

**Course Syllabus for
Electrical and Information Engineering PhD
(years 2022-23 /2023-24)**

Course title	Industry 4.0: Optimization, Control and Security
Scientific Discipline Sector	ING-INF/04
Hours of instruction	20 hours
CFU	2 CFU
Semester	First semester
Goal	The aim of the course is to show how every industrial process is capable of adopting aspects of Industry 4.0. Analysis of industrial system behavior and its optimization and control are crucial issues for commissioning these systems and for improving competitiveness of companies. Moreover, the interconnection of sensors, machines, etc, and the information exchange among them might be subject to attacks and intrusions from external agents, which aim to violate the secrecy and integrity of crucial information. In such case, opacity is a fundamental notion to determine if a "secret" can be determined by a malicious observer called "intruder".
Syllabus	The course includes the following four main sections: <ul style="list-style-type: none"> 1) Industry 4.0 – Introduction and innovations for the industrial companies. 2) Cloud computing systems: architecture and design. 3) Optimization and control in a Cloud computing system: centralized and decentralized optimization, multi-agent optimization (distributed task assignment, consensus, gossip algorithms) 4) Opacity and critical observability notions, algorithms to defend crucial information by intruder attacks.
Bibliography	Scientific papers.
Examination method	Final examination in class