UCL Université catholique de Louvain

LINGI2143

2012-2013

Concurrent systems : models and analysis

5.0 credits	30.0 h + 15.0 h	1q

Teacher(s) :	Pecheur Charles ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Prerequisites :	-- Basic notions in discrete mathematics (e.g. INGI1101) -- Basic notions in theory of computation (e.g. INGI1123) -- Basic notions in concurrent systems (e.g. INGI1113)
Main themes :	This course studies the principles, formalisms and tools used to model and analyse concurrent computer systems. -- Models of Concurrent Systems -- Semantics of Concurrent Systems -- Properties of Concurrent Systems -- Verification of Concurrent Systems
Aims :	Students completing successfully this course will be able to -- master the mathematic concepts and tools which enable modelling and analysis of concurrent computer systems; -- model an actual concurrent system in a appropriate abstract formalism; -- use automated verification techniques to analyse concurrent systems. Students will have developed skills and operational methodology. In particular, they have developed their ability to -- model existing software; -- thinking with abstractions and use a formalized approach to infer properties of an existing system. *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 :	Oral examination (2/3 of the final grade) -- Theory (based on questions available at the end of the semester) -- Exercises Assignments (1/3 of the final grade)
Teaching methods :	-- Lectures -- Exercises (theoretical exercises to master the concepts, followed by computer room session to apply these on concurrent systems) -- Assignments (performed conjointly by two students) The exercise sessions are closely related to the assignments and help student using similar models and tools on other concurrent systems.
Content :	-- Models of Concurrent Systems: processes and actions, conditions and choices, concurrency, synchronization, process algebras. -- Semantics of Concurrent Systems: state machines and transition systems, finite and infinite traces, concurrency by interleaving, equivalences and minimization. -- Properties of Concurrent Systems: invariants, safety and liveness properties, temporal logic, refinement relations. -- Verification of Concurrent Systems: model checking, equivalence checking.
Bibliography :	Reference book (mandatory) -- J Magee and J Kramer, Concurrency: State Models and Java Programming (2nd Ed.), Wiley, 2006. Additional references -- H Bowman and R Gomez, Concurrency Theory: Calculi and Automata for Modelling Untimed and Timed Concurrent Systems, Springer, 2006. -- AW Roscoe, The Theory and Practice of Concurrency, Prentice Hall, 1998 (http://web.comlab.ox.ac.uk/oucl/work/bill.roscoe/publications/68b.pdf). -- E Clarke, O Grumberg and D Peled, Model Checking, MIT Press, 1999. -- B Bérard et al., Systems and Software Verification, Springer, 2001.
Cycle and year of study :	> Master [120] in Computer Science > Master [120] in Computer Science and Engineering
Faculty or entity in charge:	INFO