

INSTITUT NATIONAL DES SCIENCES APPLIQUÉES

# DPT INFORMATIQUE COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

INSA Campus LyonTech - 7 Avenue Jean Capelle Batiment Blaise Pascal - 69621 VILLEURBANNE Phone 0472438892 Web site : http://if.insa-Iyon.fr

# Conferences and Seminars

# Experimentation and Experimental Validation

## AIMS

IDENTIFICATION		/
CODE : ECTS :	IF-5-S1-EC-TCS1 2.0	
HOURS		
Lectures :	28.0 h	
Seminars :	0.0 h	(
Laboratory :	0.0 h	
Project :	0.0 h	

The goal is to tackle computer science as a science, with its theoretical foundations, and its practical experimental evaluations. We present methods and tools to design, validate, evaluate and improve algorithms. We illustrate through concrete examples the importance of having a scientific approach to design and evaluate an algorithm in an R&D context and, more generally, to master tools for adopting a critical thought.

### CONTENT

1 - Correctness and completeness of an algorithm: What is a correct/complete algorithm? How to prove correctness and completeness?

2 - Complexity classes and computational complexity: How to evaluate scale-up properties of an algorithm from a theoretical point of view? Complexity classes, Parametrized complexity. What can we do in practice when theory tells us our goal is impossible to achieve?

3 - Experimental evaluation: What can we experimentally evaluate? What are the main steps of an experimental process? How to design a reproducible experimentation? How to choose a benchmark? What performance indicators? How to analyze experimental results?

4 - Algorithm engineering: Algorithm tuning vs code tuning; Automatic algorithm configuration and parameter tuning; Learning for per-instance automatic selection of algorithms

## BIBLIOGRAPHY

Cormen, Leiserson, Rivest : Introduction to algorithms. MIT Press and McGraw-Hill, 2009 Papadimitriou : Computational complexity. Editions Addison-Wesley, 1994 McGeoch : A guide to experimental algorithmics. Cambridge University Press, 2012 Baillargeon : Petit cours d¿autodéfense intellectuelle. Lux Editeur, 2005

# tal : 46.0 h ASSESSMENT METHOD

Teacher-student

**TEACHING AIDS** 

### **TEACHING LANGUAGE**

### French

#### CONTACT

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## INSA LYON

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