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## Computational statistics (3ST2010)

Filières concernées	Nombre d'heures	Validation	Crédits ECTS
<b>Master en statistique</b>	<b>Cours: 4 ph</b>	Voir ci-dessous	6

ph=période hebdomadaire, pg=période globale, j=jour, dj=demi-jour, h=heure, min=minute

### Période d'enseignement:

- Semestre Printemps

### Equipe enseignante

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### Contenu

The course introduces a number of methods that make use of computer resources to do statistical analysis and modeling. Some of these methods use simulation based approaches to approximate standard errors, confidence intervals, p-values of statistical tests, etc. The course emphasizes the practical side of the methods, by illustrating the theoretical issues with practical applications using the R software. The course includes three parts:

- Random variable generation,
- Elements of Monte Carlo statistical methods,
- Resampling methods for estimating and testing (jackknife, bootstrap, resampling methods for model assessment and selection).

### Forme de l'évaluation

A) First attempt

CA graded: The assessment includes 4 parts: 3 tests on computer during the semester (1 hour for each test) and 1 project at the end of the semester (the project should be presented in the classroom during 15 minutes; the project consists in the presentation of a research paper, with the corresponding practical part implemented by the student in R). Each part represents 25% of the final grade.

#### Attendance

The students must attend each of the previous 4 parts of the assessment.

B) Second attempt

- test of 3 hours on computer (1 hour for each chapter of the course) and 15 minutes (presentation of the project; the project consists in the presentation of a research paper, with the corresponding practical part implemented by the student in R).

#### Retake test deadline

- The test will be organized by the professor in agreement with the student, before the end of the corresponding session (not in Pidex).

### Modalités de rattrapage

The evaluations will be organized by the professor in agreement with the student.

### Documentation

- G. H. Givens, J. A. Hoeting (2007), Computational Statistics, Wiley.
- J.E. Gentle (2000), Random number generation and Monte Carlo methods, Springer.
- B. Efron, R. Tibshirani (1993), An Introduction to the bootstrap, Chapman and Hall.
- A.C. Davison, D.V. Hinkley (1997), Bootstrap Methods and their Applications, Cambridge University Press.
- C.P. Robert, G. Casella (2004), Monte Carlo statistical methods, Springer.

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## **Computational statistics (3ST2010)**

### **Pré-requis**

Probability theory, inferential statistics, knowledge of R.

### **Forme de l'enseignement**

- 6 ECTS credits
- Elective course for master in statistics (choose 18/24 ECTS)
- Spring Semester
- Course+practical exercises on computer: 4 hours

### **Objectifs d'apprentissage**

Au terme de la formation l'étudiant-e doit être capable de :

- Formulate statistical problems in terms of simulation experiments
- Evaluate different results obtained using simulation techniques
- Interpret results of simulation studies
- Develop computational skills

### **Compétences transférables**

- Present results
- Interpret results
- Prepare reports/presentations
- Compare different methods