one of the pioneers of experimental economics. During the course, participants should then iterate by revising their answers as they think about each question, discuss it with other participants and with me.
Guideline Questions to Think About Your Research Experiment

1. What is the question you would like to have answered after the experiment? Your answer should be a single sentence with a question mark at the end!

2. What do you know already about the possible answers to the question you have stated above?

3. What are the various possible ways of finding an answer to the question you have stated above? Include both experimental as well as any other methods you can think of.

4. What are the advantages and disadvantages of using an experiment to find an answer?

5. How important is this question to you? What are the chances that the answer you get from the experiment will surprise you or others? What are the chances that it will change someone’s mind?

6. How would you conduct the experiment? (Write down a design and instructions.)

7. Is your experimental design the simplest possible design to help answer the question you have stated?

8. What are the possible outcomes of the experiment? Do the possible outcomes include at least one outcome that will answer the question you stated above? What is the chance that you will observe this outcome?

9. At any stage of your thinking, feel free to go back and revise your earlier answers if you wish to.

4 Grading

1. Individual Presentation on Day 1: Each participant introduces herself and her raw experiment idea and motivation to participate in this course. In this five-minute presentation, each participant should refer at least to the questions 1-3 mentioned above in the Guideline Questions.

2. Team Presentation: You will do a group presentation on the final day of the course. Teams consisting of three participants are formed on Day 2. During the week, each group develops the experimental idea, to address the following points in the team presentation on Day 5.

   The beginning of your team presentation should give a general motivation leading to your specific research question. Then, you derive up to three hypotheses grounding on theory or previous empirical/experimental literature, present your experimental design that is based on your hypotheses. Explain your treatments, which are carefully set up, to test each of your hypotheses. You speculate about possible results that you expect. You present your data analysis plan.

   Each master’s team should also submit a written synopsis of their presentation (~1500 words).
Evaluation:

- Class Participation 20 %:
  Overall, class contribution will be calculated based on your attendance (which is essential and required at each session barring some emergency), the quality of your discussion, and your meaningful contributions to class discussion.

- Group presentation 80 %

5 Course Objectives:

1. To understand the philosophy of science behind experimental methods, and the interaction between theory and experiments.
2. To be able to generate research questions and to set up an appropriate experimental design to researching those questions.
3. To learn how to actually organize and conduct an experimental session.
4. To understand the challenges associated with gathering, organizing, and analyzing experimental data.

6 Readings

Readings for all Participants


Student Reading Responsibilities

Once the groups are formed on Day 2, participants are expected to read three of the important publications (and possibly more) related to their specific research question. It is the duty of the participants to identify this literature, though I will give tips if I can. The related literature is an essential part of the group presentation on Day 5. In 30-35 Minutes, each group present the motivation and the research idea, the related literature, the hypotheses (up to three), and the corresponding experimental design and treatments to test the hypotheses.

Example Research Topics and Related Literature

The topics and literature given below correspond to my personal research interests and expertise (more or less depending on the topic). However, you are not obliged to choose a topic from the list. I very welcome if you bring your own topic!

Topic 1: Gender Differences
Croson, Rachel; Gneezy, Uri; 2009, Gender differences in preferences, Journal of Economic Literature, 47, 2, 448-474.
Azmat, Ghazala; Petrongolo, Barbara; 2014, Gender and the labor market: What have we learned from field and lab experiments? Labour Economics, 30, 32-40.

**Topic 2: Leadership Experiments**
Brandts, Jordi; Cooper, David J; Weber, Roberto A; 2014, Legitimacy, communication, and leadership in the turnaround game, *Management Science*, 61(11), 2627-2645.
Gächter, Simon; Renner, Elke; 2014, Leaders as role models for the voluntary provision of public goods.
Zehnder, Christian; Herz, Holger; Bonardi, Jean-Philippe; 2016. A productive clash of cultures: Injecting economics into leadership research, *Leadership Quarterly*.

**Topic 3: Inter-Generational Cooperation**
Hauser, Oliver P; Rand, David G; Peysakhovich, Alexander; Nowak, Martin A; 2014. Cooperating with the future, *Nature*, 511(7508), 220-223.

## 7 Course Schedule

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
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<tbody>
<tr>
<td>Mon, Sep 11</td>
<td>Tue, Sep 12</td>
<td>Wed, Sep 13</td>
<td>Thu, Sep 14</td>
<td>Fri, Sep 15</td>
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<tr>
<td>09:30-11:00</td>
<td>Lecture 1: Intro</td>
<td>Visiting the PC Lab</td>
<td>Lecture 4: Theory and Experiments</td>
<td>Stata Session 1</td>
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<tr>
<td>11:00-11:30</td>
<td>Coffee Break</td>
<td>Coffee Break</td>
<td>Coffee Break</td>
<td>Coffee Break</td>
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<tr>
<td>11:30-13:00</td>
<td>Lecture 2: Experimental Design</td>
<td>Visiting the VR Lab</td>
<td>Q&amp;A Session</td>
<td>Stata Session 2</td>
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<tr>
<td>13:00-14:30</td>
<td>Lunch Break</td>
<td>Lunch Break</td>
<td>Lunch Break</td>
<td>Lunch Break</td>
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<tr>
<td>14:30-16:00</td>
<td>Course Participants present their raw ideas &amp; motivation</td>
<td>Lecture 3: Intro to VR Experiments (Groups will be formed)</td>
<td>Lecture 5: Intro to Data Analysis</td>
<td>Lecture 6: The Lab and the Field</td>
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Slight changes in the course schedule are possible.

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Contact Details

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