

Name of the course: Hospital Energy Systems

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Duration of the course: 12 hours, **Credits:** 3

Language: English.

Aims of the course: The course aims to present the technological aspects for the management of hospital facilities. The student will be provided with basic knowledge on the electrical plant engineering part relating to the description of medium and low voltage systems and on the basic knowledge of thermal plant engineering. Students will acquire training related to hospital systems useful for entering public and private structures in the sector and for active participation in teams for the management of complex structures, systems and biomedical equipment.

Teaching programme:

1. General information on electrical systems: production, transmission, distribution systems
2. Review of the three-phase electrical system and electrical system component
3. Effects of current on human beings. General information on protection and risk assessment systems. Current-time curve, Voltage-time curve. Dangerous areas for humans. In-depth study of current effects on the human body: tetanization, cardiac arrest, fibrillation. Critical current paths. Modeling.
4. State of the neutral in three-phase systems and consequences on the operation of electrical systems. Low voltage electricity distribution systems. TT, TN, IT systems ELV systems – Extra Low Voltage.
5. Protection from direct contacts. Protection criteria and methodologies: barriers, isolation, distance. Full protection, partial protection. Protection by insulation. Degrees of protection. Examples
6. Protection from indirect contacts. TT system: electrical schematization and plant considerations. Low voltage distribution systems. TN systems Use of differential switch. Operating principle, tripping curves. Pros and cons of using the i.d.
7. IT system. Medical IT system. Isolation transformer
8. Classification of Medical Premises
9. Examples of equipment consumption
10. Power supply schemes in hospital facilities. Normal emergency power supply. Classification of users. Re-power schemes following loss of external power. Power supply from UPS systems. Emergency diesel power supply.
11. Power factor correction. Plant aspects
12. Energy efficiency in hospital structures
13. The thermal systems of a hospital structure
14. Topics relating to thermal energy: balance of mass and energy, air conditioning, heating refrigeration).
15. Presentation of a test case and Technical visit to the San Martino hospital in Genoa

Exam modality:

Oral presentation

Bibliography:

Material provided by the Lecturers