

EE-477

**Multivariable control and coordination systems**

Gillet Denis

Cursus	Sem.	Type
Electrical and Electronical Engineering	MA1, MA3	Opt.
Robotics, Control and Intelligent Systems		Opt.
Robotics	MA1, MA3	Opt.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
TP	2 weekly
<b>Number of positions</b>	

**Summary**

The objective is to enable students to design advanced digital solutions for the control and the coordination of distributed dynamic systems, such as production or distribution energy systems, as well as intelligent transportation systems.

**Content**

Selected chapters in dynamic coordination:

- Modeling of complex dynamic systems using state-space representation
- Analysis of dynamic properties of complex systems
- Optimal control with and without actuator constraints
- State estimation
- Dynamic coordination

**Keywords**

Multivariable systems, complex systems, state-space methods, optimal control, LQR, dynamic programming, state-space observer, state estimation, coordination, navigation functions

**Learning Prerequisites****Important concepts to start the course**

Linear Algebra  
Dynamic Systems

**Learning Outcomes**

By the end of the course, the student must be able to:

- Choose analysis, control or estimation approaches
- Design state-space controllers or estimators
- Justify selected approaches
- Argue on their pros and cons

**Transversal skills**

- Use a work methodology appropriate to the task.
- Take responsibility for environmental impacts of her/ his actions and decisions.
- Assess one's own level of skill acquisition, and plan their on-going learning goals.
- Manage priorities.
- Use both general and domain specific IT resources and tools
- Write a scientific or technical report.

### **Teaching methods**

Lectures and case studies carried out in teams

### **Assessment methods**

Written exam and case study reports

### **Resources**

#### **Ressources en bibliothèque**

- [Multivariable control and coordination systems: course notes / Gillet](#)

#### **Notes/Handbook**

Dynamic Coordination, Denis Gillet, September 2014