

- Faculté des sciences
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Applied Coding and Information Theory (3IN2051)

Filières concernées	Nombre d'heures	Validation	Crédits ECTS
Bachelor en mathématiques	Cours: 2 ph Exercice: 2 ph	controle continu: 1	6
Bachelor en sciences et sport (mathématiques)	Cours: 2 ph Exercice: 2 ph	controle continu: 1	6
Master en informatique	Cours: 2 ph Exercice: 2 ph	controle continu: 1	5
Master en mathématiques	Cours: 2 ph Exercice: 2 ph	controle continu: 1	6
Pilier principal B A - mathématiques	Cours: 2 ph Exercice: 2 ph	controle continu: 1	6

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

Période d'enseignement:

- Semestre Printemps

Equipe enseignante:

Lecturer: Dr Hugues Mercier
Teaching assistant: Roberta Barbi

Objectifs:

This course introduces the concepts of coding and information theory with a focus on applications. The objectives are:

Formulate the fundamental concepts of information theory
Understand the principles of source and channel coding

Contenu:

Covered topics will be taken from the following list and depend on the interests of the students:

1. Introduction to Probability, Entropy, and Inference
2. The Source Coding Theorem
3. Data Compression
4. Communication over a Noisy Channel
5. The Noisy-Channel Coding Theorem
6. Error-Correcting Codes and Real Channels
7. Hash Codes: Codes for Efficient Information Retrieval
8. Message Passing Algorithms
9. Exact Marginalization in Trellises and Graphs
10. Low-Density Parity-Check Codes and Applications
11. Convolutional Codes, Turbo Codes and Applications
12. Rateless Codes and Applications
13. Codes and Information Theory for Distributed Storage Systems

Forme de l'évaluation:

Assignments and presentation of a research article in front of the class

Documentation:

Thomas Cover and Joy Thomas, Elements of Information Theory (Wiley Series in Telecommunications and Signal Processing), 2006.
David MacKay, Information Theory, Inference and Learning Algorithms, Cambridge University Press, 2002.

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