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What is Lean and why take the course?

Which industry type is right for me?



Certificate Course on Environmental Issues - Overview

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Course Outline

1. Bases for Environmental Analyses and Design, Part 1

- fundamental units
- material and energy balances

2. Bases for Environmental Analyses and Design, Part 2

- applications of chemistry
- mathematics of growth

3. Overview of Water Quality

- sources and characteristics of water
- water flow and obtaining water
- treating water

4. Maintaining Water Quality

- collection of wastewater
- characteristics of wastewater
- treatment of wastewater

5. Air Quality

- atmospheric fundamentals
- characteristics of air
- common air pollutants
- indoor air quality

6. Air Quality Control

- technical means to control air pollution
- legal measures to maintain air quality

7. Global Climate Change

- review of climate data
- implications for environmental engineers

8. Fate of Contaminants and Risk Analysis

- migration of contaminants
- interactions of contaminants with natural media
- elements of risk analysis

9. Waste Management, Part 1

- solid waste management; generation
- collection and transfer
- treatment; recycling/recovery
- final disposal

10. Waste Management, Part 2

- hazardous wastes
- identification and characterization
- treatment methods
- containment in disposal



Certificate Course on Stormwater Management

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[Day 1 – Introduction to Hydrology and Hydraulics](#)

Hydrology

- Rainfall
- Infiltration
- Methods for Runoff Prediction

Hydraulics

- Pipe Hydraulics
- Open Channel Hydraulics

[Day 2 – Design Considerations](#)

Level Pool Routing

Floodplain Routing

FHWA Methodology

Flood Pumping Stations

Construction Techniques and materials

[Day 3 – Introduction to Modeling Packages \(including use of StormCad\)](#)

[Day 4 – Application Workshops](#)

Design Examples

[Day 5 – Application Workshops](#)

Design Examples



Certificate Course on Solid Waste Management

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1. Introduction to Waste Management

- o categories of solid wastes
- o municipal wastes
- o industrial and agricultural wastes
- o hazardous wastes and hazardous chemicals

2. Generation of Solid Wastes

- o mining, agriculture, industry versus municipal wastes
- o generation rates for municipal wastes
- o variations in generation in time and place

3. Source Reduction

4. Collection and Transfer Operations

- o standard collection vehicles
- o specialized vehicles
- o transfer stations
- o material and energy recovery facilities

5. Recycling of Solid Wastes

- o recovery by industry
- o re-use of products
- o post-consumer recycling

6. Material Recovery Facilities

- o processing of waste streams
- o economics of recovery, storage, and sale
- o pollution problems at material recovery facilities

7. Aerobic Composting Operations

- o degradable fractions
- o windrow composting
- o vessel composting
- o storage of product
- o market considerations
- o contaminants in compost
- o disposal of residues

8. Combustion of Solid Wastes

- o conventional incinerators – components, operation, air pollution controls
- o residue management

9. Energy Recovery Combustion Systems

- o forms of recovered energy
- o water-wall incinerators
- o fluid-bed units
- o combined fuel units
- o uses for recovered energy
- o market considerations

10. Final Disposal of Residues

- o siting and planning landfills
- o sociopolitical considerations

11. Landfill Design and Construction

- o design goals – containment versus treatment
- o design for containment with liners and covers

12. Landfill Operations

- o control of input
- o monitoring of placement
- o collection of gases
- o collection and treatment of leachate
- o bioreactor landfill



Certificate Course on Hazardous Waste Management

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1. Fundamentals of Hazardous Waste Management

- definitions
- historical aspects
- classifications
- generation
- legal aspects
- process fundamentals

2. Fate and Transport of Contaminants

- release
- transport in the subsurface
- atmospheric transport and dispersion
- toxicology

3. Environmental Audits

- program planning
- pre-audit preparation
- on-site audit
- evaluation and presentation
- other types of audits

4. Pollution Prevention

- management strategies
- life cycle analyses
- volume reduction
- toxicity reduction
- recycling

5. Physicochemical Treatment Processes

- air stripping
- carbon sorption
- chemical oxidation
- membrane processes

6. Biological Treatment Processes

- microbiology
- growth kinetics
- *ex situ* systems
- *in situ* systems
- treatability

7. Stabilization and Solidification

- mechanisms
- technology
- testing
- field implementation
- design

8. Thermal Treatment Methods

- combustion
- gases and vapors
- liquid injection
- solid wastes incinerators
- air pollution control
- trial burns

9. Land Disposal of Hazardous Wastes

- landfill operations
- site selection
- liner and leachate control systems
- cover systems
- monitoring
- closure and post-closure care

10. Site Remediation

- quantitative risk assessment
- site and subsurface characterization
- remedial technologies
- evaluation and selection of remedial actions



Certificate Course on Water and Wastewater Management

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1. Water Supply

- o sources
- o quality
- o process options
- o general plant design

2. Water Treatment Processes

- o preliminary treatment
- o coagulation and flocculation
- o lime-soda softening
- o ion exchange
- o reverse osmosis and nanofiltration
- o sedimentation

3. Water Filtration and Disinfection

- o granular filtration
- o membrane filtration
- o disinfection and fluoridation

4. Managing Residuals from Water Treatment

- o characteristics of sludge
- o treatment and disposal of sludge
- o eliminating residuals by riverbank filtration systems

5. Wastewater Collection and Planning Wastewater Treatment

- o collection systems
- o combined sewers
- o flow variations
- o wastewater characteristics

6. Wastewater Treatment , Phase 1

- o reception and preliminary treatment
- o primary treatment

7. Wastewater Treatment, Phase 2

- o microbiology applied to wastewater treatment
- o suspended growth biological treatment

8. Wastewater Treatment, Phase 3

- o attached growth biological treatment
- o hybrid biological systems
- o post-secondary sedimentation
- o disinfection
- o aeration

9. Tertiary Wastewater Treatment and Disposal

- o chemical precipitation
- o carbon sorption
- o filtration
- o treatment and disposal of biosolids



Certificate Course on Green Engineering and Sustainable Design

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1. Introduction to Green Engineering and Sustainable Design
2. LEED Certification
3. Green Globes
4. Pollution Prevention
5. Energy Audits
6. Energy – Alternatives/smart meters
7. Life Cycle Assessments
8. Sustainable Construction – LEED
9. Storm Water
10. Environmental Assessment



Certificate Course:

The Top 10 Things You Can Do Now to Deliver Zero Energy and High Performance Green Buildings

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1. Defining the Zero Energy Building
2. The Case for Zero Energy Buildings
3. Fundamentals: How Buildings Use Energy
4. The State of the Art
5. Zero Energy Building Design Strategy
6. Right Sizing: Paying for Superior Performance
7. The ZEB Design Charette: An Interdisciplinary Process
8. Organizing the Building Massing & Envelope on the Site
9. Building Envelope Design: Aperture Openings in 5 Surfaces
10. Lighting Design
11. Ventilation & Air Movement
12. Mechanical Space Heating & Cooling
13. Hot Water
14. Plug & Equipment Loads
15. PV & Green Power
16. Water
17. Sustainable Sites
18. Sustainable Materials
19. Putting It All Together

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Certificate Course on Lean Tools for the Process Industry

Synopsis: This course will provide insights on the lean tools' methodology applied to the process industry. This course includes a leadership overview followed by in-depth discussion of tools and methods.

[What is Lean?](#)[Which Course for Me?](#)[Return to List of Courses](#)[Return to Course Schedule](#)

Process Industry - an industry in which raw materials are treated or prepared in a series of stages, e.g. using chemical processes. Process industries include oil refining, petrochemicals, water and sewage treatment, food processing, and pharmaceuticals.

1. Lean Vision for the Process Industry

- a) The History of Lean
- b) Lean versus Six Sigma
- c) Lean Goals
 - i. Define Demand
 - ii. Extend Demand Lead Time
 - iii. Match Supply to Demand
 - iv. Eliminate Waste
 - v. Reduce Supply Lead Time
 - vi. Reduce Total Costs
- d) Lean Culture
- e) Lean Leadership
- f) Lean Analytics

2. Lean Transformation Roadmap

3. Lean Tools Overview

- a) Demand
 - i. PQ - Product Quantity Analysis
- b) Supply
 - i. PR - Process Route Analysis
 - 1. Value Stream Mapping
 - 2. Identifying Waste

ii. PF – Process Flow

- 1. Standard Workflow Diagram
- 2. Identifying Waste

iii. 5S – Visual Management

iv. Variation Reduction

- 1. Six Sigma
- 2. Error Proofing
- 3. Identifying Waste

v. Achieving Continuous Flow

- 1. Does the process fit a continuous flow model?
- 2. Reduce Supply Lead Time

4. Lean Tools for Materials

- a) Kanban

5. Lean Tools Review

vi. Process Standards

- 1. Standard Operations Combination Chart
- 2. Process Capacity Table
- 3. Standard Operations Sheet
- 4. Identifying Waste



Certificate Course on Lean Tools for Discrete Manufacturing

Synopsis: This course will provide insights on the lean tools' methodology applied to discrete manufacturing. This course includes a leadership overview followed by in-depth discussion of tools and methods.

[What is Lean?](#)[Which Course for Me?](#)[Return to List of Courses](#)[Return to Course Schedule](#)

Discrete Manufacturing – defined by a production process in which its output is individually countable, or identifiable by serial numbers, and is measurable in distinct units rather than by weight or volume. Discrete Manufacturing includes makers of consumer electronics, computers and accessories, appliances, and other household items, as well as "big ticket" consumer and commercial goods like cars and airplanes.

Course Outline

1. Lean Vision for Discrete Manufacturing

- a) The History of Lean
- b) Lean versus Six Sigma
- c) Lean Goals
 - i. Define Demand
 - ii. Extend Demand Lead Time
 - iii. Match Supply to Demand
 - iv. Eliminate Waste
 - v. Reduce Supply Lead Time
 - vi. Reduce Total Costs
- d) Lean Culture
- e) Lean Leadership
- f) Lean Analytics

2. Lean Transformation Roadmap

3. Lean Tools Overview

- a) Demand
 - i. PQ - Product Quantity Analysis
- b) Supply
 - i. PR - Process Route Analysis
 - 1. Value Stream Mapping
 - 2. Identifying Waste

ii. PF – Process Flow

- 1. Standard Workflow Diagram
- 2. Identifying Waste

iii. 5S – Visual Management

iv. Variation Reduction

- 1. Six Sigma
- 2. Error Proofing
- 3. Identifying Waste

v. Achieving Continuous Flow

- 1. Does the process fit a continuous flow model?
- 2. Reduce Supply Lead Time

vi. Process Standards

- 1. Standard Operations Combination Chart
- 2. Process Capacity Table
- 3. Standard Operations Sheet
- 4. Identifying Waste

4. Lean Tools for Materials

- a) Kanban

5. Lean Tools Review



Certificate Course on Lean for Maintenance, Repair, and Overhaul (MRO) Operations

Synopsis: This course will provide insights on lean tools for the management and organization of MRO operations.

[What is Lean?](#)[Which Course for Me?](#)[Return to List of Courses](#)[Return to Course Schedule](#)

MRO Operations

- **Maintenance** - Activities required to conserve as nearly, and as long, as possible the original condition of an asset or resource while compensating for normal wear and tear.
- **Repair** - Restoration of a broken, damaged, or failed device, equipment, part, or property to an acceptable operating or usable condition or state.
- **Overhaul** - Process of restoring and maintaining an equipment, machine, or system in a serviceable condition. Overhaul involves (1) partial or complete disassembly of the item, (2) inspection to detect damaged, defective, or worn parts, (3) repair or replacement of such parts, and (4) reassembly, testing, and trial-run prior to returning the item to its full operating level.

1. Lean Vision for MRO Operations

- The History of Lean
- Lean versus Six Sigma
- Lean Goals
 - Define Demand
 - Extend Demand Lead Time
 - Match Supply to Demand
 - Eliminate Waste
 - Reduce Supply Lead Time
 - Reduce Total Costs
- Lean Culture
- Lean Leadership
- Lean Analytics

2. Lean Transformation Roadmap

3. Lean Tools for MRO Work

- Demand
 - P,Q - Process Quantity Analysis for Work
 - Demand Criticality
- Supply
 - PR - Process Route Analysis
 - Value Stream Mapping
 - PF – Process Flow
 - Standard Workflow Diagram

- 5S – Visual Management
- Variation Reduction
 - Six Sigma
 - Error Proofing
- Optimizing the Work Order Queue
- Process Standards
 - Standard Operations Combination Chart
 - Process Capacity Table
 - Standard Operations Sheet
 - Identifying Waste

4. Lean Tools for MRO Materials

- Demand
 - Demand Analysis
 - Master Data Management
- Supply
 - Initial Provisioning
 - MRO Inventory Control
 - Smart Storeroom
 - Supply Chain Management



Certificate Courses on Lean Enterprise Principles and Practices

What is Lean?

The term "Lean Production" was coined in 1988 by John Krafcik of MIT's International Motor Vehicle Program (IMVP). The Lean system of principles and practices is influenced heavily by Toyota Motor Company's manufacturing strategy originally designed in the 1950s as a response to the challenges of resource constraints and market requirements to produce a wide variety of products in lesser volumes while remaining competitive. Current Lean systems apply 21st century knowledge and tools to match supply to demand and prevent waste through a process of continual improvement and company-wide implementation.

Why Lean Courses?

Graduates of these courses should be able to begin applying the most commonly used Lean tools to create value and eliminate waste in their organization.

Lean Goals:

- Define demand
- Extend Demand Lead Time
- Match Supply to Demand
- Eliminate Waste
- Reduce Supply Lead Times
- Reduce Total Costs

Typical Lean Benefits:

Significant Reductions in:

- Production Cycle Time
- Business Process Cycle Time
- Inventory
- Production Floor Space/Office Area
- Operating Costs
- Cost of Poor Quality

Significant Improvements in:

- Productivity
- New Product/Service Development Lead Time

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Certificate Courses on Lean Enterprise Principles and Practices - Industrial Category Definitions

Discrete Manufacturing – defined by a production process in which output is individually countable, or identifiable by serial numbers, and is measurable in distinct units rather than by weight or volume. Discrete Manufacturing includes makers of consumer electronics, computers and accessories, appliances, and other household items, as well as "big ticket" consumer and commercial goods like cars and airplanes.

Process Industry - an industry in which raw materials are treated or prepared in a series of stages, e.g. using chemical processes. Process industries include oil refining, petrochemicals, water and sewage treatment, food processing, and pharmaceuticals.

Service Industry – An industry comprised of companies that primarily earn revenue through providing intangible products and services. Service industry companies are involved in retail, transport, distribution, food services, maintenance and repair, as well as other service-dominated businesses.

MRO Operations

- **Maintenance** - Activities required to conserve as nearly, and as long, as possible the original condition of an asset or resource while compensating for normal wear and tear.
- **Repair** - Restoration of a broken, damaged, or failed device, equipment, part, or property to an acceptable operating or usable condition or state.
- **Overhaul** - Process of restoring and maintaining an equipment, machine, or system in a serviceable condition. Overhaul involves (1) partial or complete disassembly of the item, (2) inspection to detect damaged, defective, or worn parts, (3) repair or replacement of such parts, and (4) reassembly, testing, and trial-run prior to returning the item to its full operating level.

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