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COURSE: **INDUSTRIAL AND MECHANICAL PLANTS**

TEACHER: **Fabio Fruggiero**

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Language **Italian**

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ECTS: **6**

n. of hours: **60**

Academic year: **2014/2015**

Campus: **POTENZA**

Semester: **I**

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#### TOPICS

The module reviews the basic requirements of plant operation; techniques of monitoring, fault diagnosis, performance assessment, risk analysis. It deals with planning of industrial plants and services; performance measurement; definition of industrial processes and their characterization; layout analysis; facility warehouse planning; engineering services and maintenance strategies; risk analysis and its assessment.

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#### TEACHING METHODS

- Theoretical lessons
- Tutorials in classroom
- Tutorials in laboratory
- Project works
- Technical visits

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#### TEXTBOOKS

*Handmade notes and duplicated lectures notes with recommended bibliography for thorough analysis:*

- L. Furlanetto: Manuale di manutenzione degli impianti industriali e servizi. Il Mulino, 2007.
- A. Monte: Elementi di impianti industriali – Voll. I e II. Ed. Libreria Cortina (TO), 2003.
- R. C. Hansen: Overall Equipment Effectiveness. Industrial Press inc, 2001.
- A. Calabrese: Servizi generali d’impianto – Voll. I e II. CUSL, 2001.
- R. Rizzo: La sicurezza degli impianti industriali. Ed. Scientifiche Italiane, 1998.
- A. Brandolese, A. Pozzetti, A. Sianesi: Gestione della produzione Industriale - Hoepli (MI), 1995.
- J. M. Moore E: Progettazione e layout degli impianti - ed. F. Angeli (MI), 1993.
- R. Castagna, Roversi A. : Sistemi produttivi - ed. ISEDI (TO), 1990.

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#### ON-LINE EDUCATIONAL MATERIAL

web address: *ftp dedicated as course starts*

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#### LEARNING OUTCOMES

On completion of the module a typical student should be able to:

##### **Knowledge and Understanding:**

- Understand the main concepts and terminology of industrial and mechanical plants
- Understand the principle for the efficient and efficacious planning of main components of an industrial plant

##### **Intellectual skills:**

- Analyze and Synthesize technical components and their performance for the optimal planning of industrial facilities and services
- Analyze and Synthesize resources based on products and market requirements
- Analyze and Synthesize procedure for Risk Management

##### **Practical Skills:**

- Plan the main components of an industrial plant and services
- Produce Maintenance plans
- Realize a risk analysis

##### **Transferable Skills:**

- Manage Industrial Facilities
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## REQUIREMENTS

Is required elementary knowledge about mathematics and physics and technology science.

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## EVALUATION METHODS

- Intermediate verifications
  - Written examination
  - Discussion of a project work
  - Practical test
  - Oral examination
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## DETAILED CONTENT

The definition of Industrial and Mechanical Plants, the Historical evolution on production systems. The Key performance indicators: Potentially and Productivity and Capacity, Break Even Point, Integration, the way of flexibility. The Product Process Matrix (the Hayes Wheelwright Classification): Project, Job Shop, Batch, Line (distinctive competences). Facility Layout Planning- Basic Layout formats: Process Layout definition - Product Layout definition - Group Technology (cellular) Layout definition – Fixed Position Layout definition. Performance Measurement in TQM approach: The Overall Equipment Effectiveness.

Process Layout and Capacity Requirement: the no wait processes; Product Layout: Assembly Lines; Group Tecnology: definition and clustering methods (KING approach). The role of Human Factor in Production System: Human Factor and Human Effects (Ergonomics and Learning Factor) – the Takt Time and its components. Methods for Motion Time Measurement: Work Measurement and Material Handling Systems.

Warehouse Facility Planning: Racking Systems (Carousel and Rack Type classification) and Item classification - Live storage Stems and Stock Keeping Units. Order Picking Paths Replenishment - Policies definition. Trasloelevators and miniload (FEM rules). Warehouse with integrated loading-Unloading System. AGV examples.

Fault diagnosis and maintenance strategies.

Safety and Risk Analysis - Methods to Risk Assessment and Management (Dlgs 81/2008 and its further integrations).

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**SEMINARS BY EXTERNAL EXPERTS**    YES     NO

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## BOOKS RECOMMENDED FOR READINGS:

- G. Colvin, La trappola del talento, Rizzoli 2009;
  - D. Lapierre, J. oro, Mezzanotte e cinque a Bhopal, Mondadori, 2003
  - R. Norman, Ridisegnare L'impresa. Quando la mappa cambia il paesaggio . Etas libri, 2002
  - M. Goldratt, Theory of Constraints and how should it be implemented, 1990.
  - Primo Levi, La chiave a stella, Einaudi 1978.
  - Primo Levi, Il Sistema Periodico, Einaudi 1975.
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