LFSAB1106

2016-2017

Applied mathematics : Signals and systems

5.0 credits	30.0 h + 30.0 h	2q

Teacher(s) :	Wertz Vincent ; Vandendorpe Luc ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	> http://moodleucl.uclouvain.be/course/view.php?id=144
Prerequisites :	LFSAB 1101, LFSAB 1102 or equivalent courses *The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.*
Main themes :	This course contains the basic notions about signals and systems, namely signal representations, both continuous time and discrete time, in the time domain and in the frequency domain, several representations of systems (impulse response, state space representation, transfer function), the Fourier, Laplace and Z transforms, their properties, elements of filtering and elements of stability.This course contains the basic notions about signals and systems, namely signal representations, both continuous time and discrete time, in the time domain and in the frequency domain, several representations of systems (impulse response, state space representation, transfer function), the Fourier, Laplace and Z transforms, their properties, elements of filtering and elements of stability.
Aims :	Contribution of the course to the program objectives: Regarding the learning outcomes of the program of Bachelor in Engineering, this course contributes to the development and the acquisition of the following learning outcomes: -- LO 1.1, 1.2 -- LO 4.4 -- LO 5.1 Specific learning outcomes of the course: More precisely, at the end of the course the students will be able to Disciplinary learning outcomes: -- Master the basic mathematical concepts in order to handle practical signal processing and system theory applications, in particular the Fourier transform, the Laplace transform, and the Z transform ; -- Compute, including with specialized software tools, the different transformations for signals, be they continuous time or discrete time ; understand the results obtained ; be familiar with the time domain and the frequency domain properties of signals ; -- Use the different representations for linear time invariant systems ; choose the most appropriate one according to the problem or the situation ; be able to switch from one representation to another ; analyze, including by means of specialized software tools, linear time invariant systems (internal or BIBO stability, controlability, observability). Transversal learning outcomes -- Further investigate the concepts, by means of an English textbook -- Write a short report for a small size project conducted in a group *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 :	The students will be evaluated by means of a written and individual examination, on the basis of the learning outcomes provided above. Tables containing transformations is the only material permitted. An example of a former examination will be provided on MOODLE. Evaluation of the small size project A report has to be written and delivered about this project where MATLAB will be used. This report is mandatory. However it is not taken into account in the final mark.
Teaching methods :	The learning process is made of courses, of practical training sessions and of sessions with MATLAB.
Content :	--

Signal and system representations, in the time domain and in the frequency domain, for both continuous time and discrete time signals ;

--

Representations of systems :

--

Impulse response,

--

State representation,

--

Transfer function

--

Fourier, Laplace and Z transforms and their properties;

--

Filtering,

--

Stability

Bibliography :	Copies of the slides and of exercices will be available on MOODLE. The textbook "Signals and Systems" (2nd edition) of Simon Haykin and Barry Van Veen, Editions Wiley, is strongly recommended. It is available at the SST library.
Other infos :	LFSAB 1201, LFSAB 1202 or equivalent courses and elementary knowledge about MATLAB are also necessary
Faculty or entity in charge:	BTCI

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Bachelor in Engineering	FSA1BA	5	LFSAB1101 and LFSAB1102	🔍