Course Description

- **Instructor**
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- **Recommended prerequisite**
  - Manufacturing process I (21-418)
  - CIS (21-774)

- **Class time**
  - Sunday-Tuesday 16:30-18:00

- **Course evaluation**
  - Mid-term (25%)
  - Final exam (40%)
  - Quiz (5%)
  - Exercise (Manufacturing Lab.) (30%)
Course Description (Continued ...)

- **Mid-term session:**
  - Sunday: 6th Ordibehesht 1394, 16:30 ~ 18:30

- **Final Exam:**
  - Sunday: 21st Khordad 1394, 09:00 ~ 11:30

- **Reference:**

- **Contents:**
  - Introduction to manufacturing automation and CIM (Computer Integrated Manufacturing) (3 sessions)
  - Product lifecycle management (PLM) from automation and CIM perspective (4 sessions)
  - Computer-Aided Design (CAD) (7 sessions)
  - Computer-Aided Process Planning (CAPP) (6 sessions)
  - Computer-Aided manufacturing (CAM) (7 sessions)
Course Description (Continued..)

Contents:

- Introduction to manufacturing automation and CIM (Computer Integrated Manufacturing)  (3 sessions)
  - Introduction to types of manufacturing systems
  - Automation & CIM relation with enterprise information systems (ERP, Accounting, Inventory, marketing ...)
  - Automation and CIM development history
  - CIM hardware and software considerations (focuses on Database concept)

Course Description (Continued..)

Contents:

- Product lifecycle management (PLM) from automation and CIM perspective  (4 sessions)
  - Automation & CIM role in Product development
    - Product development cycle
    - Concurrent engineering and automation & CIM considerations
  - Automation & CIM role in PLM
    - Overview of PLM CIM software solutions
    - Components of PLM software solutions in automation & CIM
Course Description (Continued..)

* Contents:
  * Computer-Aided Design (CAD) (7 sessions)
    * Introduction
      * Graphic primitives
  * Geometric modeling
    * Geometric modeling techniques
    * Geometric data exchange

Course Description (Continued..)

* Contents:
  * Computer-Aided Process Planning (CAPP) (6 sessions)
    * Introduction
      * Process planning primitives
    * Process planning software solutions
      * Architecture considerations of Process planning software solutions
      * Information requirements of process planning software solutions
      * Process planning systems
    * CAPP integration with CAD
      * Computer-Aided Process Planning based on CAD software solutions
Course Description (Continued..)

- **Contents:**
  - Computer-Aided manufacturing (CAM) (7 sessions)
    - Introduction
    - Manufacturing automation primitives
  - Types of automation systems
    - Pneumatic automation
    - Hydraulic automation
    - Automation systems using programmable logic controllers
  - CNC machining
    - Introduction to CNC machining
    - Types of CNC machines
    - Integration of CAD/CAPP with CNC machining operations

Course Aims

- Raise interest for industrial automation systems.
- Understand industrial control systems, their purpose and structure.
- Understand the terms used in publications and standards
- Be able to analyze a plant and propose automation solutions
- Compare the solutions used in automation with other domains
- Analyze the reliability, availability and safety of a system
- Become rapidly productive in an industrial company or public utility service.
Introduction to manufacturing automation and CIM (Computer Integrated Manufacturing)

- Automation:
  - Set of all measures aiming at replacing human work through machines
    (e.g. automation is applied science)
  - The technology used for this purpose
    (e.g. this company has an automation department)

- Automation:
  - Replacement of human work through machines
    (e.g. the automatisation of the textile factory caused uproar of the workers)
  - Replacement of conscious activity by reflexes
    (e.g. drill of the sailors allows the automatisation of ship handling)

- Automation:
  - The use of computers and machines instead of people to do a job