Politecnico di Torino

Academic Year 2010/11 (first time established in A.Y.2007/08)

01LSXJA

Discrete Event Models and Applications

1st degree and Bachelor-level of the Bologna process in Electronic And Computer Engineering - Vercelli (III FACOLTA' DI INGEGNERIA)

Teacher	Status	SSD	Les	Ex	Lab	Years Stability
Calafiore Giuseppe Carlo	AC	ING-INF/04	5	0	0	1

SSD	CFU	Activities	Area context
ING-INF/04	5	B - Caratterizzanti	Ingegneria informatica

Objectives of the course

The course 'Industrial Automation: Models' provides the student with the fundamental methodological instruments for understanding and modeling the dynamic phenomena arising in modern manufacturing systems and automation engineering.

Expected skills

The student will acquire methodological competencies for modelling and simulation of production processes through discrete event systems in continuous or discrete time.
In particular, the student will learn (i) to describe simple production processes (production cell, line transfer, flow-shop, etc) through models based on Markov Chains; (ii) the main statistical measures of system performance, such as productivity (throughput), average service time, breakdown probability, waiting times, etc, and (iii) to estimate such measures via analytics or through computer simulations.

Prerequisites

Fundamentals of linear algebra, probability and statistics.

Syllabus

- Elements of probability and statistical estimation.
- Introduction to discrete event systems. Automata.
- Model of manufacturing systems (production cell with periodic downtimes, robot with grip failures, transfer line, etc.).
- Discrete-time Markov chains: theory and applications.
- Continuous-time Markov chains: theory and applications.
- Poisson and birth-death processes.
- Resources with waiting lines. Measures of performance. Little's Law.
- Elementary queueing theory.

Laboratories and/or exercises

The course includes practise sessions and computer simulation activities.

Bibliography

Textbooks:
Cassandras, C., S. Lafortune, Introduction to Discrete Event Systems, Kluwer, 1999
G. Calafiore, Elementi di Automatica, seconda ed.; CLUT, Torino, 2007.

Revisions / Exam

Written + (possible) oral examination.

Programma definitivo per l'A.A.2010/11

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