

TDJ3M - Final Exam

Thursday January 27 - 8:50 PM - Room 130

Unit 1 – Introduction to Design **Comfortable Computing**

• Ergonomics

- The science that seeks to adapt work or working conditions to suit worker
- Repetitive movements and sitting at a workstation for extended periods of time can result in injuries in the form of :
 - Pain, tingling, numbness of the hands, headaches, neck pain
 - Soreness in legs, arms and back
 - Eyestrain, carpal tunnel syndrome
- These are all considered to be **Repetitive Strain** injuries

The Chair

- Backrest of chair should have a snug fit against your back
- You should be level with the monitor when seated upright in your chair

The Display

- The recommended viewing distance is to have your face about one arm length away from the monitor.
- If glare is a problem, position the screen at right angles to the light source
- Do not face a window
- Keep the screen clean
- Adjust the brightness and contrast controls
- Reflections can be eliminated by tilting the screen

The Keyboard

- With computer keyboards, all you need is a light touch while typing
- Typing too hard is bad for your joints and is also bad for the keyboard
- Your wrists should be as straight as possible and your arms should be parallel to the floor

Breaks

- Break up your computer tasks by getting up every once in a while to stretch or walk around
- A good rule of thumb is to only be in front of the computer for 50 minutes of every hour

Computer Lab Safety

- Make sure that all wiring and cables do not obstruct areas where people will be walking
- Be very careful that you don't get an electric shock when plugging and unplugging cables
- Food and beverages can damage the equipment in the lab therefore no food or beverages around the computers
- No horseplay in the computer lab

The Technological Design Process

1. **Define Problem or Challenge** - The Design Brief
2. **Conduct Research** - Developing a Framework
3. **Generate Ideas** - Concepts for Potential Solutions
4. **Choosing the Best Solution** - Evaluating
5. **Build a Prototype or Model** - Implementing a Plan
6. **Test and Evaluate Solution** - Does it work?
7. **Reflect and Report** - Reflecting on the Process and the Product

Engineering Drawings

What is an Engineering Drawing?

- an engineering drawing is a form of graphic communication
- a person who creates an engineering drawing is known as a drafter

What is the Purpose of an Engineering Drawing?

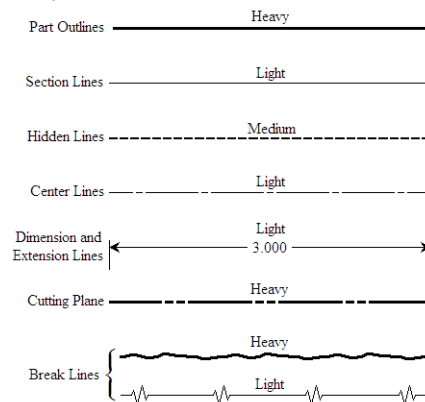
- the purpose of an engineering drawing is to accurately capture all the geometric features of a product or a component
- the end goal of an engineering drawing is to convey all the required information that will allow a manufacturer to produce that component

So What is a Blueprint then?

- engineering drawings are often referred to as "blueprints" or "blueprints"

Common features of Engineering Drawings

- **Geometry** – the shape of the object; represented as views; how the object will look when it is viewed from various standard directions, such as front, top, side, etc.
- **Dimensions** – the size of the object is captured in accepted units.
- **Tolerances** – the allowable variations for each dimension.
- **Material** – represents what the item is made of.
- **Finish** – specifies the surface quality of the item, functional or cosmetic



Orthographic Projection

- in most cases, a single view is not sufficient to show all necessary features, and several views are used
- "orthographic" comes from the Greek word for "straight writing"

Unit 2 – Computer Aided Design

Orthographic Drawing and AutoCAD

- **Study Lesson 1-3: Engineering Drawings**
 - **Orthographic Projection**
 - Three standard views – Front, Top, Right
 - Isometric view – a 3-Dimensional representation of the part with depth lines drawn at 30° angles

Study Lesson 2-1: CAD/CAM Introduction

- **CAD – Computer Aided Design**
 - **Advantages of CAD**
 - Easier creation and correction of drawings
 - Better visualization of drawings
 - Toolbox of drawing aids
 - Quick and convenient design analysis
 - Simulation and testing of designs
 - Increased accuracy
 - Improved filing
 - Better communication with manufacturing
 - **Isometric view** – a 3-Dimensional representation of the part with depth lines drawn at 30° angles

Also Know ...

- **AutoCAD LT basics:**
 1. **Review the following tutorials from the class webpage:**
 - ACAD Intro Tutorial
 - ACAD Offset Tutorial
 - ACAD Problems
 2. **Know how to do Assignment #2 from the webpage like the back of your hand!!!**
 3. **Know layers – know how they work and how to manipulate them**
 4. **Know how to start a new document and insert a standard border**
 5. **Know the following icons and how they work**
 - i. line
 - ii. offset
 - iii. mirror
 - iv. trim
 - v. extend
 - vi. delete
 - vii. layer property manager
 - viii. circle
 - ix. rectangle
 - x. move

Unit 3 – Architectural Design

Architecture

- **Types of Floor Plans**
 - **Open** – large main area leads into other rooms, outer rooms not linked
 - **Closed** – rooms are linked
 - **Rectangular** – readily adaptable to traditional and contemporary exteriors
 - **L-Shape** – allows variety in space planning through an extension from the rectangular shape
 - **H-Shape, U-Shape, T-Shape**
 - Provides more variety in room arrangement
 - Easy division of noisy and quiet areas
 - Effective traffic lanes
 - Opportunity for more efficient natural lighting and cross ventilation
 - More interesting landscaping possibilities
 - **Atrium**
 - Can be open to the sky or topped with a skylight
 - May provide a central focus for the entire home
 - **Hexagon** – expensive and difficult to build but aesthetically pleasing and unique
 - **Curved Shape**
 - expensive and difficult to build but aesthetically pleasing and unique
 - difficult to arrange furniture in rooms due to curved walls
- **Kitchen Arrangements**
 - **U-shape, L-shape, island, peninsula, corridor, one wall**
 - Know the **kitchen efficiency triangle**
- **Elements of a House Plan**
 - **House Element Symbols**
 - Door, arch opening, windows, ceiling light, switch, outlet
 - **Elevation Cladding Symbols**
 - Horizontal siding, shingles, block, board and batton, face brick
- **Stairs in House Plans**
 - **Straight run, Long L, Double L, Wide L, Narrow U, Wide U**
 - **Terminology**
 - Rise, Run, Tread, Riser, Landing, Winder Stairs
- **Roof Types**
 - **Flat, Shed**
 - Easy and cheap to construct but no storage space
 - **Clerestory**
 - Suitable for cathedral ceilings
 - **Hip, Gable**
 - Additional storage space and reasonable to construct
 - **Gambrel, Mansard**
 - Additional storage space but expensive to construct

- **Floor Plan Requirements**

- Name all major rooms
- Give length and width of each room
- Overall dimensions of house taken to outside walls
- Name each floor

- **Architectural Dimensioning**

1. The aligned system of dimensions is used
2. Dimensions are placed above the dimension line
3. Chain or string dimensioning is permitted
4. Overall dimensions of the wood framing are taken to the outside face of the walls
5. Overall building dimensions are located outside all other dimensions
6. Interior stud walls are dimensioned to the outside face of the stud
7. All dimensions locating openings in outside walls must add up to the overall dimension
8. The sequence for dimension is:
 - a) Overall dimension of building
 - b) Offsets in outer wall
 - c) Location of partitions (interior walls)
 - d) Location of openings

SoftPlan 13

1. Review the **Tutorials** on disks 1 and 2:

- Basics
- Sketching walls
- Zooming
- Dimensioning
- Editing dimensions
- Interior walls
- Interior dimensions
- Drawing openings
- Editing openings
- Redimensioning
- Bathroom layout
- Drawing stairs
- Electrical
- Creating a basement Floor joists
- Ceilings
- Adding a roof
- Generating elevations
- Detailing elevations
- Assembling Floors
- SoftView 3D

2. Know the following **icons** and **how they work**

- a) wall
- b) opening
- c) cabinet
- d) symbol
- e) stair
- f) dimension
- g) edit item
- h) delete
- i) undo
- j) redo

Unit 4 – Product Development









CAM Logo Project

- **however, you should be familiar with the processes involved in creating your sign from start to end**

Lego NXT Robots

LEGO NXT Mindstorms Programming Interface

- **Types of Blocks – know how to create and adjust the properties of the following**

			
Move Block	Sound Block	Display Block	Loop Block
			
Touch Sensor	Sound Sensor	Light Sensor	Ultrasonic Sensor

- **Know how to read and write a basic program**
- **You may be responsible for explaining how a program works**
- **You may be asked questions about how to diagnose problems**
- **Know how to calibrate the sound and light sensors**