## (III) Area of Specialization Courses in Technical and Geometrical Drawing
## Teaching of Technical & Geometrical Drawing

**Course Code: EDBET371** **Credit Hours: 3 hrs.**

**COURSE DESCRIPTION:**

Teaches advanced computer-aided drafting concepts and equipment designed to develop a general understanding of components of a typical CAD system and its operation.

Technical & Geometrical Drawing course provides students with technical knowledge and skills necessary to utilize computer software to prepare drawings commonly used in the building industry. Students receive training on recent releases of CAD software as well as hands-on experience in problem solving, critical thinking and communication skills. The curriculum is designed to provide a broad-based education with an opportunity for directing one's studies toward specific employment as well as continuation of education at a four-year university.

The Drafting Technology Program is designed to give students the skills and knowledge to begin a career in the drafting field or to pursue an advanced degree. Students learn the latest AutoCAD software in a modern lab facility. Students of the program are introduced to the field of architecture where practical lab projects and a learn-by-doing environment provides a well-rounded education that will prepare you for a new career in drafting. You will be able to apply the foundational skills learned to prepare for the - AutoDesk® AutoCAD® certification - AutoCAD® Architecture certification - AutoCAD® Civil 3D® certification - Autodesk® Inventor™ certification - Revit® Architecture certification

**Learning Outcomes**

A. Increase ability to communicate with people
B. Learn to sketch and take field dimensions.
C. Learn to take data and transform it into graphic drawings.
D. Learn basic Auto Cad skills.
E. Learn basic engineering drawing formats
F. Prepare the student for future Engineering positions

**Prerequisite:** **Basic drafting skills and some application software usage.**

**Instructional Aids/Resources:**

**Software**

AutoCAD 2000 Educational Version.

**Platform:**

Windows 2000/XP
Computer Laboratory for hands-on training

1. Introduction to AutoCAD
   1.1 Windows terminology, graphical user interface elements.
   1.2. File types, opening and closing files, saving files, setting up drawing area, drawing simple lines, rubber-banding lines, and concept of objects in AutoCAD.
   1.3. Command window: understanding format of commands, cursor's modes, selecting objects (standard window, crossing window).

2. Concept of limits, units, elements of Status bar (Object snap and OTrack) and their functions, distinction between control and operational commands.
3. Elements of Draw toolbar, coordinate systems: Cartesian & Polar, drafting settings (Polar tracking), the'@' operator, sketching Contentss of objects using coordinates.
4. Different modes of entering distances: direct distance method, using Grid snap, Polar snap. Zoom commands.
5. Drawing basic shapes: rays, circles, and rectangles.
6. Drawing basic shapes: ellipses, polygons, points, arcs, and elliptical arcs.
7. Selection command (complete), types of grips: cold, warm, hot, editing of objects using grips: deleting, stretching, scaling etc.
8. Elements of Modify toolbar
   - 8.1. Concept of base point, erasing, copying, and mirroring objects.
   - 8.2. The Offset and Trim commands, drawing wall lines of a building.
   - 8.3. The Move, Extend, Lengthen, Rotate commands.
   - 8.4. Array command, application of the previous work.
   - 8.5. Stretching, Scaling, Breaking, Chamfering, and Filleting objects.
9. Layers in AutoCAD: concept and application, layer manager.
10. Line types and line weights, Properties window.
11. Hatching: use, and setting of boundary hatch command.
12. Drawing points, point mode setting. Setting out equal distances in AutoCAD.
13. Adding text to Drawings. Text settings and scaling.
14. Dimensioning drawings:
    - 14.1. Overview of dimensioning, basic terminology, dimension toolbar.
    - 14.2. Linear, aligned, and continuous dimensions.
    - 14.3. Dimensioning angles, circles, etc.
15. Dimensioning drawings: practice of different dimensioning scenarios.
    - 15.1. Settings of Dimension Styles.
    - 15.2. Saving custom dimension styles and their use in other drawings.
16. Blocks command: creating simple blocks, saving, and using.
    - 16.1. Wblocks, introduction to AutoCAD design center.
    - 16.2. Blocks and External Suggested Readings.
17. Layouts: concept, using different layouts for a drawing.
    - 17.1. Laying out a drawing in Paper space.
    - 17.2. Working with view ports: creating, deleting, saving, naming, etc. Using view ports to manage drawings.
18. Drawing complex objects.
    - **18.1.** Polyline: different modes of editing, use of polyline.
    - 18.2. Multiline: settings and editing options, Spline: editing and use.
19. Printing in AutoCAD:
    - 19.1. Introduction, options (model vs. paper space), the Print dialog box.
    - 19.2. Adjusting scales of drawings, other options.
20. Introduction to 3D AutoCAD: coordinate systems, moving UCS etc.
    - 20.1. Drawing 3D solids: predefined solid shapes, extrude command. Viewing solids in different shade modes.
    - 20.2. 3D solids editing. Drawing shells.
21. Revision and practice sessions.

**Teaching-learning Strategies**

The instructional strategies will focus on constructionist learning approach. These strategies will be diverse in line with the course contents. Therefore, these strategies will include but not limited to demonstration, cooperative learning, collaborative learning, teacher and student-led discussion, individual and group presentations, reflective practices and classroom activities.

**Assessment and Examinations**

The students will be assessed according to the following criteria.

| Examination | Marks Distribution |
|---|---|
| Sessional work | 25 % |
| Mid Semester | 35% |
| Final Semester | 40% |

## Suggested Readings


AIOU (2006). *Population Education Course* MA EPM 584. Islamabad: AIOU.

Govt. of Pakistan. (2003). *Education for All.* Islamabad: Ministry of Education Curriculum Wing.

Haltak. J. (1990). *Investing in the Future, Setting Educational Priorities in the Developing World.* Paris, UNESCO: McGraw-Hill Kogakusha.

Indira. M. (2003). *Changing Demands of Technical and Vocational Education.* New Delhi: Annual Publication.

Ministry of Education, Curriculum Wing (2010). *13 Modules on Various Core Themes of Population Education*, Islamabad:_____.

Rao. V. K. (2004). *Population Education.* New Delhi: Efficient Printer.

Newby. T. M., Lehman, J., Russell, J., Stepich, D. A. (2000). *Instructional Technology for Teaching and Learning: Designing Instruction, Integrating Computers, and Using Media (2nd ed).* Upper Saddle River, N.J.: Prentice Hall.

UNESCO. (2004). *Quality of education in Pakistan.* Islamabad: UNESCO.

Warren. S. E. (2016). A *Manual of Elementary Geometrical Drawing Involving Three Dimensions:* In Five Divisions, DIV. I. Elementary Projections DIV. II. Details of in Shades and Shadows DIV. IV. Isometrica,

Winter. S. H. (2010). *Elementary Geometrical Drawing. Part II - The Practical Geometry Of Planes And Solids: Comprising the Elements of Descriptive Geometry, Etc. New Ed. 1880.*_____: Nabu Press.