

**CIVIL ENGINEERING DEPT.
2023-2022**

High Diploma SOIL MECHANICS

H. Diploma-STUDIES SOIL MECHANIC ENGINEERING

First Semester/ general

Code	Subject	Hours		Units
		P	T	
Eng.Civil 500	Mathematics & Statistics	1	2	2.5
Eng.Civil 501	Surveying and Projects Management	1	2	2.5
Eng.Civil 502	Structural Design	--	2	2
Eng.Civil 503	Geotechnical Engineering	--	2	2
Eng.Civil 504	Environmental Engineering	--	2	2
TOTAL		2	10	11

Second Semester/specific

Code	Subject	Hours		Units
		P	T	
Eng.Civil 515	Advanced Soil Mechanics	--	3	3
Eng.Civil 516	Advanced Foundation Engineering	--	3	3
Eng.Civil 517	Software Applications	2	1	2
Eng.Civil 518	Ground Improvement	--	2	2
TOTAL		2	9	10

Third semester

A thesis in the specialty for three months (4 unit)

Total units (25 unit)

First Semester/ Soil Mechanic Engineering/ general

MATHEMATICS AND STATISTICS (500)

Mathematics

- Matrices and determinants
 - Basic concepts
 - Systems of linear equations
 - Rank of matrix
 - Eigen values, Eigen vectors
 - Properties of Eigen vectors
 - System of differential equations
- Series solutions of differential equations
 - Power series method
 - Legenders equation
 - Bessel's equation

Statistics

- Introduction and definitions
- Normal Z,T distributions
- Chi-Square test, ANOVA
- Simple regression
- Multiple regression
- Non-linear regression

SURVEYING AND PROJECT MANAGERMENTS (501)

- **Surveying**
 - Introduction and definitions, errors and precision, tape measurements and corrections, leveling, 3-wire leveling, DEM, TIN, DSM, Viewshed, Watershed, Theodolites, Trigonometric leveling.
 - Advanced Instruments, Total station, EDM, Laser, Digital level

- GPS-Surveying, GPS Segments, Types of errors, PDOP, coordinates, UTM.
- GIS- Concepts, raster and vector, spatial and attribute data, topology, buffer, network analysis.
- Photogrammetry, types, stereovision, products.

- **project managements:**
 - project planning and control
 - project planning approaches
 - Operation research
 - Work breakdown structure
 - Value engineering
 - Decision making.

STRUCTURAL ENGINEERING (502)

1. Structural Concrete

- Limit State analysis and design
- Introduction
- Inelastic behaviour of reinforced concrete
- Moment curvature relation
- Concept of plastic hinge and collapse mechanisms
- Allowable rotation for collapse load design

2. Structural Steel

- Overhead crane
- Composite construction
- Plastic design

GEOTECHNICAL ENGINEERING (503)

6. Soil investigation and classification
7. Soil condition in the field
8. Stresses in soils
9. Flow through porous media

10. Shallow foundations
11. Engineering properties of rocks

ENVIRONMENTAL ENGINEERING (504)

10. Introduction: What's the environmental engineering.
11. Application of mass transfer concept in environmental engineering.
12. Water quality in rivers
13. Water quality in lakes
14. Water treatment
15. Wastewater treatment
16. Air pollution
17. Solid Waste management
18. Noise pollution

Second Semester/ Soil Mechanic Engineering/ Specific ADVANCED SOIL MECHANICS (515)

1. Geotechnical assessment of soil layers and site investigation techniques.
2. Geotechnical problems in Mosul city.
 - Collapsibility
 - Expansive soils
 - Gypsies soils
3. Settlement analysis
4. Earth embankments and rating structures
5. Lab. tests

ADVANCED FOUNDATION ENGINEERING (516)

1. Bearing capacity
2. Structural design of foundation
3. Structural design of retaining walls
4. Special types of footings

SOFTWARE APPLICATIONS (517)

1. Design and analysis using computer programs
2. Foundation design
3. Slope stability

4. Seepage
5. Stress distribution

GROUND IMPROVEMENT (518)

1. Soil stabilization
 - Lime
 - Cement
 - Asphalt
 - Special types
2. Grouting
3. Geotextiles and earth reinforcement