Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: Integrated Production Systems				
TEACHER: dr. Paolo Renna				
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Language italian				
ECTS: 9	n. of hours: 81	Academic year: 2014/2015	Campus: Potenza	Semester: I°

TOPICS

Components of automated manufacturing systems: Numerical control machine, automated guided vehicle, local network, numerical control programming, computer aided process planning, CAD-CAM software, BobCAD applications. Design and performance analysis of integrated manufacturing systems: Static allocation, LINGO software applications, Queuing network and decision models, Jackson Network, Mean value Analysis, Event discrete simulation, Rockwell ARENA package.

TEACHING METHODS (please tick one or more options)

□ **Theoretical lessons**
□ **Tutorials in classroom**
□ **Tutorials in laboratory**
□ Project works
□ Technical visits
Other activities (please specify) _____

TEXTBOOKS

F. Giusti e M. Santochi, Tecnologia Meccanica e Studi di Fabbricazione, Casa Editrice Ambrosiana, Milano;
F. Grimaldi, "CNC Macchine utensili a controllo numerico", HOEPLI;
N. Viswanadham, Y. Narahari, "Performance Modeling of Automated Manufacturing Systems", Prentice Hall;
F. S. Hillier, G. J, Liebermann, "Introduction to Operations Research", McGraw Hill;
Kelton, Sadowski, Sadowski, 1998, "Simulating with ARENA" McGrawHill;
A. Li Calzi, 1999, Ingegneria Gestionale, EPOS.
On line lectures materials on: https://sites.google.com/site/paolorenna/home/didattica/sistemi-integrati-di-produzione

ON-LINE EDUCATIONAL MATERIAL

web address: https://sites.google.com/site/paolorenna/home/didattica/sistemi-integrati-di-produzione

LEARNING OUTCOMES

Understand the management of numerical control machine in advanced production systems. Understand the design and performance analysis approaches for the advanced manufacturing systems in order to optimize the performance measures and integrate of its components. Understand the discrete event simulation approach; understand the design and analysis of simulation models.

REQUIREMENTS

EVALUATION METHODS (please tick one or more options)

□ Intermediate verifications
□ Written examination
□ **Discussion of a project work**
□ Practical test
□ **Oral examination**
Other methods (please specify) _____

DETAILED CONTENT
SECTION I: Automated manufacturing systems
I.1. Overview: automation in modern industrial applications
I.2. Numerical Control
I.2.a. Components of numerical control machines
I.2.b. Movements and motors of a numerical control machine
I.2.c. Tools management
I.2.d. Dimensional measurement and other services
I.2.e. Closed loop control and sensors
I.2.f. Numerical control management
I.2.g. Numerical control programming
I.3. Material Handling: Automated Guided Vehicle (AGV)
I.3.a. Overview of AGVs
I.3.b. Characteristics and structure of AGVs
I.3.c. Control and management of AGVs
I.3.d. Industrial Conveyor
I.4. Integration tools in advanced manufacturing systems
I.4.a. FMS,FAL e RMS
I.4.b. Cellular manufacturing systems
I.4.c. Design and control of integrated manufacturing systems
I.4.d. I Local Network of manufacturing systems

SECTION II: Integration tools
II.1. Il CAD-CAM software programming for numerical control machines; BOBCAM software;
II.1. Il Computer Aided Process Planning: variant and generative CAPP;
II.3. Group technology e cellular production systems
II.3.a. Code and classification of parts
II.3.b. Production Flow Analysis: the cluster Identification
II.3.c. cellular manufacturing systems applications
II.3.d. Design of cellular manufacturing systems

SECTION III: Manufacturing systems
III.1 Overview and classification of manufacturing systems
III.2 Single station manufacturing system
III.3 Cellular manufacturing systems
III.4 Flexible manufacturing systems
III.5. Assembly lines
III.5.a Transfer lines and similar automated manufacturing systems
III.5.b. Applications of automated production lines
III.5.c. Analysis of transfer lines with no internal storage
III.5.d. Analysis of transfer lines with storage buffer
III.6. Manual Assembly lines
III.6.a. Overview of assembly lines
III.6.b. Assembly lines for single product
III.6.c. Design methodologies for assembly lines
III.6.d. Flexible assembly lines
III.6.e. Design methodologies for flexible assembly lines

SECTION IV: Design and analysis methodologies for automated manufacturing systems
IV.1. Performance measures in automated manufacturing systems
IV.2. Overview of static allocation in manufacturing systems
IV.2.a. Static allocation to design manufacturing systems
IV.2.b. Static allocation to analyze manufacturing systems
IV.3. Mathematical descriptive methods

IV.3.a. Stochastic processes
IV.3.b. Overview of Markov queuing systems
IV.3.c. Queuing network
IV.3.d. Jackson Network and Mean Value Analysis
IV.4. Design and analysis by discrete event simulation
IV.4.a. Overview of discrete event simulation
IV.4.b. Simulations: languages and software
IV.4.c. Simulation models with Rockwell ARENA

SEMINARS BY EXTERNAL EXPERTS **YES** □ NO □

FURTHER INFORMATION