

AutoCAD Workshop - Winter 2009 - UMass Amherst

- **Schedule:** January 19th – 23rd, 2009
 - 9:00 am – 10:30 am Break
 - 10:45 am - 12:15 pm Lunch
 - 1:15 pm - 2:45 pm Break
 - 3:00 pm – 4:30 pm Free lab time
 - 5:00 pm
- **AutoCAD** (Computer Aided Design and Drafting) is highly developed graphic software used universally among the architectural, engineering, planning, graphic communication and a variety of manufacturing professions. The level of your AutoCAD skills upon your graduations will be one of the first qualifications that you will be asked in a job interview.
- Although it had many short comings in the past, AutoCAD has been significantly improved in its long history. It also provides foundation for many other applications that are specific for various professions. It has become significantly user friendly with many additional features for shortcut applications especially in the latest two versions – 2007 and 2008 such as express tools.
- **Target** of this workshop is to enable beginner level AutoCAD users to produce basic graphic documents of a job package. **Objectives** are helping students in comprehending the fundamental logic and mathematical principles of AutoCAD; and learning the most common tools and operations.
Tools to: draw, compose, edit, plot, and archive.
Operations to: layout in paper-space; and insert raster image types and external references of AutoCAD documents.

Receive *data* → Process *info* → Produce *work* → Execute *product*

- AutoCAD is a tool, fundamentally developed to:
 - draw and compute,
 - discuss and develop design ideas,
 - plot/print; and
 - transfer and store design works and ideas.
- Conventionally construction documents' package of a job is consist of following:
 - Cover Sheet (*Location, Index*)
 - Demolition Map
 - Layout - Site Plan
 - Grading Plan (*existing and proposed contours, spot elevations*)
 - Drainage Plan
 - Construction (*hard-scaping*)
 - Planting
 - Irrigation
 - Details and Supplementary Documents (*architect's & engineer's drawings*).

- Graphic softwares operate on two basic principles independently or interactively:
Raster – works with pixels defined by colors and their locations on a digital canvas.
Vector – works with points, lines -distances- and polygons -areas- all described mathematically in a defined space.

File types of AutoCAD are: *.dwg and *.bak

- **File management:**

Create two folders both in **M** and **Z** drives in the LARP server

Z:/AutoCAD/ **yourusernameCAD**

This drive is your personal domain where you will be working during the workshop sessions.

M:/Student Projects/09W_AutoCAD/**yournameCAD**

You are expected to copy your work here at the end of every day.

- Collect a few **photographic images** of landscapes and **graphic images** of tree, shrub, north arrow, furniture, and/or building material samples. Store in a folder (**data**) in your domain.
- Start by **opening** an existing drawing or a template or **creating** a new drawing.
Creating /opening a new drawing by using template or no template

Open: M:/Instructor to Students/09W_NedCAD/Exercises/Ex1.dwg

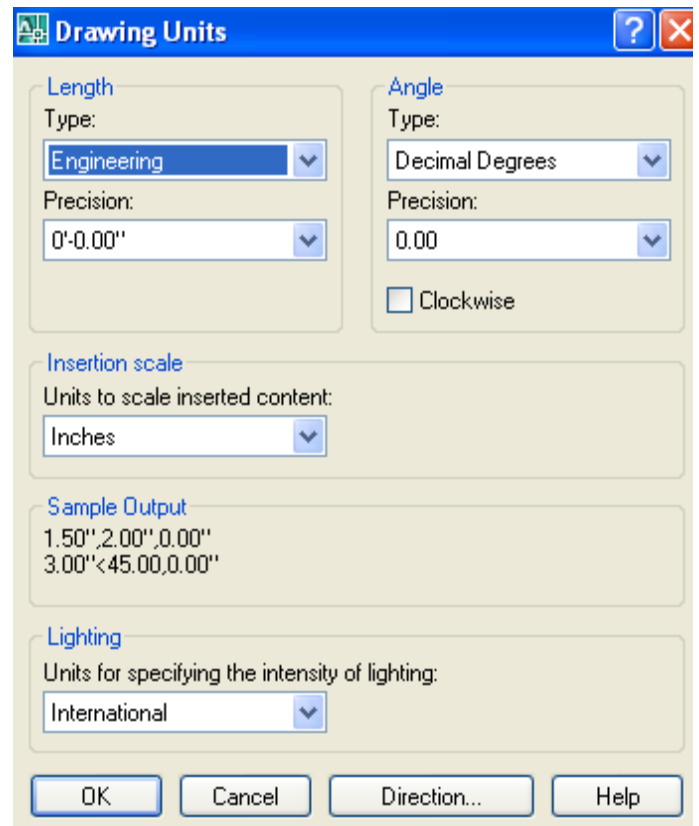
Create:Z:/CAD/yournameCAD/Ex1a.dwg

Z:/CAD/yournameCAD/Ex2a.dwg

Practice basic windows operations (**copy, paste, save as etc.**) between documents.

- You will be receiving base data generally in three different formats when starting a job:
 - *A hard copy such as conventional deed document that you will need to digitize.*
 - *Your own field survey.*
 - *Digital format of a CAD document or image type of another software.* **Purge**
- **Mathematics:** AutoCAD computes the commands in real life scale that is 1=1 .

User defines the units for his or her work preferences which eventually become critical when plotting. Units are important setting because of dimensioning and scaling which ultimately impacts applicability of the work in outer work environments.



- There are almost always three ways of entering a command into AutoCAD.
 - Pull down menu
 - Shortcut icons
 - Command line (*entering the full name of the command or just the initial letter*)

*Always check with the command line especially when AutoCAD seem noncompliant.
Let it be your second nature to hit **esc** key in constant to return the **command prompt**.*

- Function keys are used for quick access to some settings and program information. (*some of these will come handy later; do not get discouraged if you do not get much of a use out of them in the beginning, just familiarize yourself and keep them handy.*)

f 1 help **f 2** command line text window **f 3** object snap
f 7 grids **f 8** ortho **f 9** snap **f 12** dynamic inputs

Practice with **ctrl + 0** **ctrl + 1** **ctrl + 8**

- **Draw** (*using polar and cartesian coordinate systems*)
 - *Line*
 - *Circle and Arc*
 - *Polyline, Polyline arc, Spline*
 - *Polygon and Rectangle*
 - *Revision cloud for planting masses **revcloud***
- **Modify**
 - *Erase, Delete; and Undo and Redo ctrl+Z*
 - *Copy ctrl+C , Paste ctrl+V (between & within documents)*
 - *Stretch, Scale*
 - *Move, Rotate*
 - *Mirror, Offset, Array*
 - *Lengthen*
 - *Extend and Trim with fence*
 - *Break & Explode pline*
 - *Chamfer and Fillet*
 - *pedit, ddedit and chprop*
- **Basic commands and mouse functions / Enter functions = space bar = right click**
Right click functions on tabs, icons and on objects
Grips, hot grips, grip cycle
*Scroll functions – **zoom** in real time by scrolling & **pan** by clicking*
- **Zoom / View Ports / Named Viewports**
view → zoom
→ viewports → named viewports
- **Group / Block / Wblock / Insert / Explode**
- **Layers:** working with layers, layer properties, layer standards.

- **Hatch / Hatchedit**
- Dimensioning / Labeling with leader line / Callout
- **Layout: Model Space MS and Paper Space PS :**
 - mview* for drawing a polygonal viewport in paper space
 - *Paper space layout* [Page setup Manager]
 - *Layout Copy* [Right click on the tab]
 - *Display scaling* [Z → S → 1/scale factor X P]
 - *Display locking-unlocking* in Properties
 - *Display rotating* by ALIGNSPACE and MVSETUP → align → rotate *commands*
 - Copying layout between drawings: **layout / SA** (save as a template.dwt)
To insert a Layout (*right click on the tab /from template or layout / T*)
- *list* Object Properties / Distance **dist**
- **Text / Textedit / ddedit**
 - *Single line text* **dtext**
 - *Multiline text* **mtext**
- Styles
 - *Text style* **style**
 - *Dimension style* **dimstyle**
- External References: **Exref** (*Raster & DWG*)
imageframe
- Quick select
- OLE - Object Linking Embedding
 - Insert / OLE object** (excel work sheet)
 - Make sure the 'link' is checked in order to have dynamic entries*
insert → OLE object → create from file → (check) link
To modify entries access the worksheet from the CAD document
right click on the OLE document → OLE → open
or brutally double click on the OLE
- *Command line for the design center:* **adcnavigate**

Appendix

Scale Factors for AutoCAD View Ports [1' (foot) = 12" (inches)]

Architectural	Engineering	Decimal
3" = 1'-0" 1/4xp	1" = 10' 1/120xp	1 = 10 1/10xp
1-1/2" = 1'-0" 1/8xp	1" = 20' 1/240xp	1 = 20 1/20xp
1" = 1'-0" 1/12xp	1" = 30' 1/360xp	1 = 30 1/30xp
3/4" = 1'-0" 1/16xp	1" = 40' 1/480xp	1 = 40 1/40xp
1/2" = 1'-0" 1/24xp	1" = 50' 1/600xp	1 = 50 1/50xp
3/8" = 1'-0" 1/32xp	1" = 60' 1/720xp	1 = 60 1/60xp
1/4" = 1'-0" 1/48xp	1" = 70' 1/840xp	1 = 70 1/70xp
3/16" = 1'-0" 1/64xp	1" = 80' 1/960xp	1 = 80 1/80xp
1/8" = 1'-0" 1/96xp	1" = 90' 1/1080xp	1 = 90 1/90xp
3/32" = 1'-0" 1/128xp	1" = 100' 1/1200xp	1 = 100 1/100xp
1/16" = 1'-0" 1/192xp	1" = 200' 1/2400xp	1 = 1000 1/1000xp
	1" = 500' 1/6000xp	
	1" = 1000' 1/12000xp	

Line Weights for Color Based Plotting: for the default cbt file:

Pen #	Color	Line Weight in mm	Plot Color
1	Red	0.18	Black
2	Yellow	0.25	Black
3	Green	0.30	Black
4	Cyan	0.35	Black
5	Blue	0.50	Black
6	Magenta	0.80	Black
7	White/Black	2.00	Black
10	Red	4.00	Black
11	Pink		

Pen #	Color	Line Weight in mm	Plot Color
8	Gray		
9	Gray		
250	Gray		
251	Gray		
252	Gray		
253	Gray		
254	Gray		