

## COURSE SYLLABUS

# EXPERIMENTAL RESEARCH METHODS CORE COURSE

- Instructor:** József Fiser, Professor  
Department of Cognitive Science  
Central European University
- Term:** Fall, 2018/19
- Course level:** PhD (2 credits for grade)
- Pre-requisites:** basic linear algebra, basic probability
- E-learning site:** <http://ceulearning.ceu.hu/>
- Time and place:** Tuesday 9:00 – 10:40 Dept. Cogn. Sci. Oktober 6. Utca 7, Room 103

### Course Description

This course will cover the basic topics of Experimental Statistics and Research Methods for Behavioral Sciences. It will consist of two parts, frequentist and Bayesian statistics. The frequentist part comprises the subjects of scales, descriptive statistics, frequentist inferential statistics including independent and repeated measure t-tests, one- and two-way ANOVAs, effect sizes, correlational and regression analysis, and selected nonparametric methods. In the second part, the basics of Bayesian statistics will be introduced and contrasted with frequentist statistics. The course will also survey the good practices of designing, conducting, analyzing, interpreting, and communicating scientific psychological research. Finally, students will learn how to use SPSS or R for statistical analysis.

### Learning Outcomes

- Being able to plan and design an experimental study
- Understanding why and when you need statistics
- Knowing enough to evaluate appropriateness of use of statistics in Results sections of research papers
- Being able to select and perform correct statistics for your own data

### Course Requirements

The final grade will be determined roughly by the following weighting:

- Exam (to be conducted on the week following the semester): 75%
- Assigned study reports: 25%

### Required Materials:

- Gravetter, F. J., & Wallnau, L. B. (2009). *Statistics for the Behavioral Sciences (8th ed.)*. Belmont: Wadsworth. (G&W)
- Provided pdfs

## COURSE SCHEDULE

Week	Date	Topic/Reading done <i>before</i> class	Assignment Due	Homework Due
1	Jan. 18	Scales, Frequency Distributions, Central Tendency, Variability, Normalization, G&W Chapters 1-5	Review Appendix A; do learning checks, pre & post exams	<b>HW1: Chapter 1-5 homework problems</b> <b>Pre &amp; post exam times &amp; scores</b>
2	Jan. 15	Probability and Samples G&W Ch. 6-7		<b>HW 2: Chapter 6-7 homework problems</b>
3	Jan. 22	Hypothesis testing, Effect size, Power G&W Ch. 8	<b>Select/explore your Stat SW</b>	<b>HW 3: Chapter 8 homework problems</b>
4	Jan. 29	t test G&W Ch. 9-11		<b>HW 4: Chapter 9-11 homework problems</b>
5	Febr. 5	ANOVA G&W Ch. 13-15	<b>SPSS: Assignment #1</b>	<b>HW 5: Chapter 13-15 homework problems</b>
6	Febr. 12	Non-parametric statistics G&W Ch. 18-20		<b>HW 6: Chapter 18-20 homework problems</b>
7	Febr. 19	Estimation, Correlation, Regression G&W Ch. 12, 16-17	<b>SPSS: Assignment #2</b>	<b>HW 7: Chapter 12, 16-17 homework problems</b>
8	Febr. 26	What is wrong with NHST? Lindsley 1975; Loftus 1996; Gigerenzer 2004; Kline 2004		<b>HW 8: Summary 1-page</b>
9	Marc. 5	What is the difference between NHST and Bayesian statistics? Dienes 2011; Wetzels 2011; Morey 2015	<b>SPSS: Assignment #3</b>	<b>HW 9: Summary 1-page</b>
10	Marc. 12	What is Bayesian Data Analysis? Kruschke 2009; Kruschke 2011		<b>HW 10: Summary 1-page</b>
11	Marc. 19	How to compute Bayesian Statistics? Rouder 2009; Rouder 2012; Rouder 2013	<b>SPSS: Assignment #4</b>	<b>HW 11: Summary 1-page</b>
12	Marc. 26	How to do good science? Rouder 2016; Wagenmakers 2007; Marsman 2017; Munafo 2017		<b>HW 12: Summary 1-page</b>
	Apr. 2		<b>FINAL EXAM— 10:00-13:00 am</b>	