# Module (Course Syllabus) Catalogue

# 2022-2023

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|---|---|---|
| College/ Institute | Erbil Technology College | |
| Department | Survey and Road Construction Department | |
| Module Name | CAD Techniques | |
| Module Code | CAD404 | |
| Degree | Technical Diploma [*] Bachelor [ ]<br>High Diploma [ ] Master [ ] PhD [ ] | |
| Semester | 4th | |
| Qualification | Master Degree | |
| Scientific Title | Assistant Lecturer | |
| ECTS (Credits) | 5 | |
| Module type | Prerequisite [ ] Core [*] Assist. [ ] | |
| Weekly hours | 3 hours/week | |
| Weekly hours (Theory) | ( )hr Class | ( )Total hrs Workload |
| Weekly hours (Practical) | ( 3 )hr Class | ( 135 )Total hrs Workload |
| Number of Weeks | 16 | |
| Lecturer (Theory) | Glpa Ali Mahmood | |
| E-Mail & Mobile NO. | glpa.mahmood@epu.edu.iq | |
| Lecturer (Practical) | --- | |
| E-Mail & Mobile NO. | | |
| Websites | | |

# Course Book

<table>
<tr><td>Course Description</td><td colspan="4">AutoCAD®Civil3D<br>The AutoCAD Civil 3D Fundamentals class is designed for Civil Engineers and Surveyors who want to take advantage of the AutoCAD® Civil 3D® software's interactive, dynamic design functionality. The AutoCAD Civil 3D software permits the rapid development of alternatives through its model-based design tools. You will learn techniques enabling you to organize project data, work with points, create and analyse surfaces, model road corridors, create parcel layouts, perform grading and volume calculation tasks, and layout pipe networks.</td></tr>
<tr><td>Course objectives</td><td colspan="4">Using AutoCAD Civil 3D, infrastructure professionals can better understand project performance, maintain more consistent data and processes, and respond faster to change.<br>The software helps civil engineers, drafters, designers, and technicians better understand project performance and intent, improve and maintain more consistent data and processes, and respond faster to design changes, all within a familiar AutoCAD environment.</td></tr>
<tr><td>Student's obligation</td><td colspan="4">Attendance: Attendance is important so that discussions and sharing ideas are promoted. A student will lose points for unexcused absence. Absences for illness, family emergencies, or other unavoidable reasons may be excused by the instructor.<br>Homework Policies: Students requested to match deadlines for submitting their homework's and reports and assignments given by the lecturer.<br>Late homework will have the following penalties: up to 1 day late: 20% of the total points; up to 1 week late: 50% of the total points; after 1 week: no credit.<br>Quiz: Students should be prepared for sudden quizzes.</td></tr>
<tr><td>Required Learning Materials</td><td colspan="4">Notes and printed handouts are given to the students. The lectures will be given with the aid of presenting word, pdf, PowerPoint presentations, and clarifying points with the aid of white board whenever necessary. Teaching videos may also form part of the lectures.</td></tr>
<tr><td rowspan="5">Evaluation</td><td colspan="2">Task</td><td>Weight (Marks)</td><td>Due Week</td><td>Relevant Learning Outcome</td></tr>
<tr><td colspan="2">Paper Review</td><td>---</td><td>Depending on activity given</td><td>Each activity will give storm braining and additional knowledge to the subject</td></tr>
<tr><td rowspan="3">Assignme</td><td>Homework</td><td>10%</td><td></td><td></td></tr>
<tr><td>Class Activity</td><td>2%</td><td></td><td></td></tr>
<tr><td>Report</td><td></td><td></td><td></td></tr>
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|---|---|---|---|---|---|
| | | Seminar | 6% | | |
| | | Essay | | | |
| | | Project | 10% | | |
| | Quiz | | 8% | | |
| | Lab. | | | | |
| | Midterm Exam | | 24% | | |
| | Final Exam | | 40% | | |
| | Total | | 100% | | |

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| **Specific learning outcome:** | By the end of this course, each student will demonstrate the skills shown in the following list. These specific learning objectives are closely related to the major topics identified in the course outline.<br>**AutoCAD Civil 3D**<br>1. Learn the AutoCAD Civil 3D user interface.<br>2. Create and edit parcels and print parcel reports.<br>3. Create points and point groups and work with survey figures.<br>4. Create, edit, view, and analyse surfaces.<br>5. Create and edit alignments.<br>6. Create data shortcuts.<br>7. Create sites, profiles, and cross-sections.<br>8. Create assemblies, corridors, and intersections |
| **Course References:** | Useful references:<br>American Association of State Highway and Transportation Officials, (2011). A Policy on Geometric Design of Highways and Streets, AASHTO. |

| **Course topics (Theory)** | **Week #** | **Learning Outcome** |
|---|---|---|
| **1) Introduction**<br>• Course Catalogue<br>• Course Objectives<br>• AutoCAD<br>• **Civil 3D Interface**<br>• Introduction.<br>• Ribbon.<br>• Quick Access Toolbar.<br>• Drawing Area.<br>• Command Line.<br>• Status Bar. | 1 | |
| **2) Surveying**.<br>• Points Overview | 2&3 | |

| | | |
|---|---|---|
| • Point Settings<br>• Creating Points<br>• Points from coordinates<br>• Importing Survey Data<br>• Creating points from a Surface<br>• Creating points per segment: divide object<br>• Creating points by Intervals: measure object<br>• Creating Point Groups<br>• Reviewing and Editing Points<br>• Elevations from Surface<br>• Exporting points | | |
| **3) Surfaces.**<br>• Introduction.<br>• Creating and defining surfaces by point groups.<br>• Defining a surface from breaklines<br>• Defining a surface Boundary<br>• Defining a surface by Edits<br>• Defining a surface from Contours<br>• Surface Properties<br>• Volume Surfaces (Cut and Fill)<br>• Surface Styles | 4,5&6 | |
| **4) Alignments.**<br>• Roadway Design Overview.<br>• Introduction to Alignments.<br>• Creating Alignments from Objects.<br>• Alignments Layout Tools<br>• Creating and Modifying Alignments<br>• Alignment Properties<br>• Labels and Tables | 7&8 | |
| **5) Profiles.**<br>• Introduction to Profiles.<br>• Profile from Surface.<br>• Profile by Layout.<br>• Profile Styles and Labels. | 9 & 10 | |
| **6) Corridors.**<br>• Introduction.<br>• Cross-section or Assembly.<br>• Corridor Creation.<br>• Corridor Baselines.<br>• Corridor Frequencies<br>• Corridor targets<br>• Splitting a corridor<br>• Creating an Intersection and corridor Surface<br>• Creating a cul-de-sac | 11 & 12 | |

## Questions Example Design

**Sample of examination paper and ideal solution is attached at the end of the course module**

## Extra notes:

## External Evaluator

I hereby confirm that all syllabuses given in the attached course modules is sufficient to cover required subjects, areas and titles needed for students regarding the study year.

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| **Ministry of Higher Education & Scientific Research**<br><br>**Erbil Polytechnic University** |  | **Class:**<br>**Subject: AutoCAD Civil 3D**<br>**Group 1** |

**2018 - 2019**

- By using AutoCAD Civil3D software prepare these following:

1. Import points data, use points text file "60_Hectare_Kirkuk" and PENZD format.
2. Create topographic map represented contour lines use "contours 2m and 10m" style.
3. Create and design the Horizontal Alignment of a highway project with the following information:
    a. Alignment PI's stations located on the points No.: (1482, 1294, 1079, 523, 371).
    b. Use AASHTO 2001 or 2011 Design Standards with the following design criteria: Design Speed (90 km/h), $e_{max}$ (6%), Two-lane Transition Length Table, and Crowned Roadway Attainment Method.
    c. The alignment must start at point No. ( 1482 )
    d. After the design, fill down these following horizontal alignment design results:

**1. <u>Horizontal Curve-1:</u>** PC station = ……..
Curve Length = ……..
Chord Length=……
Delta angle = ……
Degree pf curvature = ……..
Mid Ordinate = ……..
Tangent Length = ……
External Distance = ……..
PT station = ……
PI station = ……

**2. <u>Horizontal Curve-2:</u>** PC station = ……..
Curve Length = ……..
Chord Length=……
Delta angle = ……
Degree pf curvature = ……..
Mid Ordinate = ……..
Tangent Length = ……
External Distance = ……..
PT station = ……
PI station = ……

**3. <u>Horizontal Curve-3:</u>** PC station = ……..
Curve Length = ……..
Chord Length=……
Delta angle = ……
Degree pf curvature = ……..

Mid Ordinate = ……..
Tangent Length = ……
External Distance = ……..
PT station = ……
PI station = ……

**4. End Station of the alignment = …….**

4. Create existing ground profile and fill down the natural ground elevation of the following stations:

| Station | Natural ground elevation (Existing elevation) (m) |
|---|---|
| 0+140 | |
| 0+400 | |
| 0+570 | |
| 0+640 | |
| 1+360 | |
| 1+550 | |

5. Create and design Vertical alignment of the highway with the following PVI elevation and station:

| Station | Station | Elevation (m) |
|---|---|---|
| Start point | | 392 |
| PVI 1 | 0+360.00m | 392 |
| PVI 2 | 0+860 | 372 |
| PVI 3 | 1+300 | 376 |
| End point | | 360 |

a. After the Vertical Alignment Design, fill down the following results:

**1. <u>Vertical Curve 1:</u>** $G_1$ = ……..
$G_2$ = ……..
A = ……
Curve Type = ……
K value = …….

Length of Vertical Curve = ……
BVC station & elevation =
……&…….
EVC station & elevation =
……&…….
High/Low point station & elevation =
……...&…….

**2. Vertical Curve 2:** $G_1$ = ……..
$G_2$ = ……..
A = ……
Curve Type = ……
K value = …….
Length of Vertical Curve = ……
BVC station & elevation =
……&…….
EVC station & elevation =
……&…….
High/Low point station & elevation =

……...&…….

**3. Vertical Curve 3:** $G_1$ = ……..
$G_2$ = ……..
A = ……
Curve Type = ……
K value = …….
Length of Vertical Curve = ……
BVC station & elevation =
……&…….
EVC station & elevation =
……&…….
High/Low point station & elevation =

……...&…….

**4.** Fill down the elevation of design line (vertical alignment) for the following stations:

| Station | Elevation (m) |
|---|---|
| 0+600 | |

| | |
|---|---|
| 0+850 | |
| 1+080 | |
| 1+110 | |
| 1+240 | |
| 1+560 | |