

# Lecture Notes On Computer Aided Design Course

Course code (M1382)

Dr. Mohamed Shehata Saleh

Department of Mechanical Engineering  
Benha Faculty of Engineering  
Benha University

Lecture 01: Introduction to CAD course

October 5, 2022



## Course Description

Lecture course. Course material includes an introduction to Computer Aided Design (CAD) tools and their applications to mechanical systems design and optimization.

### Course Information

M1382. Computer Aided Design

Fall 2022

Tuesday: 9:00AM -11:25 AM

Lecture Room: 408

Starts: October 05, 2023

### Lecturer Contact Information

Lecturer:

**Mohamed Shehata Saleh**, Ph.D Email: mohamed.saleh@bhit.bu.edu.eg

Website: <https://bu.edu.eg/staff/mohamedsaleh5>

Teaching Assistant:

**Ahmed Adel**, Demonstrator

Email: ahmed.ghoneimy@bhit.bu.edu.eg

# Course Syllabus

Computer Aided Design CAD Course constants:

- Introduction to basic concepts of CAD/CAE/CAM.
- Role of computers in synthesis and analysis .
- Geometry description and feature-based design.
- Geometric modeling: surface and solid modeling.
- Curves in modeling (Bezier and Splines interpolation curves).
- Computer graphics: transformations, constraints, and windowing.
- Introduction to finite element method.
- Application of FEA to stress analysis.
- Design optimization.
- Applications of CAD.
- The laboratory uses software packages for mechanical design.

# Course Description

## Textbooks and Materials

Required: Lecture Notes and Computer Aided Engineering Design, by Anupam Saxena and Birendra Sahay ISBN-13: 978-1402025556, Springer Science & Business Media, 2007.

## Grading policy

Final Exam	90
Midterm Exam	20
Assignments	10
Section work	10
Attendance/Participation	5
Project	15
Total	<b>150</b>

**Class attendance:** Attendance will be taken once time random.

# Course Description

Each student will be required to turn in two assignments and a final team project (Every team 3-5 students).

The assignments will coincide with the tutorials covered in the lectures. Every team will work together to built Graphical User Interface **GUI** to solve selected problem includes formulating, coding and representing. Further details will be in given during the semester.

## **Please pay attention**

- Don't be late. (Only 15 minutes are allowed at maximum!)
- Mobiles are silent if not switched off.
- No eating or drinking during lectures (Except during rest time).
- Don't talk to anyone at anytime about anything! Please Raise hands up to talk.
- Please do your assignment by yourself word by word don't copy and past from internet.

## Questions



Figure: Are you still awake?

# Introduction to Computer Aided Design

Computer-aided design (CAD) is the use of computer systems to assist in the creation, modification, analysis, or optimization of a design. Used by engineers, architects, artists, and fashion designers. Difficult problems due to complexity or magnitude can be easily solved using computer.

## Benefits of Computer-Aided Design

- Increase of design Efficiency and Effectiveness.
- Simplification of the design process
- Economy of the material and labor
- Better documentation
- By using computer simulation from the early phase of the design process, many problems that arise from dynamical interaction of different sub-systems of the product can be avoided.

## Design-Manufacturing Process Old (before computer)



Figure: Engineering drawing before computer

Sketch with pencils - Engineering Drawing with pencils - Manufacturing





Figure: Engineering drawing with computer

## Design-Manufacturing Process with computer

CAD (Solid Modeling)

Engineering Drawing

Manufacturing

CAM (Computer Aided Manufacturing) / Direct Manufacturing

CAD is a starting point of everything!

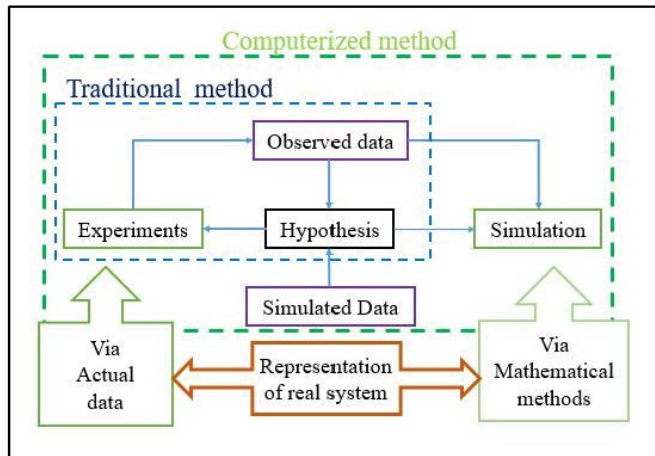


Figure: Representation of mechanical system

# Introduction to Computer Aided Design

Computer-Aided Design involves two main factors:

## System factor

- **Hardware:** Relates to physical components of the computers
- **Software:** Relates to nonphysical or programming needed to components

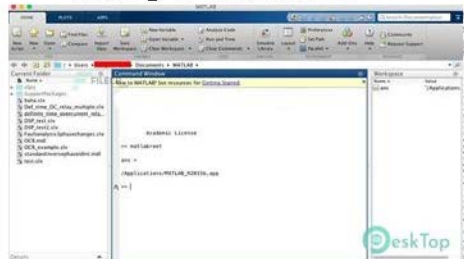
## Human factor

- **Computer-Aided Analysis:** Is the use of specialized or general purpose software to perform normal calculations in a design process.
- **Computer-Aided Visualization:** Is the heart of CAD systems, It includes the use of computer to make real-time observations (Simulations).
- **Computer-Aided synthesis:** It is concerned with selecting the most profitable solution among the available alternatives. Artificial Intelligence (AI) can be used to help the designer make decisions.

# Introduction to Computer Aided Design

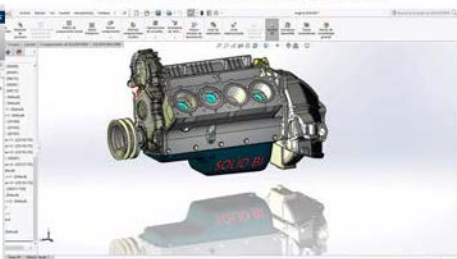
## Computer aided design software

### Coding or Subroutine



**Matlab**  
**Python**  
**MABEL**  
**JavaScript**  
**C, C+, C++**

### Commercial Softwares



**AutoCAD**  
**Solidworks**  
**ProEngineer**  
**Anslys**  
**CATIA**

# Thank You for Attention !!

## Any Questions

