

Syllabus

Course name: Multivariate Data Analysis, 3681, Helsinki and Vaasa

Period: P1, 2026/2027

Language of instruction: English

Course credits: 5 ECTS

Course description: See Sisu

Intended learning outcomes: See Sisu

Workload: 134h = scheduled (contact hours): 26h + non-scheduled work: 108h

Prerequisites: Strongly recommended: basic statistics course.

Instructor information: Agnieszka Jach, agnieszka.jach at hanken.fi, Office hours: Wednesday 15-16h in D612/MS Teams

Mode of teaching & participation: Blended learning, see Table 1

Course literature:

James, G., Witten D., Hastie, T., Tibshirani, R. (2017). *An Introduction to Statistical Learning*. 7th ed. New York: Springer. (textbook-based slides, videos, Rcode available on the Internet)

Hair, J.F, Black, W.C, Babin, B.J, Anderson, R.E (2018). *Multivariate data analysis: a global perspective*. 8th ed. or earlier. Upper Saddle River (N.J.): Prentice Hall.

Key concepts: multivariate data analysis, research questions from different business domains, journal articles, R, Rmarkdown

External partner: No

Examination and assessment: 40% (exam-quiz, first attempt 22.10.2026, second attempt 21.11.2026, both from 14:00-16:00h) + 60% (hw-quizzes and articles)
60%=4x12% (four hw-quizzes)+2x6% (two-part assignment with articles).

Exam pre-requisite: You need to obtain at least half of the points from the non-exam assignments to be eligible to take the exam-quiz.

Course-passing pre-requisite: You need to obtain at least half of the points from the exam to pass the course.

Quizzes: You do the exam-quiz and the hw-quizzes on your personal computer (both are open-Internet, open-book), from wherever you wish.

Articles: Dissection of journal articles: Special assignment with detailed info provided on Moodle.

Plagiarism and AI use: Hanken's Action Plan against Academic Misconduct in Studies.

AI use: exam-quiz and hw-quizzes: red light; articles: individual submission - green light, class-based submission - red light; everything else: green light.

Schedule: See Table 1

Week	Dates (Mon-Fri)	Wednesday 23:59h	Helsinki classroom and MS Teams Theory&Practice/Workshop Thursday	Helsinki classroom and MS Teams Theory&Practice/Workshop Friday
36	31.08-04.09	—	A.Prelim, B.Prelim 14:15-17:30h, in Futurum	— —
37	07-11.09	Quiz1 due	1.ANOVA 14:15-17:30h, in Futurum	2.MANOVA 14:15-17:30h in A309
38	14-18.09	Quiz2 due	3.REGR 17:30-19:15h in A307	— —
39	21-25.09	Quiz3 due	4.PCA, FA 14:15-17:30h in A305	5.CLUSTER 14:15-17:30h room A309
40	28.09-02.10	Quiz4 due, Article due	Articles 14:15-15:45h, in Futurum Mandatory participation	— —

Table 1: Detailed schedule.

Additional Information:

Contents:

A.Preliminary: data types, graphical and numerical summaries (ungrouped/grouped data), transformations, outliers, missing observations, re-coding variables and sub-setting, B.Preliminary: data standarization, centering, distance; optional statistical appendix

1. Analysis of variance (ANOVA)
 2. Multivariate analysis of variance (MANOVA)
 3. Multiple regression (REGR)
 4. Principal Component Analysis (PCA), Factor Analysis (FA)
 5. Clustering (CLUSTER)
- X. Articles (**mandatory class attendance**)

Software: R (computations and graphics), **markdown** (generation of documents) used within **rstudio** (=IDE for R). Please, install the software on your personal laptop, following instructions on Moodle, and have your machine ready at every session.