

University of Engineering and Technology, Taxila
Department of Civil Engineering

Course Title: Computer Applications (HU-210)
Theory + Lab

Pre-requisite(s): None

Credit Hours: 2 + 2

Contact Hours: 2 + 6

Text/Reference Book(s):

1. AutoCAD 2014: A Problem Solving Approach.
2. Step by Step Microsoft Excel 2013 by Curtis D. Frye
3. Introduction To MATLAB® For Engineers, Third Edition by William J. Palm III

Catalog Data:

Introduction; Civil engineering drawings; AUTOCAD and GUI; MS OFFICE; Functions and logics; MATLAB and engineering application

Course Objectives:

To acquaint the students with engineering applied nature computer softwares and to enhance the ability of students in computer skills with focus on drafting of architectural and structural drawings using AUTOCAD and general engineering problem solutions using MATLAB.

Course Learning Outcomes:

At the end of this course, the student will:

- CLO:1** Gain the ability to apply AUTOCAD software for simpler to complex drafting of engineering drawings.
- CLO:2** Have the ability to apply MS OFFICE tools in engineering as well as daily life problems.
- CLO:3** Have the ability to apply MATLAB in solving engineering problems.

Course Contents:

Week	Theory	Lab Work
01	<u>AUTOCAD PART-I</u> <ol style="list-style-type: none">1. Introduction to software GUI (Graphical User Interface)2. Working with Command Area3. Commands: Units, Limits & Zoom4. Use of Line Command5. Introduction to different Modes (Like; Ortho, Object Snap etc)6. Offset Command and Trim Command7. Different ways to select object (i.e., right to left or left to right)	Installation of AutoCAD. Practice of basic commands and creation of different shapes
02	<ol style="list-style-type: none">1. Extend Command2. Difference between deleting a line and trimming a line3. Copy and Multiple Copy Command4. Move Command5. Mirror Command6. Draw Arc and Circle7. Draw line at specific angle using Rotate Command8. Tools > Options – For changing of Cross Hair size, pick box size, display color etc.	Draw Plan of given scheme on AutoCAD using basic commands
03	<ol style="list-style-type: none">1. Different Types of Lines (Add New Line etc.)2. Write Text on Screen and set its size and font size3. Hatch Command4. Dimensioning and its Modifications	Draw Elevations of the provided views (Double Door, Single door and Window)

Assignment 01: Draw Plan, Elevation & Section of any single story house without stair and mummy.

Submission Date: **Week 05**

Nature of Assignment: Soft Form and Individual

- 04
1. Working in Layers
 2. Introduction to different options available in **Layer**
 3. Fillet Command
 4. How to set drawing for Printing on A3
- Draw Excavation Plan of Assignment 01.

Assignment 02: Draw a unique Plan, Elevation & Section of double story house on AutoCAD

Submission Date: **Week 7**

Nature of Assignment: Hard Form on A3 page and individual

- 05
1. Break Command
 2. Chamfer Command
 3. Match Command
 4. Poly Line Command
 5. Area Command
- QUIZ 01**
(Including Lecture 1-4)

MS EXCEL PART:

1. Introduction to GUI of MS Excel
2. Use of basic formulas for summation and subtraction etc.

- 06
1. Scale Command
 2. Divide Command
 3. Donut Command
 4. Region Command
 5. Stretch Command
 6. Difference between scale and stretch command
 7. Oops Command
- Practice of AutoCAD commands for given sketch.
- Creation of Small Spread Sheet for calculation of Excavation (Earth Work Calculation)

MS EXCEL PART:

1. Formatting in Excel

- 07
1. Array Command
- Practice of Array Command in AutoCAD and creation of different shapes

MS EXCEL PART:

1. Use of IF Command/Function
- Creation of Small Spread Sheet for calculation of Brick work, and Lean (1:4:8)

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| 08 | <u>MS EXCEL PART:</u>
1. Create basic charts etc. | Practice of basic charts for the given data |
| 09 | <u>AUTOCAD PART-II:</u>
1. Extrude Command
2. Boolean Operations:
a. Subtract Command
b. Union Command
3. -CH Function for creation of openings
4. View, visual style & orbit toolbar | Practice of 3D modeling of house in AutoCAD |
| 10 | 1. Extrude along the Path
2. Transformation of axis and use of UCS tools
3. Boundary Conditions for creating reegions | Practice of creating 3D lid of pressure cooker (specifically using UCS tools and Extrude command) |

Assignment 03: 3D modeling of hand pump

Submission Date: **Week 12**

Nature of Assignment: Soft form and individual

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| 11 | <u>MS EXCEL PART:</u>
Spread Sheet for Detailed Estimation | QUIZ 02
(Including Lecture 9-10) |
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Term Project: 3D modeling of an urban city

Submission Date: **Week 16**

Nature of Task: Soft form and group

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| 12 | <u>MATLAB:</u>
1. Default MATLAB Desktop
2. Entering command and expression
3. Use of basic MATH Operators
4. Array Index
5. Polynomial Roots
6. Linear Algebraic Equations
7. Comment Symbol | Practicing of commands;
Writing Script File or M-File
Different Input/output commands |
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Grading Policy:

Sr.	Grading	% of Total Marks
Theory		
1	Assignments	10
2	Quizzes (Announced + Surprised)	10
3	Mid Term Examination	20
4	Final Examination	40
Lab		
1	Term Project/Assignment	05
2	Quizzes/Mid Term Exam	05
3	Final Oral Examination	10
Total		100 %

Student Learning Outcomes:

Students who pass the course will be able to apply computer software tools in solving the engineering problems.

Course Professional Outcome/Industrial Usage:

Students appreciate the need for knowing software tools used in civil and general engineering. They will be able to know various softwares to be considered for successful completion of practicable engineering program.

PLOs	CLOs		
	CLO-1 (Applying drafting software)	CLO-2 (Applying software for estimation)	CLO-3 (Using software for engineering problems)
PLO 1 (Engineering Knowledge)		✓	
PLO 2 (Problem Analysis)			✓
PLO 3 (Design/Development of Solutions)			
PLO 4 (Investigation)			
PLO 5 (Modern Tool Usage)	✓	✓	✓
PLO 6 (The Engineer and Society)			
PLO 7 (Environment and Sustainability)			
PLO 8 (Ethics)			
PLO 9 (Individual and Team work)	✓		
PLO 10 (Communication)			
PLO 11 (Project Management)			
PLO 12 (Lifelong Learning)			

Assessment Modules		CLOs		
		CLO 1	CLO 2	CLO 3
Assignments	(10%)	✓		
Quizzes	(10%)	✓	✓	✓
Lab	(20%)	✓	✓	✓
Midterm Exam	(20%)	✓	✓	
Final Exam	(40%)	✓	✓	✓

LEVEL OF COURSE COVERAGE (THEORY)

		Contact Hour / Week
Topics covered in the course and level of coverage:	Introduction to AutoCAD and its GUI, learning of basic commands from draw tool bar	2 Hours
	Different commands from draw and modify toolbar	2 Hours
	Dimensioning, hatching and other drafting tools	2 Hours
	Concept of layers and fillet command and its use	2 Hours
	Concept of polyline command etc.	2 Hours
	Different editing commands in AutoCAD and formatting in MS Excel	2 Hours
	Array command in AutoCAD and IF function in MS Excel	2 Hours
	Creation of various basic charts in MS Excel	2 Hours
	Introduction to AutoCAD 3D and use of basic commands	2 Hours
	Transformation of axis using UCS and boundary conditions	2 Hours
	Spread sheet formation for material estimation of construction project using MS Excel	2 Hours
	Introduction to MATLAB and basic fundamental rules of mathematics	2 Hours
	Working with different mathematics operators	2 Hours
	Using of IF & ELSE function	2 Hours
	Different plots in MATLAB	2 Hours
Special commands in AutoCAD, Excel/Word and MATLAB	2 Hours	
Total Contact Hours / Semester =		32 Hours

MAPPING OF COURSE CONTENTS AND OUTCOMES

Program learning outcomes and how they are covered by specific course outcomes:	Detailed Contents	CLO	PLO
	Introduction to software GUI (Graphical User Interface); Working with Command Area; Commands: Units, Limits & Zoom; Use of Line Command; Introduction to different Modes (Like Ortho, Object Snap etc.); Offset Command and Trim Command; Different ways to select object (i.e., right to left or left to right)	CLO-1	PLO-5
	Extend Command; Difference between deleting a line and trimming a line; Copy and Multiple Copy Command; Move Command; Mirror Command Draw Arc and Circle; Draw line at specific angle using Rotate Command; Tools > Options – For changing of Cross Hair size, pick box size, display color etc.	CLO-1	PLO-5
	Different Types of Lines (Add New Line etc); Write Text on Screen and set its size and font size; Hatch Command; Dimensioning and its Modifications	CLO-1	PLO-5
	Working in Layers; Introduction to different options available in Layer; Fillet Command; How to set drawing for Printing on A3.	CLO-1	PLO-5
	Break Command; Chamfer Command; Match Command; Poly Line Command; Area Command; Introduction to GUI of MS Excel; Use of basic formulas for summation and subtraction etc.	CLO-1 CLO-2	PLO-5
	Scale Command; Divide Command; Donut Command; Region Command; Stretch Command; Difference between scale and stretch command; Oops Command; Formatting in Excel.	CLO-1 CLO-2	PLO-5
	Array Command; Use of IF Command/Function	CLO-1 CLO-2	PLO-5
	Create basic charts etc.	CLO-2	PLO-5
	Extrude Command; Boolean Operations (Subtract Command, Union Command etc); -CH Function for creation of openings; View, visual style & orbit toolbar	CLO-1	PLO-5
	Extrude along the Path; Transformation of axis and use of UCS tools; Boundary Conditions for creating regions; Modeling of giant urban area as group task	CLO-1	PLO-5 PLO-9
	Spread Sheet for Detailed Estimation	CLO-2	PLO-1
	Default MATLAB Desktop; Entering command and expression; Use of basic MATH Operators; Array Index; Polynomial Roots; Linear Algebraic Equations; Comment Symbol; Writing Script File or M-File; Different Input/output commands	CLO-3	PLO-2 PLO-5

	Creating matrices and vectors; Array Addressing; Additional Array functions; Element-by-Element Operators; Matrix-Matrix Multiplication; EYE command and ZEROS command; Polynomial Multiplication and Division	CLO-3	PLO-2 PLO-5
	Common mathematical functions; Operations with complex numbers; Expressing function argument; IF & ELSE Structure; TABLE command	CLO-3	PLO-2 PLO-5
	Nomenclature for typical xy-plot; Requirements for correct plots; Grid and Axis Command ; Subplot command; Labeling curves and data; Specialized plot commands; Interactive plotting in MATLAB; Three dimensional line plots and Surface plots	CLO-3	PLO-2 PLO-5
	Special commands of AUTOCAD, EXCEL & MATLAB	CLO-1 CLO-2 CLO-3	PLO-5