Course Syllabus

Introduction to Industry 4.0

Course Code	CEUs
10-100	1.1 CEUs

Course Introduction

This 100-level class provides prerequisite learning and definitions on further classes in the Industry 4.0 and data collection/analysis space. It is meant to provide a digital language when talking about Industry 4.0.

Benefits to Taking the Course

The gap that exists with lots of Industry 4.0 conversations and training is the chasm between talking about Industry 4.0 and doing Industry 4.0. It is easy to talk about Industry 4.0. Companies find it much harder to translate the talk into action. This course would help bridge that by having hands-on activities in the data collection space of Industry 4.0.

Learning Outcomes:

- Understand the historical context and evolution of industrial revolutions leading up to the emergence of Industry 4.0
- Identify and describe key technologies that define Industry 4.0 including IoT, cyber-physical systems, big data, collaborative robots, simulation, digital twins, artificial intelligence and machine learning
- Understand the relationship and interdependence of many of these key technologies to each other
- Recognize the patterns and challenges associated with implementing Industry 4.0 within manufacturing
- Understand the cultural and change management processes needed for successful digital transformation
- Develop hands-on technical skills including setting up a Raspberry Pi with a basic sensor to collect real-world industrial data and using cloud-based analytics platforms to help process, visualize, and analyze data

Instructional Methods:

- Lecture
- Whole group discussions
- Lab Activities

Lesson Outline:

- Day 1
  - Raspberry Pi Data Collect Introduction
    - What is a sensor and how is data collected?
    - Introduction to Raspberry Pi operating system
    - Use Raspberry Pi to capture air temperature
    - Data Analysis of collected data
  - Concepts of Industrial Revolutions and Definitions of Industry 4.0
    - Defining 1st, 2nd, and 3rd Industrial Revolutions
    - The Building Blocks of Industrial Revolutions
    - People's Reactions to Technologies

- o   Overview of Industry 4.0 Technologies
  - ▪ Multiple frameworks
  - ▪ Define and Detail the Technologies Associated with Industry 4.0
- Day 2
  - o   Cultural Impact of Industry 4.0
    - ▪ Implementation: Culture and People
  - o   Raspberry Pi and Google CoLab Data Collect Advanced and Analysis
    - ▪ Utilizing Coding Languages to Process and Visualize Data
    - ▪ Activity One: Visualizing Data
    - ▪ Activity Two: Complicating Data
      - Using data collected to show the impact of noisy data, and how to clean data in scripting languages

Assessment Methods
No formal assessment will take place in this course; however, attendees will participate in informal activities such as knowledge check and Q&A sessions with the facilitators to verify that learning outcomes are being met. Assessment of successful achievement of learning outcomes must be included throughout the course to meet the ANSI/IACET 1-2013 standard for continuing education programs and for CEUs to be awarded.

Course Requirements:
Attendees are required to bring a laptop that can connect to WIFI and access the internet. A Google Account is needed to be able to log into Google CoLab website, where the data analytics and scripting lab will occur.

Pre-course Activities:
None

Texts, Books or other Resources available for purchase:
N/A

Attendee Requirements to Earn CEUs:
1. Present at least 9.5 hours of the total 10.5 hours of instructional time (90%), which does not include meals or breaks.
2. Active participation (can include asking questions, communicating with other attendees during and taking part in group activities, providing responses during whole class or group discussions).
3. Successful achievement of learning outcomes.

Who Should Attend?
- Leaders/Managers
- Process/Manufacturing Engineers
- Robotics/Automation Engineers/ OT (Operational Technology)
- IT
- Quality Control
- Those new to manufacturing/foundry business