



**Prof. Dr. Robert Jung / D. Walser**

Econometrics and Statistics (520K)

Faculty of Business, Economics and Social Sciences

**Contact:** [econometrics@uni-hohenheim.de](mailto:econometrics@uni-hohenheim.de)

**Consultation hours:** make an appointment by email

Course Outline winter term 2026/27

## "Introduction to Statistical Learning" (..)

*Bachelor in Business, Economics and Social Sciences (BA WiWi)*

### Schedule:

- **Lecture/Lab: Wednesday 16:00–19:00, [HS 33], Prof. Dr. R. Jung (lecture) and D. Walser (Lab)** (starts on 14.10.2026)
- **Flexible split of the three hours depending on the week's topic (e.g. 3h lecture, 1h Lab + 2h lecture, 2h Lab + 1h lecture, or 3h Lab), announced in advance each time**

### Objectives:

This course introduces modern methods of statistical learning with a clear focus on prediction: how to build, evaluate, and compare predictive models based on their out-of-sample performance. Topics include regression and classification as prediction tools, resampling methods (cross-validation, bootstrap), regularization, tree-based methods (decision trees, random forests, boosting), and unsupervised learning (PCA, clustering).

Upon successful completion, students will be able to select appropriate statistical learning methods for a given question, implement models in R, and soundly assess their predictive performance against simple baseline models. No prior knowledge of R is required; the course is deliberately designed for a heterogeneous starting level.

### Grading:

The exam is computer-based (Bring Your Own Device): students work with data and code directly on their own laptop and submit results via ILIAS.

**Grading structure:** The midterm on 16.12.2026 counts 25% and the final exam on 03.02.2027 counts 75% toward the final grade.

Permitted aids will be announced on ILIAS prior to the exams.



### **Prior knowledge of R:**

R is a free, open-source software package available from <https://www.r-project.org/>.

No prior knowledge of R is required – the course is deliberately designed for a heterogeneous starting level.

Students who have already taken the “Introduction to Data Science” course have an advantage, but this is not a prerequisite. A getting-started tutorial (installing R, RStudio and GitHub Desktop, and first programming steps) will be provided at the start of the semester.

### **Course materials:**

All course materials and problem sets will be made available on the ILIAS platform.

The ILIAS course will be available under the following link:

<https://ilias.uni-hohenheim.de/goto.php/crs/1857251>

*NOTE: You must provide your name, semester, and study program to access the ILIAS course.*

### **Literature:**

Main textbook:

James, G., Witten, D., Hastie, T., Tibshirani, R. (2021). An Introduction to Statistical Learning. 2nd edition. Springer. <https://www.statlearning.com/>.

Supplementary reading will be provided during the course.



**Course content (preliminary)**

1. Introduction: Statistical Learning, Prediction vs. Inference, Setup (R, RStudio, GitHub Desktop)
2. Regression as a predictive model, Train/Test, Bias-Variance
3. Classification I: Logistic Regression, Model Assessment
4. Classification II: LDA/QDA, Comparison of Methods
5. Resampling: Cross-Validation, Bootstrap
6. Model Selection & Regularization I: Subset Selection, Ridge
7. Model Selection & Regularization II: Lasso, In Depth
8. Non-linear Methods: Splines, GAMs (compact)
9. Tree-based Methods: Decision Trees
10. Ensemble Methods: Bagging, Random Forests, Boosting
11. Unsupervised Learning: PCA, Clustering
12. Review, Case Study, Questions on the Final Exam