INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES RENNES

Academic year 2024/2025

Courses offered by the programme

Génie Mécanique et Automatique (GMA)
Mechanical and Control Systems Engineering

Semester(s) :

Curricula are organized in groups of courses (Unités d'Enseignement (UE)), consisting of several courses (Eléments 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 pedagocial 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

Automation III: Optimal Control	GMA09-COMOP
Number of hours : 24.00 h	2.00 ECTS credit
Reference Teacher(s) : GUEGAN Sylvain	

Objectives :
Problems associated with optimal control of dynamic systems, including a number of practical problems: Control with minimal
expenditure of energy, Control in minimal time, etc. Study of linear quadratic commands. Introduction of robustness of the
Gaussian linear quadratic commands; H2 and H¥

Content :
Mathematics in optimal control. Calculation of variations. Principle of the maximum. Dynamic programming. Optimal control
of linear systems. Additions from Lyanpunov's theory. Quadratic optimisation of continuous systems. Continuous stationary
regulator. Quadratic optimisation of discrete systems. Discrete stationary regulator. Linear quadratic command system + stability. Gaussian linear quadratic commands H2 et H¥

Bibliography :
KWAKERNAAK H. SIVAN R., 1972, « Linear optimal control systems», John Wiley 1 Sons, Inc.
THOMAS Y., 1992 « Signaux et systèmes linéaires » 1991, Masson
DE LARMINAT Ph. 1993, « Automatique, commande des systèmes linéaires », Hermès.

Requirements :
Signaux et Systèmes - Automatique 1 - Automatique 2

Organisation :
Revision of lecture notes. Preparation of exercises, problems and practical work (Two hours per week).

Evaluation :
Three-hour written examination at the end of the semester(lecture notes and handouts allowed).
Two practical work reports .

Target :