MTL202
Industry 4.0

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1

OBJECTIVE OF THE COURSE

- Introduce the core concepts and evolution of Industry 4.0.
- Explore enabling technologies like IoT, AI, Big Data, and Cyber-Physical Systems.
- Develop skills to implement smart manufacturing and automation.
- Highlight industrial communication and digital twin applications.
- Address challenges like cybersecurity and sustainability in Industry 4.0

COURSE OUTCOMES (COs)/ EXPECTED LEARNING OUTCOMES:

At the end of a module the learner will be able to:

1.CO1: Explain the key concepts and technologies driving Industry 4.0, including IoT, AI, & CPS.
2.CO2: Analyze the application of smart manufacturing and automation in modern industrial processes.
3.CO3: Evaluate industrial communication protocols and their role in enabling connectivity and real-time decision-making.
4.CO4: Assess the impact of Industry 4.0 on productivity, sustainability, and workforce dynamics.
5.CO5: Design and propose innovative solutions for implementing Industry 4.0 technologies in industrial and supply chain operations.

2

MTL202 Industry 4.0

Introduction: Sensing & actuation, Communication, Networking; Industry 4.0: Globalisation and Emerging Issues, The Fourth Revolution, LEAN Production Systems, Smart and Connected Business Perspective, Smart Factories; Basic principles and technologies of a Smart Factory: Internet of Things (IoT) & Industrial Internet of Things (IIoT), Big Data Analytics and Software Defined Networks, Machine Learning and Data Science, Data Management with Hadoop, Security in IIoT, Fog Computing; Industrial IoT Application Domains: Factories and Assembly Line, Food Industry, Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications), Facility Management, Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries. Big Data Cyber-Physical System Value chains in manufacturing companies, Customization of products Digital Twins Cloud Computing / Cloud Manufacturing; Industrial IoT.

3

Course Code: MTL202 Credits: 3 (3-0-0)
Course Name: Industry 4.0

- Introduction: Sensing & actuation, Communication, Networking;
- Industry 4.0: Globalisation and Emerging Issues, The Fourth Revolution,
- LEAN Production Systems,
- Smart and Connected Business Perspective,
- Smart Factories; Basic principles and technologies of a Smart Factory:
- Internet of Things (IoT) & Industrial Internet of Things (IIoT),
- Big Data
- Cyber-Physical System
- Value chains in manufacturing companies,
- Customization of products
- Digital Twins
- Cloud Computing / Cloud Manufacturing; Industrial IoT

Mid Sem

Dr AKS (21 hours)

Recommended Books:

1. Industrial Internet of Things – Cyber manufacturing Systems, Eds. S. Jeschke, C. Brecher, H. Song and D.B. Rawat, Springer Series in Wireless Technology, 2017, ISBN 978-3-319-42559-7, DOI 10.1007/978-3-319-42559-7.
2. Production Systems, and Computer Integrated Manufacturing Mikell P.
3. INDUSTRY 4.0 THE INDUSTRIAL INTERNET OF THINGS Alasdair Gilchrist Apress
4. Industrial Internet of Things Cyber manufacturing Systems Home Book Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat Springer

4

Lectures

Theory Class (3 classes per week, Total ~41)

Students Registered : 16

Location & timing
Monday, Tuesday Thursday,
C/L 103 Time 10:30-11:25AM

3 lecture hours dedicated

- Work on a project for Problem solution

Web Resources: Video Course on "https://www.coursera.org/learn/industry-4-plm-value-chain-and-smart-factory"
https://nptel.ac.in/courses/108/105/108105088/ Introduction to Industry 4.0 and Industrial Internet of Things By Prof. Sudip Misra | IIT Kharagpur

Communications

- By mail:
  - Course content
  - Problem-solving
  - Project scoping
- Group Email

- On Time & Attendance

Guest lectures from domain experts : Automation, motion programming, smart manufacturing, i4.0

Examinations & Evaluation

Examination	Marks	Start Date	End Date
Mid-term-1	30	17/02/2025 (Mon)	24/02/2025 (Mon)
Project	15	Mid Apr	
Assignment	15	End of Mar	
End Semester	40	28/04/2025 (Mon)	05/05/2025 (Mon)