



ITEC 285: INDUSTRIAL NETWORKS

Proposer:**Name:**

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Effective Term:

Fall 2024

Credit Status:

Credit - Degree Applicable

Subject:

ITEC - Industry and Technology

Course Number:

285

Discipline:

| And/Or | (| Discipline |) |
|--------|---|-----------------------|---|
| | | Industrial Technology | |

Catalog Title

Industrial Networks

Catalog Description

The theory and implementation of industrial automation networks, including digital data, industrial control networks, instrumentation and process control bus and network standards.

Prerequisites

ITEC 174, ITEC 182, ITEC 184 and ITEC 283 or equivalent college courses with a minimum grade of C

Corequisites

ITEC 176, ITEC 279, and ITEC 287 must be taken concurrently

Validation**Validation Type**

Sequential - Same Discipline

Course

ITEC 174

Validation Type

Sequential - Same Discipline

Course

ITEC 182

Validation Type

Sequential - Same Discipline

Course

ITEC 184

**Validation Type**

Sequential - Same Discipline

Course

ITEC 283

Validation Type

Sequential - Same Discipline

Course

ITEC 176

Validation Type

Sequential - Same Discipline

Course

ITEC 287

Validation Type

Sequential - Same Discipline

Course

ITEC 279

Complete the Prerequisite/Corequisite Objectives and provide sound quantitative research to document the need for the requisite.

Method of Instruction:

Distance Education (Emergency Addendum)

Laboratory

Lecture and/or Discussion

Course Units/Hours:**Course Units Minimum:**

4

Lecture Hours Minimum (week)

3

Lab Hours Minimum (week)

3

Total Contact Hours Minimum (semester)

105

Total Outside Hours Minimum (semester)

105

Total Student Learning Minimum Hours (semester)

210

Repeatability:

No

Open Entry/Exit:

No

Field Trips:

Not Required

Grade Mode:

Standard Letter

TOP Code:

094500 - * Industrial Systems Technology and Maintenance

SAM Code:

C - Clearly Occupational

Course Content

Methods of Assessment:

Multiple choice tests
Problem solving assignments or activities
Problem solving quizzes or exams
Project
Short answer quizzes or exams
Skill demonstrations

Course Topics:

| Course Topics | |
|---------------|---|
| 1 | Theory and application of data transmission and industrial networking. A) The digital representation of numerical data and number formats (data types). B) Serial communication network configuration and troubleshooting using hardware and software commonly used in industry. C) Simplex vs duplex serial communication. D) Serial network connector types and cables. |
| 2 | Distributed I/O systems for programmable logic controllers. A) Installation and configuration of Ethernet remote I/O adapters and modules used with Allen-Bradley PLC platforms. B) PLC programming and project I/O configuration using Studio5000 software. |
| 3 | Communication of industrial control data using fieldbus standards such as EtherNet/IP, DeviceNet, HART, RS-232 and DH-485. A) Serial network devices and infrastructure. B) IP addressing and Ethernet network topologies. C) Industrial Ethernet switches and management features. D) Variable frequency drive control using various industrial network standards. E) Configuration of smart-transmitters to communicate over a HART network using software and hand-held communicator. |
| 4 | Wireless network gateways, access points, and remote access devices. A) Installation, configuration, and troubleshooting of wireless communication devices used in industrial applications. B) Industrial wireless networking principles. C) Network bridges, access points, and mobile connectivity on the plant floor. D) Industrial VPN router installation and configuration for remote access applications. |

Course Objectives:

| Course Objectives | |
|-------------------|---|
| 1 | Understand the common data conventions used in transmitting data used in modern automation equipment. |
| 2 | Understand how to install and configure communication settings for devices on an industrial ethernet network. |
| 3 | Understand fundamental networking concepts for data transmission and network device addressing. |

Course Outcomes:

| Course Outcomes | |
|-----------------|--|
| 1 | Students will be able to configure devices to communicate over an industrial network. |
| 2 | Students will be able to identify and explain different network standards and network topologies. |
| 3 | Students will be able to troubleshoot industrial network communications using software and hardware tools. |

Assignments:

| Assignment Type: | Details |
|------------------|---|
| Reading | Students will read a chapter from the textbook and answer chapter questions in a written homework assignment to prepare for class discussions. |
| Writing | Students will prepare a written summary of classroom discussion topics. |
| Homework | Students will complete written assignments related to discussions and activities held in lecture and lab. |
| Lab | The student will install and configure devices to communicate on an industrial network using various communication standards. PLC, distributed I/O, HMI and VFD networking over Ethernet. Smart transmitters over HART and Foundation Fieldbus. Wireless network devices. |

Textbooks or other support materials

| Resource Type: | Details |
|----------------|---|
| Books | "Lessons In Industrial Instrumentation", Tony R. Kuphaldt, 2019. Free online resource. Creative Commons Attribution 4.0 International Public License. Download link: https://www.ibiblio.org/kuphaldt/socratic/sinst/book/liii.pdf |

Equity Review:

Yes

Other Degree Attributes

Degree Applicable

Not Transferable

Not a Basic Skills Course

Additional Attachment

ITEC 285 Outcomes.pdf

ITEC285-DLA.pdf

Banner Title:

Industrial Networks

Course Control Number:

CCC000591326