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| COURSE: **INDUSTRIAL SYSTEMS ENGINEERING** | | | |
| ACADEMIC YEAR: 2019/2020 | | | |
| TYPE OF EDUCATIONAL ACTIVITY: Characteristic | | | |
| TEACHER: FABIO FRUGGIERO | | | |
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| phone: +39 0971 205196 | | mobile (optional): // | |
| Language: Italian | | | |
| ECTS: (lessons e tutorials/practice) | n. of hours: 34 (class) + 26 (practice) | Campus: Potenza<br>Dept./School: School of Engineering<br>Program: BME | Semester: I |

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

***Practical Skills:***

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

***Transferable Skills:***

- Manage Industrial Facilities

PRE-REQUIREMENTS

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

SYLLABUS

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 manufacturing) 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 Technology: definition and clustering methods (KING approach and similarities). Labour planning and management. 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. Material handling systems. Trasloelevators and miniload (FEM rules). Warehouse with integrated Loading-Unloading System. AGV examples.

Fault diagnosis and maintenance strategies. The management of services and facilities. Main services. Safety and Risk Analysis - Risk Assessment and Management (Dlgs 81/2008 and its further integrations).

TEACHING METHODS

The course arrange 26 hours of technical EXERCISES on real test beds and case issues; 34 hours of frontal TEACHING; It is expected ONE or MORE tours on real industrial systems; a final planning project

EVALUATION METHODS

Written test (planning methods - weight 0.4) and oral exam (knowledge measure - weight 0.6) are required. The written test is arranged on 3 numerical problems. Exercise 1 (weight 0.4) about production planning: it is required characterization of machines and methods and process, definition of an optimal - based on demand requirements – configuration. Exercise 2. (weight 0.3) is about internal logistic planning and analysis. Exercise 3 (weight 0.2) is about service planning and management. The written test is evaluated with a score from18 to 30. Time for test is 3 hours. The student may use calculator and PC. An oral discussion is required. The oral examination is about industrial and mechanical systems engineering. The is a limit one to 5 days from written to oral examination.
The final score of the test is the weighted sum of written and oral examination. A not sufficient score requires test repetition.
Integration and learning rights are guaranteed.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

*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.

INTERACTION WITH STUDENTS

Students are invited to use online material. At starting it is required a registration (Name and Surname and email are needed) to a common service. It has been planning tutoring till two hours after the teaching calendar. Students can contact the teacher directly by email and phone/cell number. It is generally guaranteed tutorial long over the daily time.

EXAMINATION SESSIONS (FORECAST)[1]

05/02/2020; 19/02/2020; 25/03/2020; 29/04/2020; 17/06/2020; 08/07/2020; 29/07/2020; 16/09/2020; 21/10/2020; 25/11/2020; 16/12/2020

SEMINARS BY EXTERNAL EXPERTS YES ■ NO □

BOOKS RECOMMENDED FOR READINGS:

- 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
- R. Karasek & T. Theorell ,Healthy Work, Basic Books, 1990.
- 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

[1] Subject to possible changes: check the web site of the Teacher or the Department/School for updates.