

**Report of event of  
NPTEL Course in Six  
sigma  
Date: Jan to Apr 19**

### 3. NPTEL Course in Six sigma

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NOC | Six Sigma

EVOP, Fractional, Full and Orthogonal Experiments, Regression model building, Taguchi methods for robust design, and Six Sigma sustainability. The course is designed with a practical orientation and includes cases and industry applications of the concepts

#### Course Instructor

 Media Object

#### Prof. Jitesh J. Thakkar

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. He has 18 years of teaching, research and industry experience. He has been invited as a faculty expert by various reputed institutes such as IIT Kanpur, IIT Madras, IIM Indore, NITIE Mumbai, NIT Surat, NIT Trichy, Institute of Rural Management Anand (IRMA), Ahmedabad Management Association (AMA), BCCI Kolkata, Adani Institute of Infrastructure Management (AIIM), L&T Project Management Institute, Chennai. He has guided four PhD at IIT Kharagpur in the areas of Sustainable Supply Chain Management and Lean Manufacturing. He has supervised more than 50 M.Tech and B.Tech projects at IIT Kharagpur. He has published 53 research papers in the leading International Journals in the areas of Lean & Sustainable manufacturing, Supply Chain Management, Quality Management, Small and Medium Enterprises and Performance Measurement. The publications have appeared in the leading journals – International Journal of Production Economics, Journal of Cleaner Production, Production Planning and Control, Computers & Industrial Engineering, Expert System with Applications, International Journal of Advanced Manufacturing Technology, Resources Policy, International Journal of Quality and Reliability Management, Journal of Manufacturing Technology Management and International Journal of Productivity and Performance Measurement. He is an Editorial Board member for three journals: i) International Journal of Productivity and Performance Management, ii) International Journal of Quality and Reliability Management and iii) International Journal of Lean Six Sigma. He has trained Corporate Managers in Lean Manufacturing, Process Excellence, Six Sigma, Value Engineering, Project Management, Quality Management, Supply Chain Management and Statistical Decision Making. He has also trained Teachers in Research & Publication and Teaching & Learning  
More info (<http://iitkgp.ac.in/department/IM/faculty/im-jt>)

#### Teaching Assistant(s)



# Course Name: Six Sigma

[About Course](#)[Certificate Type](#)[Toppers list](#)[Statistics](#)

## Six Sigma-Introductory Video



### Course abstract

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. The course will provide an exposure to well-established methods of quality assurance and management and advanced statistical methods including design of experiments. Six Sigma is recognized as modern quality strategy to compete and sustain in the global markets. The philosophy of Six Sigma is built on two frameworks-DMAIC (define, measure, analyze, improve, control) and DMADV (define, measure, analyze, design, verify). This course will provide a detailed understanding on both the methodologies to the students. The course intends to cover basic concepts in quality management, TQM, Cost of quality, quality engineering and Six Sigma, review of Probability and Statistics, Test of Hypothesis. Subsequently, the course will focus on DMAIC process for process and design improvement, Acceptance Sampling, SPC (Statistical Process Control), Process Capability, Gage Reproducibility and Repeatability, Quality Function Deployment. This will be followed by advanced quality control tools like Design of Experiments, ANOVA,





**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.



## 12.SIX SIGMA

### 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.







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Approved by All India Council for Technical Education, New Delhi, Pharmacy Council of India, New Delhi,  
Directorate of Technical Education, Mumbai (MS), Permanently affiliated to  
Savitribai Phule Pune University, Pune & Approved under Section 2 (f) & 12 (B) of UGC Act, 1956

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M.S, M.N.A.M.S.  
Chairman, Business Council  
P.E.Society, Pune

2018-19

Name of Course: NPTEL Course on Six Sigma

Date: Jan-April 2019

Course Code: NA

Course Duration: 12 week

List of Students

Sr. No	Name of Students	Sign
1	DHAYBAR PRAJAKTA ANIL	
2	PALLAVI INDRAJIT KHARBAS	
3	VAIBHAV RAUT	
4	GABHALE NIKHIL KISAN	
5	AHIRE SUSHANT SHASHIKANT	
6	DISHA SANJAY KAMBLE	
7	SANTOSH KUMAR BALASAHEB KASHID	
8	SHRILEKHA CHAVAN	
9	BHAGYASHREE DATTATRAY SARANGKAR	

Dr. A. A. Phatak  
Single Point of Contact



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Pune - 411 044.



## SIX SIGMA



**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
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Directorate of Technical Education, Mumbai (MS), Permanently affiliated to  
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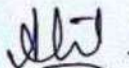
2018-19

Name of Course: NPTEL Course on Six Sigma  
Date: Jan-April 2019  
Course Code: NA

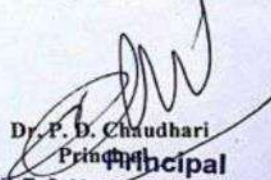
Course Duration: 12 week

List of Students

Sr. No	Name of Students	Assessment %
1	DHAYBAR PRAJAKTA ANIL	51
2	PALLAVI INDRAJIT KHARBAS	40
3	VAIBHAV RAUT	43
4	GABHALE NIKHIL KISAN	40
5	AHIRE SUSHANT SHASHIKANT	42
6	DISHA SANJAY KAMBLE	47
7	SANTOSH KUMAR BALASAHEB KASHID	40
8	SHRILEKHA CHAVAN	40
9	BHAGYASHREE DATTATRAY SARANGKAR	56

  
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## **National Programme on Technology Enhanced Learning (NPTEL)**

The National Programme on Technology Enhanced Learning (NPTEL) was initiated by seven Indian Institutes of Technology (Bombay, Delhi, Kanpur, Kharagpur, Madras, Guwahati and Roorkee) along with the Indian Institute of Science, Bangalore in 2003.

The Online Education which was started with NPTEL for Technology Courses has now been broadened to include all other disciplines such as Humanities, Social Sciences and Management in the indigenous online platform SWAYAM.

NPTEL has become a part of SWAYAM, all the NPTEL Local Chapters have been re-designated as **SWAYAM - NPTEL Local Chapter**.

### **Anytime Anywhere Learning**

Massive Open Online Courses (MOOC) is essentially an asynchronous platform and a process for teaching through pre-recorded lectures, resource video materials, lecture notes, assignments and quizzes, which are usually online and provide self-assessment in regular intervals during learning.

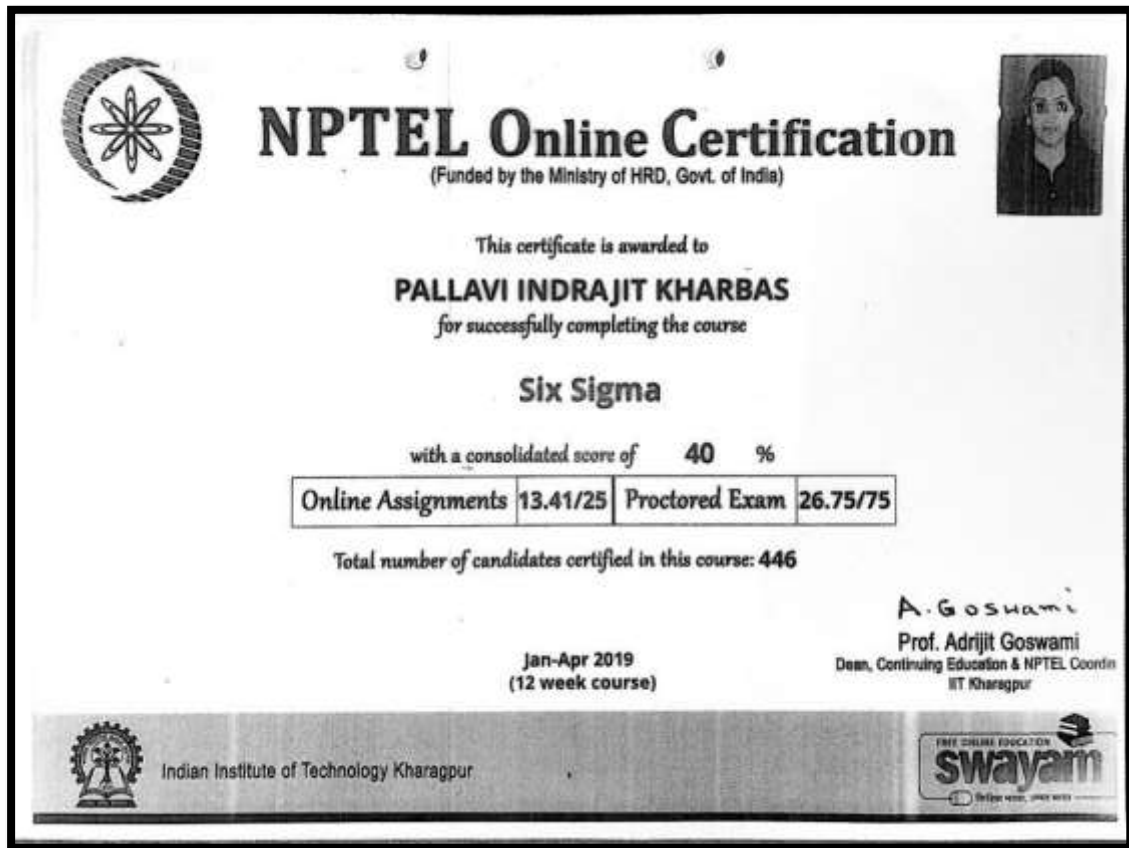
The enrolment to and learning from these courses involves no cost.

Following these online courses, an in-person, proctored certification exam is conducted across 100+ cities within India and a certificate is provided through the participating institutions and industry, when applicable.

**As it is MOOC type of course conducted by Government body open to all and attended by enrolled candidate from any where and anytime.**



3.NPTEL Course on Six sigma (Sample certificate)







# NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)



This certificate is awarded to  
**VAIBHAV RAUT**  
for successfully completing the course

**Six Sigma**

with a consolidated score of **43** %

Online Assignments	15.69/25	Proctored Exam	27.75/75
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Total number of candidates certified in this course: **446**

Jan-Apr 2019  
(12 week course)

A. Goswami  
Prof. Adrijit Goswami  
Dean, Continuing Education & NPTEL Coordn  
IIT Kharagpur



Indian Institute of Technology Kharagpur

