LINGI2348

2012-2013

Information theory and coding

5.0 credits	30.0 h + 15.0 h	2q

Teacher(s) :	Pereira Olivier ; Louveaux Jérôme ; Macq Benoît (coordinator) ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Prerequisites :	solid basic knowledge in computer science and mathematics as taught in 1st and 2nd year of Bachelor in Engineering
Main themes :	-- Information representation: decorrelation coding and entropic coding. -- Information security: cryptographic coding. -- Information correction: channel coding theory and error-correcting codes.
Aims :	-- To explain the notions, methods and results that are used in the analysis and design of information representation, protection and correction systems. -- To present not only general results that determine the possibilities offered by information theory, but also effective compression, security and correction methods. -- To provide some design tools for multimedia (image, sound, data) information coding. *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods :	Written examination (no document allowed)
Content :	-- Basic notions in information theory; mutual information and entropy. -- Discrete source coding by fixed length-codes and variable-length codes. -- Decorrelation coding and coding gain notions. -- Basic notions in cryptology; secret-key and public-key cryptographic coding systems. -- Discrete memoryless channel; capacity notion; noisy channel coding theorem. -- General block coding theory; role of the minimum distance. -- Linear codes: generator matrix and parity-check matrix; syndrome decoding. -- Study of certain classes of linear block codes: cyclic codes and Reed-Solomon codes. -- Introduction to convolution codes.
Bibliography :	-- R.G. Gallager, "Information Theory and Reliable Communication" , John Wiley, 1968. -- F.J. MacWilliams and N.J.A. Sloane, "The Theory of Error-Correcting Codes" , North-Holland, 1977.
Cycle and year of study :	> Master [120] in Electrical Engineering > Master [120] in Computer Science and Engineering > Master [120] in Computer Science > Master [120] in Electro-mechanical Engineering > Master [120] in Mathematical Engineering > Master [120] in Statistics: General
Faculty or entity in charge:	INFO