



**PROF. JITESH J THAKKAR**

Department of Industrial and Systems Engineering  
IIT Kharagpur

**TYPE OF COURSE** : New | Elective | UG/PG      **COURSE DURATION** : 12 weeks (28 Jan'19 - 19 Apr'19)  
**INTENDED AUDIENCE** : Mechanical, MBA, Industrial      **EXAM DATE** : 28 April 2019  
**PRE-REQUISITES** : Engineering and Math courses in undergraduate (B Tech) program.

**INDUSTRIES APPLICABLE TO** : Manufacturing and Service Industry

### COURSE OUTLINE :

The course on Six Sigma will focus on detailed strategic and operational issues of process improvement and variation reduction called Six Sigma, a measure of quality that strives for near perfection. It is a disciplined, data-driven approach for eliminating defects (driving towards six standard deviations between the mean and the nearest specification limit) in any process—from manufacturing to transactional and from product to service. A Six Sigma defect is anything outside of customer specifications. To be tagged Six Sigma, a process must not produce more than 3.4 defects per million opportunities.

### ABOUT INSTRUCTOR :

Dr. Jitesh J. Thakkar is an Associate Professor at the Department of Industrial and Systems Engineering, Indian Institute of Technology Kharagpur, India. He received Ph.D in Supply Chain Management from IIT Delhi, Masters in Technology in Industrial Engineering from IIT Delhi and Bachelors in Mechanical Engineering with Gold Medal from the oldest Government Engineering College Birla Vishvakarma Mahavidyalaya, Sardar Patel University, Gujarat.

### COURSE PLAN :

- Week 01** : Brief overview of the course, Quality concepts and definition, Six Sigma overview and history of continuous improvement, Six Sigma principles and focus areas, Six Sigma Applications
- Week 02** : Quality management: Basics and Key concepts, Fundamentals of Total Quality Management (TQM), Cost of quality and Six Sigma, Voice of customer, Quality Function Deployment (QFD) Six Sigma Management tools
- Week 03** : Six Sigma : Project identification, selection and definition, Six Sigma : Project Charter and Monitoring, Process characteristics and analysis, Process Mapping, Data collection
- Week 04** : Measurement systems: Fundamentals, Measurement system analysis : Gauge R & R Study, Seven QC Tools, Basic statistics, Probability theory
- Week 05** : Hypothesis testing: Fundamentals, Hypothesis testing: Two population Test, Hypothesis testing: Two population: Examples and Illustrations, Correlation and Regression analysis: Key principles, Correlation and Regression analysis: Model validation
- Week 06** : Statistical Process Control: Basics, Statistical Process Control: Control Charts for variables, Statistical Process Control: Control Charts for attributes, Statistical Process Control: Implementation issues, Statistical Process Control: Minitab application
- Week 07** : Process capability analysis: Basics and concepts, Process capability analysis: Measures and indices, Process capability analysis: Minitab application, Non-normal process capability analysis, Non-normal process capability analysis: Minitab application
- Week 08** : Failure Mode Effect Analysis (FMEA): Basics and Principles, Failure Mode Effect Analysis (FMEA): Application, Multi-vari analysis: Basics and concepts, Multi-vari analysis: Illustrative example, Multi-vari analysis: Application in Minitab
- Week 09** : ANOVA: Basics, One-way ANOVA, Two-way ANOVA, Introduction to Design of Experiment, Design of Experiment: Replication, Repetition and Blocking
- Week 10** : Randomized block design: Basics, Randomized block design: Illustrative application, Randomized block design: Application in Minitab, Factorial design: Basics, Factorial design: Illustrative application
- Week 11** : Fractional factorial design: Basics and concepts, Fractional factorial design: Key principles, Fractional factorial design: Illustrative example, Taguchi Method: Basics and concepts, Taguchi Method: Practical application
- Week 12** : Design for Six Sigma (DFSS): Key concepts, Design for Six Sigma (DFSS): DFM, DFA, DMADOV, Team Management, Six Sigma: Case study, Six Sigma: Summary of key concepts and strategies