ARCH 211 Lab 1 Notes

Commands

- Viewports, Layers, Osnaps, Ortho Mode
- Line, Circle, Rectangle
- Offset, Trim, Extend, Polar Array, Mirror
- Split, Join
- Hatch

Strategies

- Construct drawings by exploiting relationships. Look for projections, modulations, and copies.
- Make all of your edits first, then make copies.
- Handle exceptions last.
Lab Part I - Basic Rhino functions

Drawing

- There are (at least) three ways to enter most commands: icons, parser (type-in), menus

- For example: to Draw a Line, you can click the line icon, type “Line,” or go to Curves > Lines
- Pay close attention to what the command line asks you to do for each step; follow instructions!

- To finish a command, ENTER or Right-click
- Pro-Tip: Pressing ENTER with no command running restarts the last command

- To Undo; Ctrl-Z
- To Delete; click the object and press Del

Screen view controls

- Double-click the viewport label (e.g. Top) to Maximize the viewport
- Pan the screen - hold RMB
- Zoom - Scroll wheel

More complex tools

Experiment with the Polygon tool

- Some commands have different options; With Polygon, you can change the Number of Sides, for example.
- You can access these by clicking the option in the parser with the mouse or by typing the first letter of the option
- Try changing the number of sides to 3 and making a Triangle

- Practice making a bunch of objects. Draw some Lines, Rectangles, and Circles.

Selecting

Now practice selecting

- Select with a click or with a window (drag)
- Hold SHIFT and click to add objects to your selection
- Hold CTRL and click to remove objects from your selection
- (These commands work with clicking or dragging selection)

- if you pick a line that is overlapping, you get the Choose dialog box
Lab Part II – Plan Drawing

You'll be creating a measured drawing using the plan and elevation from the course page:
http://digitaldrawing.tcaup.umich.edu/downloads.html

Remember to construct your drawings – look for relationships and exploit them to save effort and draw accurately. To save time, we'll draw one quarter of the plan and make multiple copies of it.

1. **Start a new drawing in Feet mode.** Go to File > New and choose Large Object – Feet. This sets up your units and grid.

2. **Set up the viewport to use a single top view.**
   - Double-click the Top label to maximize the viewport
   - You can also type "top" into the parser

3. Now, we are going to set up a couple of basic layers.
   - A [Layer](#) is like a sheet of tracing paper. Layers help organize your drawing, which helps you to keep only the information you need in front of you.
   - To turn on Layers, right click the layer tab on the bottom (the black square where it says Default). To change their settings, right-click on the layer name.

   ![Layers - All Layers](image)

   - Set up 2 layers. Rename two layers to "plan" and "xlines". One is for our drawing and the other will be for some construction lines. You can delete the other layers, if you like.

4. **Draw a square** (centered at 0,0, 40' x 40')
• We start with the basic shape of the room.
• Make a **Centered Rectangle**. You can find the tool by holding down the mouse button on the Rectangle tool until the other commands spill out.
• Create the rectangle at the origin (0,0), give it 40’ length and width

5. Create the wall thickness using the **Offset** tool.

• Start the **Offset** tool. Change the Distance to 3’. Click the square. Then click inside the square to make the offset.

6. Before we move on, let’s **make some reference lines**, so we can locate the center of the room more easily later.

• We want to make two crossing lines drawn from the midpoints of the square. How do we know how to do that accurately? We use Object Snaps.
• To turn them on, go down to the bottom of the screen and click **Osnap**. Then check the snaps you want. It’s important to only select the ones you need. Sometimes, the more
things you can potentially snap to, the harder it can be to get the correct point you want.

- Turn on the **Mid** (midpoint) Osnaps. Check the box for Mid.
- Switch to the xlines layer (click on it in the Layers palette, until the checkmark appears next to it)
- Draw two lines from the midpoint of the rectangle, so they cross over each other at the origin
- Switch back to the plan layer. Turn off the xlines layer for now by toggling the lightbulb icon.

7. Inscribe a circle on the innermost square

- **Use a Center, Radius circle.** Use 0,0 as the center and midpoint snap to the inner rectangle
• Alternate method: **Use a 3 point Circle.** Use midpoint snaps on 3 midpoints of the inner rectangle.

8. Lay out the rest of the circle

   - **Offset** the circle 5’ to the inside
   - **Offset** the first circle 1.5’ to the outside and 3’ to the outside
   - You can save time by using ENTER to restart the command each time.

9. Make the stair treads.

   - Turn on **Ortho** (orthogonal) mode – this restricts our movements to 90 degree increments and helps us make straight lines. Press F8 or click Ortho on the bottom of the screen.
- **Draw a line** from the midpoint of the top segment of the square down past the inner circle.
- Toggle **Ortho** OFF.

- Start the **Trim** tool.
- **Trim** the ends off the line to leave only the tread.

- Choose the two circles as the cutting edges. Click the parts you want to remove from the line. Press Enter to stop the tool.
• **ArrayPolar** the line. Choose 0,0 as the center. Make 20 copies in the -90 direction.

10. Refine the poche shapes.

• **Extend** the 2nd and 2nd to last treads to the outer square;
• Start the **Extend** tool. Pick the outer square. Click the top part of the 2 lines to project them.
• Repeat the procedure to extend the middle two tread lines to the outer circle.

11. Let's **delete** some treads we don’t need.

• Pick the first two and last two treads and remove them (select and press Del)
12. Make the entryways using **Trim**.

- Start **Trim**.
- Choose the extended lines at the edge of the alcove as your cutting lines.
- Trim away all of the squares and all but the innermost circle

13. Create the frame details
• Using Osnaps and Ortho mode, create the lines as shown using the middle circle and edge of the stairs as your guide.

• **Trim** lines to finish the frame.

  ![Diagram 1](image1.png)

• Repeat for the other frame (on the bottom right).
• **Delete** the middle circle when finished.

14. Make the alcoves using **Trim**.
- Start **Trim**.
- Select all the alcove lines as cutting edges
- Trim away the exterior lines until you get an arrow shape.

**15. Create the alcove detail.**

- **Offset** the alley lines 4”
• Extend the circles (to preserve the curvature). Trim away the excess

16. To create the closed shape we need for the poche hatch pattern, we need to Split the circle curve.

• Start the Split tool.
• Choose to split the circle curve. Use the alcove lines as your cutting objects.
17. **Join** the curves from the poche into one closed shape

- Select all the lines in the shape. **Join** them together.

18. **Add the Hatch to the poche**

- Pick the closed shape you just made.
- Start the **Hatch** tool. Use pattern Hatch1 with 45 degrees and a scale of 2.0
19. To finish up the drawing, we need to make copies. There are many different ways to do this.

- You could **Mirror** the pieces.
- Turn on the xlines layer
- Select all the pieces you want to copy – Pick everything. Then deselect the ones you want to exclude. Remember, **handle exceptions last**.
- Use the xlines objects to draw your Mirror axis
- Take the two copies and **Mirror** them again to finish

- Another way that is a bit more efficient is to use another **polar array**.
- Pick all the objects you want to copy. Start **ArrayPolar**. Make 4 copies at 360 degrees.

20. Last, using Osnaps, add a **circle** to finish the plan for the stairs.
Part 2 -- Elevation

For practice, try drawing the elevation.

Project the lines from the plan in order to create the stairs. For reference, the stair tread is about 8” deep. Remember to look for relationships – save yourself time and effort by planning the drawing.