Module Description, available in: EN

Quality Control

General Information

Number of ECTS Credits

3

Module code

TSM_QCheck

Valid for academic year

2026-27

Last modification

2022-01-05

Coordinator of the module

Yuri Lopez De Meneses (HES-SO, yuri.lopezdemeneses@he-arc.ch)

Explanations regarding the language definitions for each location:

- Instruction is given in the language specified for each location and module execution.
- Documentation is available in the language(s) listed for each location and module execution. If the documentation is in multiple languages, the percentage distributed is indicated (100% = all documentation provided).
- The examination, including both questions and answers, is provided entirely (100%) in the language(s) specified for each location and module execution. The exams are on-site.

	Lausanne			Lugano	Zurich		
Instruction	**X** E 100%						
Documentation	**X** E 100%						
Examination	**X** E 100%	**X** F 100%					

Module Category

TSM Technical scientific module

Profile Recommendations

This module is recommended for the following profiles:

	Lausanne
Profile	Mic

Lessons

2 lecture periods and 1 tutorial period per week

Entry level competences

Prerequisites, previous knowledge

Prior to joining the module, the students should be familiar with the basics of statistics (variance, standard deviation, probability density). The student should also understand the concepts of measurement uncertainty, repeatability and reproducibility. Knowledge of design/mechanical drawing reading/tolerancing

Brief course description of module objectives and content

Introduction:

- Introduction to Quality Control
- Statistics refresher: Probability distributions, sampling distributions, inference
- Overview of the most commonly used problem-solving tools: histogram, plots, Pareto chart

Problem-solving methodology:

- Quality management approaches: QRQC, A3, 8D, DMAIC, etc.
- Statistical analysis: t-tests, confidence intervals

Introduction to Statistical Process Control :

- Customer and supplier risk
- Acceptable Quality Level
- Acceptance Sampling plans
- Control charts: variable, attribute, multivariate
- Analysis of Variance (ANOVA)
- Process and Measurement System Capabilities
- Gage repeatability and reproducibility, GR&R studies

Design of experiments:

- Process optimization with designed experiments
- Factorial and fractional experimental designs
- Surface response methodology

Aims, content, methods

Learning objectives and competencies to be acquired

At the end of the module, the students should

- Understand the quality management approach
- Understand the functioning and apply the principles of statistical process control
- Be able to estimate the capability of a measuring device for the quality control
- Be able to make a conformity decision
- Be able to evaluate the resulting customer/supplier risks
- Be able to set up a sampling plan for a given Acceptable Quality Level
- Know the most commonly used SPC methods and understand their main limitations.
- Understand the different methods for problem solving
- Be able to setup and analyze a designed experiment for process improvement.
- Understand the main quality wordings.

Module content with weighting of different components

- Introduction to quality management: 10%
- Problem solving methodology: 20%
- Introduction to Statistical Process Control: 20%
- Incoming quality control: 10%
- Metrologic performance and measurement capability: 10%
- Design of Experiments: 20%
- Examples and case studies: 10%

Teaching and learning methods

- Lectures
- Exercises
- Case studies

- Self-study of SPC methodologies

Literature

D. Montgomery, "Introduction to Statistical Quality Control", 8th ed., Wiley & Sons (2020)
D. Montgomery, "Design and Analysis of Experiments", 10th ed., Wiley & Sons (2019)
Quality Trainer, http://qualitytrainer.minitab.com, Minitab
E.L. Cano, J.M. Moguerza and A. Redchuk. "Six Sigma with R. Statistical Engineering for Process Improvement", UseR ! series. Springer, (2012)

M. Pillet, « Six Sigma: Comment l'appliquer » , Ed. Eyrolles (2013)

Assessment

Additional performance assessment during the semester

The module contains additional performance assessment(s) during the semester. The achieved mark of the additional performance assessment(s) applies to both the regular and the resit exam.

Description of additional performance assessment during the semester

Evaluation mode: 33% exercises during the semester, 67% written examination

Basic principle for exams

As a rule, all standard final exams are conducted in written form. For resit exams, lecturers will communicate the exam format (written/oral) together with the exam schedule.

Standard final exam for a module and written resit exam

Kind of exam

Written exam

Duration of exam

120 minutes

Permissible aids

Aids permitted as specified below:

Permissible electronic aids

- Calculator (without telecommunication functionality)
- Open book

Other permissible aids

Pocket language dictionary for non-native English or French speakers

Exception: In case of an electronic Moodle exam, adjustments to the permissible aids may occur. Lecturers will announce the final permissible aids prior to the exam session.

Special case: Resit exam as oral exam

Kind of exam

Oral exam

Duration of exam

30 minutes

Permissible aids

Aids permitted as specified below:

Permissible electronic aids

- Calculator (without telecommunication functionality)
- Open Book

Other permissible aids

Pocket language dictionary for non-native English or French speakers