

Doctoral School of the Polytechnic of Bari
(Academic Year 2019/20)

INSEGNAMENTO	CFU	S.S.D.	DURATA	LINGUA DI EROGAZIONE
1. Theory and applications of stochastic processes	3	ING-INF/03	30 ore	INGLESE
2. Design and optimization of nearly Zero Energy Buildings and Districts	3	ING-IND/33	30 ore	INGLESE
3. Middleware and architecture for Industry 4.0	3	ING-INF/05	30 ore	INGLESE
4. Modeling of Smart Material Systems	3	ING-INF/04	30 ore	INGLESE
5. Software-Based Methods for Modern Control Systems Design	3	ING-INF/04	30 ore	INGLESE
6. Multidisciplinary approach to solving complex environmental problems	2	ING-IND/22, ICAR/03 and ICAR/02	20 ore	INGLESE
7. Human Performance in Production System	3	ING-IND/17	30 ore	INGLESE

1. Theory and applications of stochastic processes
CFU 3 (30 ore); SSD: ING-INF/03

- Review of probability (2 hours)
- Poisson Processes (4 hours)
- Finite State Markov Chains (4 hours)
- Countable State Markov Chains (2 hours)
- Continuous Time Markov Chains (4 hours)
- Introduction to queueing and queueing network theory (4 hours)
- Selected Applications (4 hours)

2. Design and optimization of nearly Zero Energy Buildings and Districts
CFU 3 (30 ore); SSD: ING-IND/33

Introduction

Technologies for Zero Energy Buildings and Districts

Modelling principal components

Development of tools for optimal operation of ZEB/ZED

Representation of most common distribution grids: electrical, natural gas and water

Optimization of energy resources in the presence of grid constraints

Development of tool for optimal design of ZEB/ZED

3. Middleware and architecture for Industry 4.0

CFU 3 (30 ore); SSD: ING-INF/05

The program will cover the following topics:

- Industrial Internet: the Industrial Internet of Things
- The Internet technology into production process
- Industrial IoT (IIoT) Reference Architecture
- Middleware Software Patterns
- Software Design Concepts
- Middleware Industrial Internet of Things Platforms
- IoT in the production process: connecting machines, products and systems
- Events and Streaming: Complex Event processing

Products and services: open standards and solutions

4. Modeling of Smart Material Systems

CFU 3 (30 ore); SSD: ING-INF/04

- Introduction to smart materials in mechatronics
- Modeling of thermal shape memory alloys
- Modeling of piezoelectric ceramics
- Modeling of magnetic shape memory alloys
- Modeling of dielectric elastomer
- Computer-aided simulation and design of smart material actuator and sensor systems in Matlab/Simulink environment

5. Software-Based Methods for Modern Control Systems Design

CFU 3 (30 ore); SSD: ING-INF/04

- Introduction to modern control systems
- Multi-physics modeling of systems from different domains: mechanical, electrical, fluidic, thermal, chemical
- Control methods based on time domain
- Control of multi-input multi-output systems
- Control of uncertain systems
- Computer-aided design of modern control systems in Matlab/Simulink environment

6. Multidisciplinary approach to solving complex environmental problems

CFU 2 (20 ore); SSD: ING-IND/22, ICAR/03 and ICAR/02

The following issues will be addressed: (i) Use of renewable energies for wastewater treatment and reuse in agriculture; (ii) Remediation of contaminated soil, the case study of the "Terra dei fuochi" in the Campania Region; (iii) Assessment of public perception in support to social acceptance of technological solutions: the case study of actions concerning the water and solid waste minimization implemented in the island of Favignana (Egadi Islands, Sicily); (iv) Siting of the municipal solid waste treatment and disposal facilities in the context of industrialized countries

7.Human Performance in Production System

Industry 4.0, Internet of Things and Lifecycle Management.

Ergonomic principles in the workplace.

Work-related Musculoskeletal Disorders (MSDs) and upper limbs movements and postures.

OCRA method and International Standards (ISO).

Real time ergonomic assessment using low cost sensors.

Human Performance and Human Factors.

Definition of Human Reliability.

Reliability-based Human Performance: Models and Tools Human Factors and 'Industry 4.0'.

Human Performance in visual inspection and operation tasks in assembly line.

Human Performance Modeling.

Learning Fatigue Phenomena in Operations.

Risk Analysis in Industrial Plants Vigilance tasks in safety functions.