UCL Université catholique de Louvain

LINGI2348

2015-2016

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
Inline resources:	> http://icampus.uclouvain.be/claroline/course/index.php?cid=INGI2620
Main themes :	-- Information representation: decorrelation coding and entropic coding. -- Information security: cryptographic coding. -- Information correction: channel coding theory and error-correcting codes.
Aims :	Given the learning outcomes of the "Master in Computer Science and Engineering" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: -- INFO1.1-3 -- INFO2.2 -- INFO5.2 -- INFO6.4 Given the learning outcomes of the "Master [120] in Computer Science" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: -- SINF1.M1 -- SINF2.2 -- SINF5.2 -- SINF6.4 Students completing this course successfully will be able to -- explain the notions, methods and results that are used in the analysis and design of information representation, protection and correction systems. -- present not only general results that determine the possibilities offered by information theory, but also effective compression, security and correction methods. -- 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 covering both on the theory and the exercises.
Teaching methods :	The course consists of magistral courses and sessions learning by exercise which to explore the different facets of the theory.
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.
Other infos :	Background: -- LFSAB1402 : solid basic knowledge in computer science -- LFSAB1103 : solid basic knowledge in mathematics
Faculty or entity in charge:	INFO

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Master [120] in Electrical Engineering	ELEC2M	5	-	
Master [120] in Computer Science and Engineering	INFO2M	5	-	
Master [120] in Mathematical Engineering	MAP2M	5	-	
Master [120] in Computer Science	SINF2M	5	-	