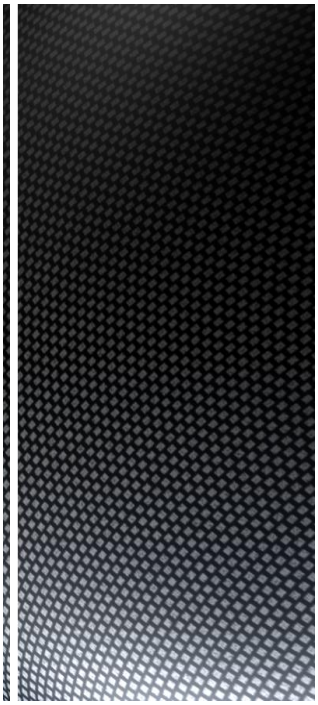


Automation (21-541)

Advanced Manufacturing Laboratory
Department of Industrial Engineering
Sharif University of Technology

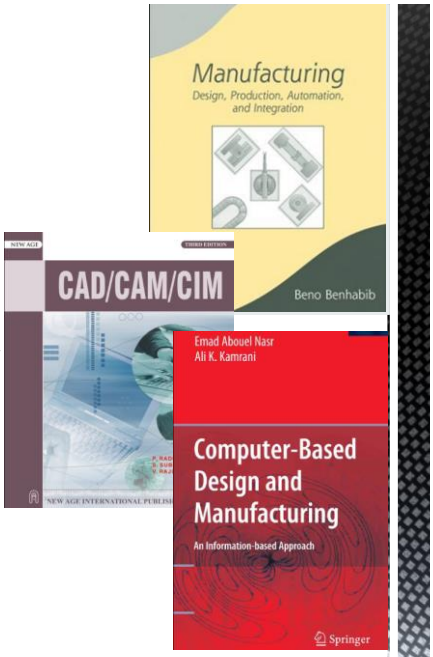
Session # 1

Course Description

- *Instructor*
  - *Omid Fatahi Valilai, Ph.D. Industrial Engineering Department, Sharif University of Technology*
  - *Email: FValilai@sharif.edu , Tel: 6616-5706*
  - *Website: Sharif.edu/~fvalilai*
- *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:*
  - *Benhabib, Beno; "Manufacturing: Design, Production, Automation, and Integration", 2003, Marcel Dekker Inc, New York*
  - *Radhakrishnan, P.; Subramanian, S.; Raju, V.; "CAD/CAM/CIM", 3rd edition, 2005, New age international (P) limited publishers, New York*
  - *Abouel Nasr, Emad; Kamrani, Ali K.; "Computer-Based Design and Manufacturing: An Information-Based Approach", 2007, Springer, New York*



Course Description *(Continued..)*

- *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*