

Academic year 2025/2026

Courses offered by the programme

Mathématiques appliquées (MA)

Semester(s) :

Curricula are organized in groups of courses (Unités d'Enseignement (UE)), consisting of several courses (Éléments Constitutifs (EC)). An EC is a teaching module including lectures (cours magistraux (CM)), tutorials (travaux dirigés (TD)), laboratory work (travaux pratiques (TP)), projects (PR), conferences (CONF), personal work (TA) and possibly other pedagogical activities (DIV). Some internships (stages (ST)) are compulsory

Commonly used abbreviations

CM : Lectures

TD : Tutorials

TP : Laboratory Work

CONF : Conferences

TA : Personal Work

PR : Project

ST : Internship

DIV : Miscellaneous

Automatons and Local Industrial Networks	GMA05-AURES
Number of hours : 42.00 h	3.00 ECTS credit
CM : 16.00 h, TD : 10.00 h, TP : 16.00 h	
Reference Teacher(s) : MAURINE Patrick	

Objectives :

Creation of sequentially commanded automatic production systems using appropriate tools. Industrial networks and automatons.

Content :

1. Synthesis and optimisation of sequential logic systems. Mealy and Moore machines. Representing sequential systems. Flipflops. Synthesis of synchronised sequential systems. The Huffman-Mealy method.
2. Industrial Programmable machines (IPM): Placement and role of an IPM at the core of an automated industrial production system. Specific structure and functionality of an IPM. Connection and peripherals of the automaton. IPM programming languages. Connection to networks.
3. Grafcet: Definitions and normalisation. Basic elements; Syntax and evolution of the system. Basic and special structures. Extension of the representations. Marco-stages using Grafcet. Algorithms and equivalent equations. Partition and placement of a Grafcet. Forcing situations.
4. Local industrial systems: Functional architecture of local industrial networks. SIM and three-axis modelling. Field networks. Architecture, reduced OSI model. FIP, ASI and PROBUS networks.

Bibliography :

1. GREPA, "" Le Grafcet "", 2ème édition, 1995, Cépadues
2. CIAME, "" Réseaux de terrain "", 1998, Hermès

Requirements :

1. Combinational logic.
2. Study and optimisation of combinational logic systems.

Organisation :

Evaluation :

Two-hour examination. Mark for practical work.

Target :