

UNIVERSITA' DEGLI STUDI MEDITERRANEA DI REGGIO CALABRIA

Subject Code	16570
Subject Name	Measurements for the Quality & Electrical Security
Professor	Eng. Rosario Morello Prof. Eng. Rosario Carbone
Department:	DIIES
Degree course:	MSc degree in Electronic Engineering
Class:	LM-29
Type of educational activity:	Lessons and Laboratory
Disciplinary Area:	Measurement and Electric Systems
Scientific-Disciplinary Sector:	09/E4 - 09/C1
Compulsory preliminary exams:	NA
Course Year:	II
Semester:	II°
ECTS:	6
Hours:	48

Synthetic description:

The course deals with the quality theory in measurements and processes, and with the security in electric field applications.

Acquisition of knowledge on: Measurements for the Quality

The module "Measures for Quality" aims to provide students with the basics and concepts necessary for the evaluation and optimization of the quality in the measures and in the processes. Will also be addressed basic concepts related to the study, evaluation and interpretation of the performance reliability of the measurement systems and the related report writing. Will be provided the methodological tools to measure and verify the compliance of a system or product / service specification requirements and to monitor its performance in terms of quality enhancement. At the end of the course students will acquire skills related to appropriate measures for the quality and qualification of a generic measurement process or service / product. Students will also be able to interpret the certification process, both products and system, and to identify the most appropriate methods of quality control in relation of international standards.

Electrical Security

First, will be done an analysis of the issues related to the danger for people of electrical contacts and, later, after giving attention to the classification of electrical systems, all systems are analyzed together with the design choices appropriate to ensure the protection of individuals against the aforementioned dangerous electrical contacts.

Evaluation method:

Oral test with laboratory exercitation.

Student's independent work

NA

Detailed course program

Measurements for the Quality

Process and product / service quality and quality across the enterprise. Quality Management: SGQ, Manual Quality, System Quality. Standardization, certification and accreditation (UNI EN ISO 9000:2008, CEI 56-50, ACCREDIA). European Directives and the concept of the essential safety requirements. Quality and CE marking marks.

Analysis of the measurement results. Assessment of the accuracy and reliability of the data. Statistical tools for assessing the quality of the measurement data. Quality indicators and their determination. Evaluation of the different contributions of the uncertainty in a measurement process. Impact of measurement uncertainty in measurement quality. Reliability and statistical quality control. Security analysis and classification. Reliability of the measuring instruments. Metrological traceability. Curves of life and decay. Calibration and maintenance intervals.

Design and characterization of a measurement process by choosing the optimum: of the measurement system, of the method of measurement, of the measurement procedure and analysis of results. Interpretation of results: levels of attention and alarm, drift effects, decision-making risk. Standard ISO 14253. Quality control: product and process control, natural tolerance and specification tolerance. Indicators of capacity and performance. Qualification of a production process. Measures for the qualification in the enterprise.

Electrical security

Analysis of the constitution of a typical electrical installation in medium and low voltage plants and of a photovoltaic plants for the generation of alternating current electricity (single phase and three phase) from the sun. Considerations on the fundamental building blocks and their function (generator, transformers, lines and distribution networks, protection against overcurrent and overvoltage, distribution boards, field board, inverters, fuses, interface devices.

Analysis of the danger of electrical contacts in case of failure, in the possible different plant situations (TT systems failures, breakdowns in TN both in the LV side and in the MV side, DC side and AC side faults in PV systems with and without galvanic isolation transformer) .

Classification of plants and criteria and procedures for earth connection of the grounds.

Constitution and sizing of the earth plant.

Use of the differential relay.

Use of double insulation supplies.

Resources and main references

Measurements for the Quality

- M.Lazzaroni, L.Cristaldi, L.Peretto, P.Rinaldi, M.Catelani "Reliability Engineering - Basic Concepts and Applications in ICT", Springer 2011 - Caps. 1-2-3-4-5.
- International and Europea Standards.
- Douglas C. Montgomery: "Statistic control of quality", McGraw-Hill, 2000.
- M.A.Levin, T.T.Kalal: Improving Product Reliability, J.Wiley, 2003.
- Nello Polese, Stefano De Falco, "Misure per la gestione - Assicurazione di qualità, logiche decisionali, progettazione degli esperimenti, normativa", Ed. ESI, Cod. ISBN: 9788849519761, 2010.

Electrical security

- L. O. Chua, C. A. Desoer, E. S. Kuh, "Linear and Nonlinear Circuits", McGraw-Hill, 1987.
- Lesson Notes
- Standards CEI 64-8 and CEI 82-25.
- Guida Blu n.15: Fotovoltaico. Edizioni TNE.
- V. Carrescia: "Fondamenti di sicurezza elettrica". Edizioni TNE, Torino.