Prof. Dr. E. Ertuğrul Karsak
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IE 5250 Product Development & Process Management

Objective: The main objective of this course is to familiarize the student with the tools of designing and/or analyzing products and processes to reduce production cost and improve customer satisfaction. The background of fundamental methods used for this purpose will be discussed with examples.

Textbooks:
Xie, M., Tan, K-C., Goh, T.N., *Advanced QFD Applications*, ASQ Quality Press, Milwaukee, 2003.
Yang, K., El-Haik, B., *Design for Six Sigma: A Roadmap for Product Development*, McGraw-Hill, New York, 2003.

Papers:
Deshpandé, R., "Why You Aren't Buying Venezuelan Chocolate", *Harvard Business Review*, 2010.
Karsak, E.E., "Fuzzy Multiple Objective Decision Making Approach to Prioritize Design Requirements in Quality Function Deployment", *International Journal of Production Research*, Vol. 42, No. 18, 3957-3974, (2004).
Karsak, E.E., Sozer, S., Alptekin, S.E., "Product Planning in Quality Function Deployment Using a Combined Analytic Network Process and Goal Programming Approach", *Computers & Industrial Engineering*, Vol. 44, 171-190, (2003).
Sener Z., Karsak, E.E., "A fuzzy regression and optimization approach for setting target levels in software quality function deployment", *Software Quality Journal*, Vol. 18, 323-339, (2010).

Semester grades will be determined on the following approximate bases:

Midterm exam	30%
Project	20%
Final exam	50%
	100%

Week Nr.	Topic
1	- Introduction and organization - The provenance paradox
2	- Basic concepts of quality - Development of quality methods - Statistical process control - Acceptance sampling
3	- Design of experiments (DOE) - Total quality management (TQM) - Seven tools of quality - Errorproofing (poka-yoke) - Robust engineering/Taguchi method - Quality function deployment (QFD) - Theory of inventive problem solving (TRIZ) - Axiomatic design

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Week Nr.	**Topic**
4	- Six sigma fundamentals - Process - Process mapping - Value stream mapping - Process management
5	- Process performance and process capability - Process capability indices (C_p, C_{pk}, C_{pm})
6	- Design for six sigma (DFSS)
7	- QFD basics - House of quality (HOQ) - Construction of the HOQ - Recent developments in the QFD methodology
8	**Midterm Exam**
9	- Future voice of the customer - Voice of the customer with a future dimension - Use of forecasting methods - Prioritization and decision making employing QFD - Use of analytic hierarchy process (AHP) for prioritization - Integrated use of decision making tools in QFD
10	- Software quality function deployment (SQFD)
11	- Axiomatic design
12	- Fundamentals of experimental design
13	- Theory of inventive problem solving (TRIZ) - Project presentations
14	- Project presentations
15	**Final Exam (comprehensive)**