

- Faculté des sciences
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Computational statistics (3ST2010)

Filières concernées	Nombre d'heures	Validation	Crédits ECTS
Master en statistique	Cours: 4 ph	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

Prof. tit. Alina Matei
Institut de Statistique
Av. de Bellevaux 51, CH-2000 NEUCHÂTEL
Office phone : +41 32 718 13 27 - email : alina.matei@unine.ch

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

Retake exams

- exam of 3 hours and 15 minutes (1 hour for each chapter provided by 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 exam deadline

- The exam will be organized by the professor in agreement with the student, before the end of the corresponding exam 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.

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- C.P. Robert, G. Casella (2004), Monte Carlo statistical methods, Springer.

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
- Develop computational skills
- Interpret results of simulation studies
- Evaluate different results obtained using simulation techniques

Compétences transférables

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