BRIEF COURSE DESCRIPTION

This course provides students with the analytical and management tools necessary to solve manufacturing quality problems and implement effective quality systems. Topics include quality systems and standards, the Six Sigma problem solving methodology, process capability analysis, measurement system analysis, gauge R & R, ANOVA, statistical process control, and geometric tolerances.

REQUIREMENTS

Sufficiency probability theory and statistics.
COURSE AIMS

Knowledge and ability to understand. The course aims to provide useful knowledge on engineering techniques for statistical process control and their quantitative and qualitative characteristics. Specific attention will be devoted to the evolution of techniques related to the modern availability of measuring instruments.

Ability to apply knowledge and understanding. Through the analysis of recent scientific literature and quantitative data related to case studies in engineering, we will provide analysis tools and statistical techniques applicable in various engineering fields, particularly in manufacturing. After the course the student should be able to: i) know the techniques of statistical process control in manufacturing and process companies; ii) know the methods and techniques of experiment design and analysis of experimental data; iii) know the advanced techniques of modeling / monitoring of measurement data.

Autonomy of judgment. Through the study of theoretical approaches and the critical evaluation of different techniques, the student will be able to improve his judgment and proposal skills in relation to the engineering problem of statistical process control.

Communication skills. The presentation of the course topics will be carried out in such a way as to allow the acquisition of the mastery of a technical language and of an appropriate specialist terminology. The development of communication skills, both oral and written will also be stimulated through the drafting of a work project that will be presented and discussed in the classroom during the final exam.

Learning ability. The ability to learn will be stimulated through presentations and discussions in the classroom, aimed at verifying the effective understanding of the topics covered. The ability to learn will also be stimulated by the deepening of scientific articles related to research topics of statistical process control as well as case studies typical of management engineering.

TEACHING METHODOLOGY

The course consists of lectures based on the use of slides made available to students through this portal. Classes are aimed at achieving the training objectives through the presentation of theories, models and methods as well as the discussion of case studies in manufacturing field.

ASSESSMENT TYPE

Examination: oral. The exam consists in the presentation and discussion of the case-study assignment results by project groups. Case Study assignments should be completed in teams of 1 or 2. Teams of 3 may be allowed provided a request is made in advance to the instructor.

OTHER USEFUL INFORMATION

Office Hours: By appointment; contact the instructor by email or at the end of class meetings.
1. Quality Management System (4 hours)

2. EN 9100 – Quality System for Aerospace Manufactures (5 hours)
How to identify and interpret the requirements of EN 9100. The structure of EN 9100. The sequence of a certification audit. Quality management system implementation issues.

3. Metrology principles (27 hours)

4. Statistical Process Control (SPC) (18 hours)

5. Measuring Methods and Gauges (18 hours)

6. Geometric tolerances (9 hours)

REFERENCE TEXT BOOKS
All lecture notes, data sets, solutions, and tutorials are available on the course web page.