Simulation of Manufacturing Systems and Processes

Code: MK5GYFTG04G117_EN17_EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 2nd semester

Its prerequisite(s): Engineering Systems and Modelling

Further courses are built on it: Yes/<u>No</u>

Number of teaching hours/week (lecture + practice): 2+2

Topics:

The series of lectures and practices are based on the topics of production management and business strategy development. The students learn about production strategies and product life time in Tecnomatix environment. The lectures describe the properties of different production processes and the competitiveness of a production system, aggregate planning and the typology of forecasts, and the component of production and operation management in programming (C and C#). The students learn about basic programming skills and programming languages. The target of this subject is to describe company values and culture and to develop process thinking in engineer students with modern computer simulation. By the end of the semester the students will acquire and will be able to use these kinds of methods.

Literature:

Compulsory:

- William J. Stevenson: Operations management 10th ed. Bostob: McGraw-Hill/Irwin 2009. ISBN-13: 978-0073377841 ISBN-10: 0073377848
- Olhager, Jan – Person, Fredrik: Advances in Production Management System Springer-Verlager GmbH, 2007. ISBN 978-0-387-74157-4
- James P. Womack – Daniel T. Jones: Lean Thinking, Banish Waste and Create Wealth in Your Corporation. Revised an Updated, Touchstone, an Imrint of Simon & Schuster, Inc., 2003. ISBN 0-7432-4927-5
- Steffen Bangsow: Tecnomatix Plant Simulation Modeling and programming by Means of Examples ISBN 978-3-319-19502-5

Recommended:

- Clark, Kim – Takahiro, Fujimoto: Product Development Performance, Boston, Harvard Business School Press, 1991. ISBN-10: 0875842453 ISBN-13: 978-0875842455
- Nishiguchi, Toshihiro: Strategis Industrial Sourcing: The Japanese Advantage, Oxford: Oxford University Press, 1994. ISBN: 9780195071092

Schedule

1st week: Registration week	
2nd week:	**3rd week:**
Lecture: Cycle Time, Bottle Neck	**Lecture:** Basics of Quality, G8D, scrap
Practice: Basic programming knowledge	**Practice:** Basic functions of Tecnomatix environment
4th week:	**5th week:**
Lecture: Production planning in Tecnomatix	**Lecture:** Variables in production

Practice: Information flow programming in Tecnomatix	**Practice:** Modelling of transportation ways
6th week: **Lecture:** Robots and material handling equipments in Tecnomatix **Practice:** Attributes, variables, Pick and Place elements, Robot simulation, "The lock out Zone"	**7th week:** **Lecture:** Storage systems **Practice:** Buffer in Tecnomatix, Stock level calculations, Kanban, Supermarket
8th week: 1st drawing week	
9th week: **Lecture:** Organization in Tecnomatix, operation shift **Practice:** Simulation of machine operators, Chaku-Chaku cells	**10th week:** **Lecture:** Ergonomy, safety elements **Practice:** Simulation of machine operators with different efficiency
11th week: **Lecture:** Single Minute Exchange of Dies (SMED), Value Stream Map (VSM), Value Stream Design (VSD) **Practice:** SMED programming, "speed changes" in production	**12th week:** **Lecture:** Key Performance Indicator in production **Practice:** OEE calculation
13th week: **Lecture:** Icon editor, animations **Practice:** 3D plant simulation	**14th week:** **Lecture:** Fluid simulation **Practice:** Energy system analysis, statistics
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must attend the practices and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up a practice with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, to be discussed with the tutor. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence due to the lack of active participation in class. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.

B, for grade:

The course ends in a mid-semester grade (AW5). Based on the average of the grades of the drawings and the average of the test results, the mid-semester grade is calculated as an average of them: - the grade of the drawing task - the average grade of the two tests The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, students once can take a retake test of the whole semester material.