POINTFUL EDUCATION

Architectural Design I

Syllabus

» Course Overview

In Architectural Design I, students will review various concepts used in the design and architecture field. They will learn about basic drafting equipment and how to use and maintain it. They will analyze challenges and solutions within the development of design. They will also learn how to prepare drawings manually and using AutoCAD software. A substantial portion of the course will be spent on sequential processes so that students develop an understanding of creating and annotating drawings as well as how to apply standard rules regarding line types, offset objects, creating layers, and setting up a page for plotting. They will also explore three-dimensional drawing and use coordinating and navigation systems to create them.

» Course Outline by Module

Module 1	Basic Drafting	**Module 8**	Sequential Processes Part I
Module 2	Design and Drawings Part I	**Module 9**	Sequential Processes Part II
Module 3	Design and Drawings Part II	**Module 10**	Sequential Processes Part III
Module 4	Design and Drawings Part III	**Module 11**	Sequential Processes Part IV
Module 5	Dimensioning and Annotation	**Module 12**	Sequential Processes Part V
Module 6	Working Drawings	**Module 13**	Three-Dimensional Drawing Part I
Module 7	Pictorial Drawings and Surface Developments	**Module 14**	Three-Dimensional Drawing Part II

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» Module Overview and Learning Objectives

Module 1. Basic Drafting

Fundamentals are key to understanding key concepts, techniques, and strategies. Architects have an assemblage of specialized tools that they use in their work. There are also tricks of the trade and specific industry language with which you should familiarize yourself. To begin understanding the foundations of architectural, you'll focus on:

- drafting equipment
- measuring scales
- drafting techniques
- the alphabet of lines
- drafting title blocks
- lettering techniques
- geometric and trigonometric principles

***Learning Objectives*:** In this module, students will:

- Use and maintain drafting equipment, measuring scales, drafting instruments, and reproduction equipment.
- Identify and use the various drafting media and techniques and demonstrate the use of the alphabet of lines.
- Prepare title blocks and other drafting formats and use various freehand and other lettering techniques.
- Develop skill in sketching and mark making to plan, execute and construct two-dimensional images or three-dimensional models, including presentation graphics.
- Apply geometric construction techniques and solve geometric, algebraic, and trigonometric problems related to drafting.
- Demonstrate care of equipment and apply use of effective and accurate architectural and/or engineering vocabulary throughout design and drafting process.

Module 2. Design and Drawings Part I

Designers are tasked not only with the job of creating something innovative and visually appealing, but also with solving problems. You may think of unique structures and creative uses of space when you think of design. But it is much larger than that. Architects must use design principles to create balance, movement, contrast, and unity. But they must also consider things like the sustainability of their design. They have to understand environmental impacts and how to minimize those using elements of design and functionality. At their core, designers and architects are solving problems as they bring their projects to life.

***Learning Objectives*:** In this module, students will:

- Analyze challenges and identify solutions for design problems.
- Investigate the use of space, scale and environmental features to create three-dimensional form, or the illusion of depth and form.
- Analyze and apply data and measurements to solve problems and interpret drawings.
- Prepare multi-view scaled drawings.
- Select proper drawing scale, views and layout.

Module 3. Design and Drawings Part II

Preparing any type of drawing, be it a standard architectural drawing, a section drawing, or some other type, requires knowledge of a drawing's components. In this module, you'll learn many of the basic techniques to preparing various types of drawings and how each of them is used. You'll review the terminology and develop a more thorough understanding of the concepts of creating drawings and the components that are used within them. You will also watch AutoCAD demos of many of the concepts covered, so you'll be able to see it in action as well as practice what you've learned.

***Learning Objectives*:** In this module, students will:

- Prepare drawings containing horizontal and vertical surfaces.
- Prepare drawings containing circles and/or arcs.
- Prepare removed details and conventional breaks.
- Prepare drawings containing full sections and half sections.
- Prepare drawings containing offset sections.

Module 4. Design and Drawings Part III

Construction drawings are necessary for every building project. However, construction drawings can sometimes leave out details that are critical for building and design. In this module, you will learn about the various types of views of specific objects in construction drawings that can help designers, builders, engineers, and architects communicate to one another. These include additional section drawings like revolved, removed, and broken-out sections. Each of these views provides information about the geometry of an object, its size, how it fits into the overall space or structure, and even what materials are used to build it.

***Learning Objectives*:** In this module, students will:

- Prepare drawings containing revolved sections.
- Prepare drawings containing removed sections and broken-out sections.
- Prepare a sectional assembly drawing applying material symbols.
- Prepare drawings containing primary auxiliary views.
- Prepare drawings containing auxiliary views that include curved lines.

Module 5. Dimensioning and Annotation

Any drawing, whether it be for architecture, construction, manufacturing and many other fields, is not complete without dimensions. Dimensions are the quantitative (numerical) values placed along with other components of a drawing like lines, symbols, and notes. They are essential when it comes to defining the size, geometry, and other characteristics of features, processes, and components. You will learn about several types of dimensions, but architects most often used aligned dimensioning, which is a type of linear

dimensioning. Another critical part of creating drawings is adding notes and annotations. Notes are not typically part of the dimensions, but they can contain dimensional information. The objectives of general notes is to provide additional, helpful information to anyone looking at the drawing. Local notes apply to certain features in a drawing.

***Learning Objectives*:** In this module, students will:

- Prepare drawings containing linear, angular and circular standard dimensions.
- Prepare drawings using general and local notes.
- Apply basic tolerance techniques and nominal and actual dimensions.

Module 6. Working Drawings

Working drawings are an essential part of every building project. They are a set of drawings that include all of the structural information and details that are necessary to build a structure. Precision is required when creating any working drawing, whether it is an assembly drawing, detail drawing, technical drawing, or drawings relating to materials and parts specifications. Consider the amount of time it would take to build an entire house or apartment building, for example. Now imagine having to rebuild all or part of that project. Time, money, and resources would be wasted, and that's just part of the comprehensive rebuilding process. A primary reason for rebuilding is imprecise or inaccurate working drawings. Understanding the significance of the drawings is as important as understanding how to create them!

***Learning Objectives*:** In this module, students will:

- Prepare assembly drawings.
- Prepare detail drawings.
- Prepare technical drawings.
- Modify drawings to include material specifications and parts list.

Module 7. Pictorial Drawings and Surface Developments

Pictorial drawings may look simplistic. Essentially, they are. They are the way to simplify the understanding of what an object looks like from a certain perspective. While creating objects with different views is helpful, pictorial drawings are easier to understanding because of lines being true to length and the illusion of depth created by isometric drawings. In this module, you will learn how to prepare several types of pictorial drawings including isometric and oblique drawings, one- and two-point perspective drawings, graphics used for presenting drawings, geometric solid drawings (prisms, cylinders, cones, and pyramids), transition pieces, and intersecting pieces.

***Learning Objectives*:** In this module, students will:

- Prepare pictorial drawings using 2D sketching and/or CAD software
  The student will be able to:
  - Prepare isometric, oblique and other pictorial drawings.
  - Prepare one-point and two-point perspectives.
  - Prepare presentation graphics.
  - Prepare developments of prisms, cylinders, cones and pyramids.
  - Prepare developments of a transition piece.
  - Prepare drawings involving intersecting pieces.

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Module 8. Sequential Processes Part I

The commands in AutoCAD are useful and plentiful. Each command is accessed easily and makes creating detailed, precise drawings simpler and more efficient. Using these commands to add features to drawings that will help to communicate your designs enhances your concept and gives the viewer specific information about the design. When creating mechanical assemblies, for instance, there are commands to create lines, circles, arcs, splines, and any other geometric figure needed to best define the objects in your design. The accuracy and speed with which you can easily create and modify any drawing is unmatched. Additionally, tools like text and editing can improve what you've already created. Throughout the module you'll learn the ways to navigate many AutoCAD tools and features.

***Learning Objectives*:** In this module, students will:

- Demonstrate organizational skills to influence the sequential process when creating drawings.
- Construct geometric figures of lines, splines, circles, arcs, etc., to represent plans and/or mechanical assemblies.
- Create and edit text using appropriate style and size to annotate drawings.
- Create and use multi-leaders.
- Use control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- Use editing commands.
- Use viewing commands to perform zooming and panning.

Module 9. Sequential Processes Part II

As you continue learning about Sequential Processes in this module, you'll delve more deeply into how to manipulate the objects you create. You'll begin by gaining an understanding of how scale and layout are represented and how you can plot drawings accordingly. In the previous module, you discovered ways to use commands to create lines and geometric shapes. This module will uncover different types of commands that will help you find information - specifically query and inquiry commands. You will revisit dimensioning and explore how to most efficiently and precisely apply them to your drawings. Finally, you'll learn about modifying objects that you've created, whether it's moving them, stretching or reshaping them, or trimming or extending them.

***Learning Objectives*:** In this module, students will:

- Plot drawings on media using layout and scale.
- Use query commands to interrogate database for entity characteristics, distance, area, and status.
- Apply standard dimensioning rules.
- Move, stretch and offset objects.
- Create a radius between objects.
- Trim and extend objects.
- Break and join objects.

Module 10. Sequential Processes Part III

In this third module dedicated to Sequential Processes, you will continue to deep dive into AutoCAD commands that will help you create, edit, change, and remove properties and objects. You previously learned how to add dimensions. Now, you will learn how to edit them as well as how to create, manage, and import dimension styles. You'll be able to change the properties of the objects you have created and to isolate and hide objects. Finally, you will learn about selection methods in AutoCAD. As you work through the Sequential Process modules, it may help you to go back and review what you have already learned so that you can continue to build a solid foundation in AutoCAD.

***Learning Objectives*:** In this module, students will:

- Create and edit dimensions and work with dimension styles.
- Change object properties.
- Crosshatch objects.
- Apply external references.
- Isolate and hide objects.
- Use selection set methods.

Module 11. Sequential Processes Part IV

In part four of Sequential Processes, you'll continue to learn about the procedures to use when you want to create and modify elements of your drawings. The focus in this module will be using arrays to organize objects - specifically polar and rectangular arrays. You will also learn about creating reference angles to angle objects to match one another. You will spend time learning about layouts, layout viewports, and visual styles. Design is artistic and unique to the creator, but there are rules when it comes to creating balance and when using lines, shapes, form, and space. Managing layers of your drawing is a critical component to view select portions of your drawing and to create settings and rules for each layer. Finally, you will learn about the functionality of the Page Setup feature for plotting.

***Learning Objectives*:** In this module, students will:

- Use rectangular and polar arrays.
- Use rotation reference angles.
- Use elements of creativity and organizational principles to create visually coherent views and layouts.
- Create and manage layers or levels.
- Use page setup for plotting.

Module 12. Sequential Processes Part V

This is the final module on sequential processes. In this module, you're going to focus mainly on procedures that add detail to the objects and drawings you create. You will also learn how to create content that you can reuse for later drawings. You will review linetypes and discover how to create, scale, and modify them. You will also build on the foundation of your knowledge about hatching techniques you previously learned. In this module, the focus will be on creating different types of fills for objects like hatches and color as well as using gradients to create more natural looking objects. Since you're learning to create those types of fills and patterns, it's also important to learn how to edit them, so that is how you'll round out this final module on sequential processes.

***Learning Objectives*:** In this module, students will:

- Create, insert and edit reusable content such as symbols and blocks or cells.
- Use specific line types.
- Create fills and gradients.
- Edit hatch patterns and fills.

Module 13. Three-Dimensional Drawing Part I

Until now, what you have learned pertains to a two-dimensional environment. The next two modules will help you understand the three-dimensional (3D) space. You will learn about the coordinate system that is used to locate objects in a three-dimensional space. In two-dimensional spaces, you could use two coordinates. Adding a third dimension means adding another coordinate to locate an object. You will review geometric shapes that are used in both 2D and 3D modeling. Three-dimensional drawings are based on established parameters to define size, placement, and orientation of the objects. You will spend time learning about Boolean commands used to join, intersect, or subtract three-dimensional objects. The transformation of two-dimensional objects into three-dimensional objects involves techniques like rotation, revolution, and other techniques that this module will cover.

***Learning Objectives*:** In this module, students will:

- Use coordinate systems to locate objects in three dimensional space.
- Use basic geometric shapes available in two-dimensional and three-dimensional modeling software.
- Define the parameters used for determining size, placement, and orientation of a modeling object.
- Describe the Boolean modeling operations of union, subtraction, and intersection.
- Demonstrate extrusion or sweeping techniques that transform two-dimensional objects into three-dimensional objects.
- Describe the 'revolve' or 'lathe' techniques for animating a two-dimensional object and give examples of their application.
- Use scale, rotate, and move actions that comprise the transformation technique for animating a three-dimensional object.

Module 14. Three-Dimensional Drawing Part II

In the second part of Three-Dimensional Drawings, you'll learn techniques like navigation, zooming, rotating, and panning. You will further develop your understanding of working with the materials libraries that exist in AutoCAD as well as establishing techniques and processes with both two-dimensional and three-dimensional models. Since there is extensive crossover between 2D and 3D in AutoCAD, it is essential to continue practicing with what you have already learned, even as you're developing new skillsets. You may find that there are challenges that come with working in a 3D environment. As you learn about some of these challenges, you will also consider some solutions that can address these issues. To round out this module, you will investigate how space, scale and environmental features are used to create depth in 3D models as well as how technology and software are innovating trends in visual culture.

***Learning Objectives*:** In this module, students will:

- Use basic viewing navigation tools such as zoom, rotate and panning.
- Work with materials, techniques, and processes through practice and perseverance to create desired result in two-dimensional and three-dimensional models.
- Analyze challenges and identify solutions for three-dimensional design problems.
- Investigate the use of space, scale, and environmental features within a model to create three-dimensional form or the illusion of depth and form.
- Apply materials, ideas, images, and/or equipment from other content areas to generate ideas and processes for the development of three-dimensional models.