Regression and Analysis of Variance

MSc: Statistics and Actuarial-Financial Mathematics

Konstantinos Bourazas
kbourazas@aegean.gr

Department of Statistics and Actuarial-Financial Mathematics

October 7, 2026

Course overview

Main goal

Learn how to use data to understand relationships between variables, compare groups, and make predictions.

Main topics

- Covariance, correlation, plots, and data summaries.
- Simple and multiple linear regression.
- Estimation, inference, prediction, and model diagnostics.
- Categorical predictors and one-way ANOVA.
- Tukey multiple comparisons, two-way ANOVA, interactions, and ANCOVA.
- Applications and examples in R.

Course format and assessment

Course approach

- Emphasis on interpretation and understanding.
- Theory supported by examples and applications.
- Use of `R` throughout the course.

Assessment

- Final examination.
- Optional applied assignment: up to $+1$ **point**.
- The bonus is added only after a passing grade has been achieved.

Use of AI in the optional assignment

AI may be used for **advice, clarification, and correction**, but not for generating the assignment, the analysis, the code, or the conclusions.

Background and references

Required background

- Basic probability and probability distributions.
- Estimation, confidence intervals, and hypothesis testing.
- Basic descriptive statistics.

Recommended references

- Καραγρηγορίου, Α. και Καλλιγέρης, Ε. Ν. (2023).
  Γραμμικά Μοντέλα και Σχεδιασμός & Ανάλυση Πειραμάτων με Εφαρμογές σε R και Minitab.
  Κάλλιπος.

- Faraway, J. J. (2025).
  Linear Models with R (3rd ed.). Chapman & Hall/CRC.