

ISS9AF MODELING OF ADVANCED SYSTEMS

ISS9AF	Duration : 21 hours	ECTS Credits : 2	Semester : S9
Modeling of Advanced Systems			
Person(s) in charge : Patrick HENAFF, Professor, patrick.henaff@univ-lorraine.fr			
Keywords : synchronous languages, formal description techniques, timed automata, performance evaluation, network calculus, schedulability			
Prerequisites: Modeling of critical systems			
Objective : comprendre les enjeux de la robotique interactive et des systèmes cyber-physiques interactifs, imaginer ce que pourrait être la robotique du futur			
Program and contents : This module presents the available approaches for the design, the abstraction and the analysis of a system in order to guarantee its behavioral and real time properties. First we study several modeling techniques of a system (synchronous and asynchronous paradigms) according to both its expected reaction to an environment that it has to control or monitor and its component-based architecture requiring an assessment of the properties on the inter-component communications. In addition, the second part of this module provides an in-depth overview of the main techniques that have to be used in order to verify safety properties that depend on performance properties (stochastic and deterministic approaches, schedulability, network calculus). Modeling and validation of system behavior • Synchronous approaches • Synchronous hypothesis • Esterel language • Analysis techniques of Esterel-based applications • Case studies • Formal Description Techniques (FDT) General principles of FDT SDL languages Analysis techniques Model simulation Case studies Schedulability analysis Performance evaluation through deterministic approach (r,b)-bounded traffic, Introduction to Network Calculus (Max/Min, +)			
Abilities:			
Levels	Description and operational verbs		
Know			
Understand			
Apply			
Analyse			
Synthétise			

Assess				
Evaluations :				
☒ Written Test	☐ Continuous Control	☒ Oral, Report	☒ Project	☐ Written Report