

**Simulation, Bootstrap and Applications**

Code: 103192  
ECTS Credits: 6

Degree	Type	Year	Semester
2501919 Applied Statistics	OB	3	2

### Contact

Name: Aureli Alabert Romero  
Email: Aureli.Alabert@uab.cat

### Use of languages

Principal working language: catalan (cat)  
Some groups entirely in English: No  
Some groups entirely in Catalan: Yes  
Some groups entirely in Spanish: No

### Teachers

Aureli Alabert Romero  
Roger Borrás Amoraga

### Prerequisites

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### Objectives and Contextualisation

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### Content

#### 1- Simulation

- Simulation of random variables from the uniform distribution.
- Discrete Event Simulation.
- Simulation with the R package *simmer*.
- Output analysis, variance reduction.
- Generation of uniform variables.

#### 2- Permutation tests

- Two-sample tests.
- Paired-samples test.
- Correlations test.

- Advanced examples.

### **3- Bootstrap and other resampling methods**

- Basic concepts.
- Estimation of the standard error and the bias.
- parametric bootstrap.
- Non-parametric bootstrap.
- Methods to compute confidence intervals.
- Application examples (linear models and generalised linear models, hypothesis testing, time series, ...).

### **4- Resampling for machine learning**

- Bagging.
- Boosting.