

## Fiche de proposition d'un cours scientifique

**TITRE DU COURS : Logic and Automata Theory**

**Intervenant** (*préciser le statut, c'est important pour l'administration*) : **Radu IOSIF (DR CNRS) laboratoire VERIMAG**

**Nombre d'heures et calendrier ou période du cours :**

**24 heures, mars-avril 2024, en présentiel uniquement**

**Public visé : Master (1+2), Doctorands**

**Objectif du cours :**

**Many major hardware (Intel, IBM) and software (Microsoft) companies are now using the technique of Model Checking in practice. Examples of its use include the verification of VLSI circuits, communication protocols, software device drivers, real-time embedded systems, and security algorithms. The works of A. Pnueli, E. Clarke, E.A Emerson and J. Sifakis on algorithmic verification of systems using the Model Checking has been awarded the 1996 and 2007 Turing awards. The basis of this work is the relation of logic with automata theory, which was introduced by the seminal works of Büchi (1960) and Rabin (1969). This course is intended to introduce the student to these techniques, focusing on decision methods for classical non-interpreted logics and integer arithmetic theories.**

**Descriptif du cours :**

**1. Classical first- and second-order logic, finite word and tree automata, closure properties and language emptiness. 2. Relationship between Weak Monadic Second-Order Logic and finite automata. 3. Infinite automata on words (Büchi, Muller) and on trees (Rabin) automata, and their relationship with Monadic Second-Order Logic. 4. Game theory. Proof of Rabin's Complementation Theorem. Application of game theory to logic.**