

## MM3361

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| <b>Study program / course: Mechanical Engineering</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                           |                              |                   |                     |
| <b>Type and level of study: Master academic studies</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                           |                              |                   |                     |
| <b>Course: Methods for quality improvement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                           |                              |                   |                     |
| <b>Lecturers: Lazić P. Miodrag</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                           |                              |                   |                     |
| <b>Status of course: Elective for module M<sub>6</sub>, III semester</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                           |                              |                   |                     |
| <b>Number of ECTS: 6</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                           |                              |                   |                     |
| <b>Precondition: none</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                           |                              |                   |                     |
| <b>The objective of course</b><br>Introduction, training of students to use statistical methods of quality control, quality of basic tools and methods and techniques to improve quality, as well as designing the process of improving quality.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           |                              |                   |                     |
| <b>The outcome of course</b><br>At the end of the course students are expected to be able to: apply basic SPC methods of quality control, quality basic tools, methods and techniques for improving the quality, design procedures to improve quality, determined activities and measures to improve quality, ensure a high level of capacity processes and equipment apply modern software solutions in the areas of SPC methods and quality tools, methods and techniques to improve quality, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                           |                              |                   |                     |
| <b>Syllabus</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                           |                              |                   |                     |
| <b>Theoretical study</b><br>Improving the quality. Methods of improving the requirements of QMS standards, tools and techniques of quality. Basis of statistical methods of control. Mathematical Statistics (terms, the sampling method, the probability). Defined and natural tolerance. Method of control charts (control charts, charts parameters, the statistical monitoring of the quality of material and products). Statistical receiving control (receipt of plans, the probability of admission, surgical curve ...). Basic quality tools (forms for collecting data, data stratification, hystogrms, scattering diagrams, Pareto diagrams, Ishikava diagrams, control charts). Additional quality tools. The importance of improving quality. Methods of improving the quality of (management processes, reactive and proactive improvement). Methods and techniques of quality. Method of seven steps to improve quality. Benchmarking. Methods and techniques of assessment of skills and equipment. Six sigma method. Taguchi function loss and Taguchi methodology. |                           |                              |                   |                     |
| <b>Practical Studies:</b><br>Calculating the exercise include the practical work of students on the application of statistical methods and quality tools, methods and techniques to improve quality and modern software tools in the field of SPC methods and improving quality.<br>Project tasks from the application of statistical methods and quality tools, skills assessment processes and methods to improve quality.<br>Study Research. In the study research students will be trained for basic research in the field of subjects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                           |                              |                   |                     |
| <b>Recommended reading</b><br>[1] Lazic M., Tools, methods and techniques to improve quality, the Center for quality, Faculty of Mechanical Engineering, Kragujevac, 2006.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                           |                              |                   |                     |
| The number of hours of active teaching:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                           |                              |                   | Other classes:<br>1 |
| Theory:<br>3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Practical classes:<br>1.4 | Other forms of teaching: 0.6 | Research study: 0 |                     |
| <b>Methods of teaching</b><br>Teaching is done through lectures, auditory exercises and individual work of students.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                           |                              |                   |                     |
| <b>Evaluation of knowledge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                           |                              |                   |                     |
| <b>Pre-final exam obligations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>points</b>             | <b>Final exam</b>            |                   | <b>points</b>       |
| Activities during the classes:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>10</b>                 |                              |                   |                     |
| Practical classes:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                           | Exam                         |                   | <b>30</b>           |
| Colloquiums(s) :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>30</b>                 |                              |                   |                     |
| Seminar(s) :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>30</b>                 |                              |                   |                     |