Intermediate statistics in SPSS and/or R

Department of Psychology and Behavioural Sciences, Aarhus University

Venue: Aarhus University

Course coordinator: Karolina Ścigała (KS; karolina.scigala@psy.au.dk)

Lectures: Ali Amidi (AA; ali@psy.au.dk); Bobby Zachariae (BZ; bzach@psy.au.dk); Mia Skytte O'Toole (MSO; mia@psy.au.dk); Karolina Ścigała (KS; karolina.scigala@psy.au.dk)

Dates:

Block 1: 05-06/03/2025: Fundamentals (SPSS)

Block 2: 25-27/03/2025: Linear and logistic regression (SPSS)

Block 3: 07-08/05/2025: Multilevel modeling (SPSS)

Block 4: 03-04/06/2025: Systematic review and meta-analysis (SPSS)

Block 5: 18-19/06/2025: Introduction to R for beginners: R environment, data cleaning, and basic statistical analyses (R)

It is not obligatory to attend each block. Participants can sign up to any number of blocks. See pages 5-6 for a detailed outline of the course.

ECTS:

Blocks 1, 3, 4, and 5 amount to 3 ECTS per block. Block 2 amounts to 4 ECTS.

Course description

Learning outcomes

Across the five blocks of the course, participants will:

- Gain a theoretical understanding of basic and some advanced statistical analyses relevant to social sciences, particularly psychological research.

- Perform both basic and some advanced statistical analyses using IBM SPSS Statistics.

- Conduct basic statistical analyses using R.

- Learn to navigate R effectively for more advanced analyses, including exploring relevant packages, vignettes, tutorials, and other resources to support ongoing independent learning.

Content

The first four blocks of the course will provide students with a theoretical understanding of statistical methods and practical skills in conducting these methods using IBM SPSS Statistics. The fifth block will introduce participants to conducting basic statistical analyses in R, focusing on technical and practical skills, rather than theory. This block is suitable for students who have completed Blocks 1 and 2 and want to apply those analyses (e.g., correlations, t-tests, linear and logistic regression) in R, or for those already familiar with the theory behind these statistical methods. Participants will also learn to navigate R for more advanced analyses using various resources.

This course assumes prior undergraduate knowledge of introductory statistics. If you need a refresher, it is recommended to attend the first block and review topics you do not feel confident in using the provided literature list.

Format and Evaluation

The course includes a combination of lectures and practical instruction using SPSS and R. Focus will be on giving participants hands-on experience with each type of analysis. Practical exercises will be assigned for each session; some of these exercises will be done collectively during the teaching day and others must be completed independently. The course consists of five blocks in total.

In order to receive a certificate of completion and ECTS points for a block, participants must submit and receive approval of the corresponding assignment.

The specific number of ECTS points awarded is determined as follows:

- Block 1: 1 assignment + 2 days of attendance (with preparation) = 3 ECTS

- Block 2: 1 assignment + 3 days of attendance (with preparation) = 4 ECTS

- Block 3: 1 assignment + 2 days of attendance (with preparation) = 3 ECTS

- Block 4: 1 assignment + 2 days of attendance (with preparation) = 3 ECTS

- Block 5: 1 assignment + 2 days of attendance (with preparation) = 3 ECTS

Priority will be given to students who can attend all of the course, but it is possible to attend specific blocks if space is available. Notice that certification for a block only is awarded if the corresponding assignment is submitted and approved, and that certificates are not sent out, until the whole course is finished.

Expected workload

100-150 pages per course day as well as homework assignments. The due dates for the homework assignments will be 2-3 weeks after each block.

Readings and Resources: The core reading materials:

Field, A. (2018). Discovering Statistics Using SPSS, 5th Edition.

Field, A. (2012). Discovering Statistics Using R.

Lakens, D. (2023). Improving Your Statistical Inferences.

https://lakens.github.io/statistical_inferences/

An 'Additional reading' list is also outlined in this booklet (pp. 7-9). Participants will be expected to read from the list to expand their understanding of the course content.

An OSF page will be made for the course where we will upload PowerPoint slides, answers for the assignments, links to additional materials, etc. Announcements will be sent via e-mail.

Getting in contact with us

Open dialogue and cooperation are important to us. If you have questions about the class, special needs, or require clarification regarding the course requirements, please ask! Similarly, if you are having difficulty understanding something, please let us know.

Detailed overview of the course

Teacher	Dates	Times	ECTS	Content	Software
				Block 1: Fundamentals	
KS	05/03/2025	10:00-15:30	3 ECTS	Fundamentals 1: Introduction to SPSS; statistical assumptions, correlation, t-tests, effect sizes, confidence intervals	SPSS
KS	06/03/2025	09:00-15:30		Fundamentals 2: Missing data, sample size and power analysis, introduction to Bayesian statistics, equivalence testing	SPSS
				Block 2: Regression	
AA	25/03/2025	10:00-15:30	4 ECTS	Linear regression 1: Simple and multivariate regression	SPSS
AA	26/03/2025	09:00-15:30		Linear regression 2: Mediation and moderation in regression	SPSS
KS	27/03/2025	10:00-15:30		Logistic regression and chi square; ANOVA as regression	SPSS
				Block 3: Multilevel modeling	
MSO	07/05/2025	10:00-15:30	3 ECTS	Multi-level modeling 1	SPSS

MSO	08/05/2025	09:00-15:30		Multi-level modeling 2	SPSS

Block 4: Meta-analysis

BZ	03/06/2025	10:00-15:30	3 ECTS	Systematic Review and Meta-analyses 1	SPSS
BZ	04/06/2025	09:00-15:30		Systematic Review and Meta-analyses 2	SPSS

Block 5: Statistics in R: A quick introduction for beginners

KS	18/06/2025	10:00-15:30	3 ECTS	R environment, data cleaning, t tests and correlations, linear regression	R
KS	19/06/2025	09:00-15:30		Logistic regression, data visualizations, power analyses and simulations	R

Block 5 is meant for:

1. Students who have completed blocks 1 and 2 and would like to conduct the analyses they learnt about in these blocks using R, or

2. Students who have not completed blocks 1 and 2 but are familiar with: correlations, t-tests, linear and logistic regression in other softwares and want to learn to conduct these analyses them in R

Additional readings

American Psychological Association. (2009). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: American Psychological Association.

Baguley, T. (2012). *Serious stats: A guide to advanced statistics for the behavioural sciences*. New York, NY: Palgrave MacMillan.

Bandalos, D. L., & Finney, S. J. (2010). Factor analysis: Exploratory and confirmatory. In G. R. Hancock & R. O. Mueller (Eds.), *The reviewer's guide to quantitative methods in the social sciences* (pp. 93-114). New York, NY: Routledge.

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York, NY: Guilford.

Byrne, B. (2016). *Structural equation modeling with Amos: Basic concepts, applications, and programming* (3rd ed.). New York, NY: Routledge.

Camerer, C. F., Dreber, A., Holzmeister, F., Ho, T.-H., Huber, J., Johannesson, M., et al. (2018). Evaluating the replicability of social science experiments in *Nature* and *Science* between 2010 and 2015. *Nature: Human Behaviour, 2*, 637-644.

Cummings, G. (2014). The new statistics: Why and how? *Psychological Science, 25*, 7-29.

Cummings, G., & Calin-Jageman, R. (2017). *Introduction to the new statistics: Estimation, open science, and beyond*. New York, NY: Routledge.

Field, A., & Hole, G. (2003). *How to report and design experiments*. London, England: Sage.

Gamst, G., Meyers, L. S., & Guarino, A. J. (2008). *Analysis of variance designs*. Cambridge, England: Cambridge University Press.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Publications.

Heck, R. H., Thomas, S. L., & Tabata, L. N. (2014). *Multilevel and longitudinal modeling with IBM SPSS* (2nd ed.). New York, NY: Routledge.

Hoekstra, R., Kiers, H. A. L., & Johnson, A. (2012). Are assumptions of well-known statistical techniques checked, and why (not)? *Frontiers in Psychology, 3*, 1-9.

Kline, R. B. (2011). *Principles and practices of structural equation modeling* (3rd ed.). New York, NY: The Guilford Press.

Lance, C. E., & Vandenberg, R. L. (2010). *Statistical and methodological myths and urban legends*. New York, NY: Routledge.

Mueller, R. O., & Hancock, G. R. (2010). Structural equation modeling. In G. R. Hancock & R. O. Mueller (Eds.), *The reviewer's guide to quantitative methods in the social sciences* (pp. 371-384). New York, NY: Routledge.

Navarro, D. (2024). *Learning Statistics with R*. https://learningstatisticswithr.com/

Pallant, J. (2010). *SPSS survival manual* (4th ed.). Maidenhead, England: McGraw Hill.

Palij, M. (2012). Review of Cummings – Understanding the new statistics: Effect sizes, confidence intervals, and meta-analysis. *PsycCRITIQUES, 57*(24).

Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). P-curve: A key to the file-drawer. *Journal of Experimental Psychology: General, 143*, 534-547.

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics* (6th ed.). Boston, MA: Pearson.

Wagenmakers, E.-J. (2007). A practical solution to the pervasive problem of p values. *Psychological Bulletin & Review, 14*, 779-804.