Applied Mathematics in Manufacturing Design

Code: MK5AMTTM04MX18-EN

ECTS Credit Points: 4

Evaluation: exam grade

Year, Semester: 1st year, 1st semester

Number of teaching hours/week (lecture + practice): 1+2

Topics:

The applied mathematics in manufacturing design course is covered the following topics: Business Forecasting and product lifecycle, time series forecasting, capacity analysis of machine, Models and indicators in production system, inventory design, aggregate planning. At the end of the semester the student should be have a basic understanding of design, and schedule manufacturing system.

Literature:

Compulsory:

- Wayne L. Winston: Operations research: Applications and Algorithm, 4th Edition, Brook/Cole, Canada, 2004, ISBN: 978-0534380588
- William J. Stevenson: Operations management, 13th ed., McGraw-Hill Education - New York, 2018, ISBN 978-125-9921-81-0
- Stephen N. Chapman, J. R. Tony Arnold, Ann K. Gatewood, Lloyd M. Clive: Introduction to Materials Management, 8th. global ed., Pearson New - Jersey, 2016, ISBN: 978-1-292-16235-5

Recommended:

- Steven Nahmias, Tava Lennon Olsen: Production and Operations Analysis, 7th ed., Waveland press, Inc., - Long Grove Illinois, 2015, ISBN 978-1-4786-2306-9

Schedule

1st week Registration week	
2nd week: **Lecture:** Applied mathematics in manufacturing processes: introduction to production and service operations. Components of demand. **Practice:** Knowledge survey – solved problem.	**3rd week:** **Lecture:** Competitiveness, productivity, model of manufacturing systems. **Practice:** Determination of manufacturing system's components.Productivity – problem solving.
4th week: **Lecture:** Introduction to Forecasting. Elements, steps in the forecasting process. Qualitative Forecasts. **Practice:** Forecast based on time series data.	**5th week:** **Lecture:** Monitoring forecast error. Choosing a forecasting technique, using forecast information. **Practice:** Associative forecasting technique.

6th week: **Lecture:** Capacity planning for products and services, waste in the manufacturing. **Practice:** Determination of real and theoretical capacity. Bottleneck in process – developing capacity strategies.	7th week: **Lecture:** Service level improving.Capacity planning for services. **Practice:** Developing capacity strategies for services.
8th week: 1st drawing week	
9th week: **Lecture:** Define the term of Inventory, functions of inventories. **Practice:** Inventory (stock) control.	10th week: **Lecture:** Basic Economic Order Quantity. **Practice:** Deterministic Inventory Models.
11th week: **Lecture:** Introduction to Aggregate planning. **Practice:** Techniques for Aggregate planning.	12th week: **Lecture:** MRP - Inputs of MRP, steps of MRP. **Practice:** MRP processing.
13th week: **Lecture:** Waiting Lines Management – Implications, goals characteristics. **Practice:** Queuing models.	14th week: **Lecture:** Lean operation – characteristics of lean systems. Building blocks. **Practice:** Lean tools.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice is compulsory. Students must attend lectures and may not miss more than three of them during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at lectures will be recorded by the lecturer. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed lectures must be made up for at a later date, being discussed with the tutor.

End of the semester the students must write a test for signature. The minimum requirement of the test is 60%. If the score of test is below 60% the student once can take a retake test of the whole semester material until 1st week of the exam period. If the result is 60 % or better the retake test is success.

B, for grade:

B, for a grade:

The course ends in an examination in the exam period.

The grade is given according to the following (score/grade): 0-59 % = fail (1); 60-69 % = pass (2); 70-79 % = satisfactory (3); 80-89 % = good (4); 90-100 % = excellent (5).