

Civil engineering Department

LAB BROCHURE

**Civil Engineering
Department
Faculty of Engineering**

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INTRODUCTION

This Brochure gives an overview of the Laboratory facilities of Civil Engineering Department of Najran University. It briefs about the Office, Classroom and Library support also. The department has currently seven dedicated labs. Safety Regulations are also mentioned in the brochure, which is pasted in each lab. All labs and 17 dedicated classrooms are equipped with wireless multimedia projector, Wi-Fi and whiteboard. The lecture notes and all course materials are also provided to the students by the e-learning systems. Most of the textbooks are available in the library in adequate numbers. The students and faculty members can search any required books using a smart search engine of the library website. Books can be borrowed for an academic semester from the library. All Faculty members are supported in every aspect by the college for their lecture, research and other activities.

LAB SAFETY REGULATION GUIDELINES

1. Make sure that you know the location of **Fire Extinguishers and First Aid kit and Emergency exists** before you start your experiments.
2. Strong closed shoes to be worn in laboratory.
3. Students are under supervision of laboratory technician or course instructor during the experiments.
4. **Do not** attempt to operate any machine before you fully understand its mechanism and be sure to know how to stop the machine before you start it.
5. Always **STOP** the machine before measuring, cleaning or making any adjustment.
6. **Never** operate a machine unless all safety guards are in place.
7. **Do not** attempt to stop a machine with your hands.
8. **Never** have more than one person operate the machine at one time.
9. Remember, **Safety First** and do all your actions smoothly when moving heavy equipment.

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10. **STOP** the machine and turn the power off before you leave the lab.
11. Handle tools and equipment with extreme care and keep tools to their proper places.
12. Work area **must** be cleaned during experiments.
13. **SMOKING**, eating or drinking in the laboratory are prohibited.
14. Get First Aid immediately for any injury, no matter how small it is.
15. In case of an **emergency**, please do not panic call on emergency numbers.

Directors of security guards – 0515204385 Security monitors - 0515204387

LAB DESCRIPTION

Soil Mechanics Laboratory

Items (equipment)

lab items	Qty
static cone penetrometer	3
consolidation apparatus	3
direct shear apparatus	3
casagrande liquid limit device	6
plastic limit set	6
static and dynamic triaxial apparatus	1
sand cone density -6-1/2	5
sand cone density -	5
balloon density apparatus	5
set of sieves	2
rapid moisture meter	2
pycnometer	2
sand puring cylinder	2
standard proctor test	3

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modified proctor test		3
hydrometer test apparatus		3
grain size distribution test apparatus		3
bench-mounting mixer 5 liters nominal capacity		2
Constant level tank		2
vacuum pump		2
falling head permeability cell		2
standpipe panel		2
soaking tank		2
aluminum scoop, small		4
timer clock		3
semi-automatic cone penetrometer apparatus		5
penetration test cone and cups for Atterberg limits		5
glass plate		5
wash bottle polythene		5
volumetric shrinkage set		3
Vernier calipers		4
Plate load test apparatus		1
		2



Figure 1: Soil Mechanics Laboratory

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Courses taught: -

1- 221CE -3Soil Mechanics (1)

a) Experiments

- Water content determination
- Unit weight and dry unit weight
- Liquid limit determination by Casagrande method
- Liquid limit determination by Cone penetrometer
- Plastic limit determination
- Sieve analysis
- Hydrometer Analysis
- Standard compaction test
- Modified compaction test
- Sand cone test

2-322CE -3 Soil Mechanics (2)

a) Experiments

- Oedometer test
- Unconfined compression tests
- Shear box test
- Triaxial test
- Unconsolidated Undrained test (UU)
- Consolidated Undrained test (CU)
- Consolidated Drained test (C)
- Permeability tests

Facilities:

WiFi, Whiteboard, Wireless Multimedia Projector, PCs, Printer, etc.

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Structural Materials Laboratory

Items (equipment)

Lab Items	Qty
pundit tester	2
steel tensile stress testing machine	2
concrete mixer	2
los Angeles abraision machine	3
large curing tank	2
drying oven	4
compression tension machine	2
flexural beam frame	1
slump test apparatus	5
k-slump tester	5
automatic mortar mixer	2
precision air entrainment meter	2
moulding equipment	20
vibrating table	2
concrete test hammers	5
concrete permeability apparatus	2
Automatic vicat apparatus	3
aggregate crushing value apparatus	2
sieve shaker	2
core drilling machine	2
compression test machine	2
British standard sieves	2
torsion machine	1

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Figure 3: Structural Materials Laboratory

Facilities:

WiFi, Whiteboard, Wireless Multimedia Projector, PCs, Printer, etc.

Courses taught: -

Properties and testing of materials

a) Experiments

- Cement tests
 - Fineness of the Cement
 - Setting time
 - Concrete compressive strength.
- Aggregate tests
 - Sieves analysis (Fine and coarse)
 - Absorption
 - Moisture content
 - Los Angeles Abrasion
- Fresh concrete
 - Slump and flow of fresh concrete.
 - Temperature measuring test

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- Air content of fresh concrete.
- Treatment room for sample preservation
- Capping of sample
- Hard concrete
 - Concrete compressive strength of cube
 - Concrete compressive strength of cylinder
 - Schmidt hammer test
 - Non-destructive testing.
 - Core test
 - **Steel test**
 - Torsion of steel
 - Tensile of steel

**Water Resources & Environmental Engineering Laboratory
Items (equipment)**

Lab Items	Qty
Glass Fiber filters (47- mm)	4
Glass Fiber filters (25-mm)	4
Small Oven	1
Medium Oven	1
Analytical balance Dual	1
Ultraviolet-Visible Spectrophotometer	2
Table top Sterilizer	1
Muffle furnace	1
Dissicator Cabinets	2
PHPH Meter - Benchtop	3
Turbidity Meter- Benchtop	2
Conductivity Meter - Benchtop	2
Dissolved Oxygen Meter-Benchtop	2
Magnetic Stirrer Hot plate with Stand	4
Magnetic Stirbars	2
Stir Bar Retriever	6
Thermometers	6
Vacuum/Pressure Pump	2
Analytical balance single range	1
Top loading electronic balance single range.	1

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Jar test Apparatus	2
Biochemical Oxygen Demand (BOD) incubator for 5-day BOD test. BOD	1
Laboratory Chemical Cart. ة	2
Vacuum Filter Holder Assembly - Glass, 47-mm	4
Multiunit digestion heater	1
Multiunit Counter Top distillation Units	1
water distillation unit. single/Double distilled.	1
Fecal coliform incubator waterbath	2
hydraulics bench and accessories	1
laminar flow table	1
advanced hydrology study bench	1
fluid properties and hydrostatics bench	1
pipe surge and water hammer apparatus	1
particle drag coefficient	1
hele-shaw apparatus	1
laboratory channel for hydraulic teaching	1
drainage and seepage tank	1
precision pressure gauge calibration	1
portable pressure meter	1
lysimeter	1
infiltration apparatus	1



Fig. 2 Water Resources & Environmental Engineering Laboratory

Facilities:

WiFi, Whiteboard, Wireless Multimedia Projector, PCs, Printer, etc.

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Courses taught:

The Sanitary and Water Resources Laboratory is used to teach concepts and perform research related to sanitary Engineering, water and wastewater reclamation and related fields. The laboratory is also utilized for research purposes.

The Water Resources laboratory contains modern instruments and apparatus for projects and research purposes. The laboratory is used by the students in the graduation projects. The laboratory's equipment includes

Sanitary and environmental Engineering

a) Experiments to be performed:

- Determination of Total Solids (TS) in a Water sample
- Determination of Total Dissolved Solids (TDS) in a Water sample
- Determination of Total Suspended Solids (TSS) in a Water sample
- Measuring pH value of Water/Waste water Measuring Turbidity of Water/Waste water
- Measuring Electrical Conductance
- Measuring Turbidity of Water/Waste water
- Measuring total and type of alkalinity of a given water sample
- Measuring total hardness of a given water sample
- Determination of calcium hardness
- Measuring the Dissolved Oxygen in a water sample
- Measuring Biochemical Oxygen Demand (BOD) of an effluent sample
- Measuring Chemical Oxygen Demand (COD) of an effluent sample

Hydrology Engineering and Fluid Mechanics CE- 3 331

a) Experiments to be performed:

- Hydrologic Cycle
- Water Balance
- Precipitation
- Evaporation
- Transpiration
- Infiltration
- Rainfall-runoff relationship
- Stage Hydrographs
- Determination of Soil Hydraulic
- Application of Darcy's Law

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- Steady confined radial flow toward a well
- Steady unconfined radial flow toward a well
- Type of flow in open
- Free flow under Sluice Gate
- Flow rate under Broad Crested weir
- Flow rate and weir head under Ogee-Crested Weir
- Hydraulic Jump
- Free flow under Radial Gate
- Submerged flow under radial gate
- Flow under Culvert
- Submerged flow under Culvert
- Elements for Energy Dissipation
- Series coupling of two pumps with the same characteristics
- Parallel coupling of two pumps with the same characteristics
- Centrifugal Pumps Characteristics
- Operative characteristics of Pelton's Turbine

The Water Resources laboratory contains modern instruments and apparatus for projects and research purposes. The laboratory is used by the students in the graduation projects. The laboratory's equipment includes:

Engineering characteristics of water including measuring the speed of water flow in pipes and measuring friction losses. Students also study the different types of pumps and ways of concerting them (in series or parallel). In addition, they also study water networks and flux surface measurement, measurement of drainage in open channels (measurements of the hydraulic jump) and effects of the waterbed inclination and shape on water surface.

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Highway Engineering Laboratory

Items (equipment)

Lab Items	Qty
calibration kit	1
rotational viscometer	2
cylinder mould 100mm	2
cylinder mould 150mm	2
ductility testing apparatus	1
digital asphalt thermometer	1
hubbard-carmick specific gravity bottles	3
travelling beam device	1
compact core drill machine	1
benkelman beam	1
centrifuge extractor	1
Reflux extractor	1
automatic compaction apparatus	1
marshal test 50	1
vacuum pycnometer apparatus	1
loss onheating/thin film oven	1
automatic penetrometer apparatus	1
cleveland flash cup apparatus	1
hot extractor apparatus	1
binder recovery apparatus double sample unit	1
automatic ring and ball apparatus	1
percentage refusal density apparatus	3
bacon sampler	5
superpave gyratory compactor	1
ignition oven	1
rolling thin film oven	1

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Figure 5: Highway Engineering Laboratory

Course Taught:

Highway Engineering

Experiments to be performed:

The Highway Laboratory (Figure 5) is utilized for:

- Soil & Aggregate
- CBR test.
- Loss Angles Abrasion Test.
- Specific Gravity Test
- Sand Equivalent Test.
- Soundness Test.
- Asphalt
- Kinematic Viscosity Test.
- Absolute Viscosity Test.
- Penetration Test.
- Flash and Fire Point Test.
- Ductility Test.
- Softening Point Test.
- Thin Film Oven Test.
- Solubility Test.
- Marshall Test.

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Surveying Laboratory

Items

Courses Taught:

Surveying (1)

List of Lab Instruments.....	3
Project 1 INTRODUCTION TO SURVEYING INSTRUMENTS.....	4
Project 2 Field measurements with a steel tape	6
Project 3 CHAINING AND OFFSET TAKING.....	10
Project 4 Measuring Horizontal Angles	12
Project 5 Measuring Horizontal Angles	12
Project 6,7 Compass Traverse.....	15
Project 8,9 Traverse Angle measurements and closure Computations.....	19
Project 10 Control Leveling	21
Project 11 Control Leveling	21
Project 12 To set out a simple curve.....	26
Project 13 STUDY OF PLANIMETER.....	29

Surveying (2)

Introduction.....	3
List of Lab Instruments.....	3
Experiment 1 Total Station introduction.....	5
Experiment 2 Total Station: Setting up and Leveling.....	5
Experiment 3 Total Station: Setting up and Leveling.....	5
Experiment 4 Total Station: Data collection.....	5
Experiment 5 Total Station: Data setting out.....	5
Experiment 6 GPS: introduction.....	9
Experiment 7 GPS Static Observation Field Procedures.....	9
Experiment 8 GPS RTK Observation Field Procedures.....	9
Experiment 9 GPS Data exporting Procedures.....	26
Experiment 10 Building lay out Procedures.....	27
Experiment 11 Introduction to Remote sensing.....	27
Experiment 12 Introduction to ArcMap (GIS).....	33
Appendices.....	38.

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Lab Items	Qty	Lab Items	Qty
Total Station with Prisma	3	Digital level With Rods	5
Global Positioning (GPS) System	2	Mechanical Planimeter	5
Digital Theodolite	3	Prism system	4
Prismatic Compass	5	Tripod	5
Digital Distance Measuring Wheel	5	3- meter Leveling Rod	10
Plumb bob Brass 12 oz	10	Digital level With Rods	5



Figure 5: Surveying Laboratory

Facilities:

WiFi, Whiteboard

Computer Laboratory:

Items

The Computer Laboratory contains 30 desktops. Engineering software packages are provided and served by Windows. All software packages are provided in every general access computer lab, available software packages are:

Autocad.

SAP2000.

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Premavira.

Ansys.

Matlab.

The lab is recognized according to the time table of lectures to be opened from 8:00 am to 5:00pm



Figure 6: Computer Laboratory:

Facilities:

WiFi, Whiteboard, Wireless Multimedia Projector, PCs, Printer, etc

B. Computing Resources

The computer services and facilities are available at three different levels i.e. university, Faculty of Engineering and departmental levels.

B.1 University Computing Resources

The university Information Technology and Communications Deanship is the umbrella for all the facilities provided to all faculties and departments spread over the campus. It provides two campus wireless networks NU, which is a secure network for students, faculty and staff, and Guest, which is an unsecured network for visitors. Students have open access to the campus network and the Internet. There are wireless access points that serve campus buildings including staff offices and laboratories. The practical result is that anyone in the campus community can have access to the campus network and the

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Internet at any time from any place. The university Information Technology and Communications Deanship maintains the Internet servers and provides internet services through local area network and remote dial-up facility. It also provides various licensed versions of educational software. It operates around the clock with supporting staff for any technical consultation and trouble shooting. Also, the university Information Technology and Communications Deanship will provide two projects Virtual Computers and Security Cameras System, which serves all the colleges in campus.

B.2 Faculty Computing Resources

The Faculty of Engineering operates and maintains an Open Access PC Laboratory. The laboratory is open five days a week (Sunday to Thursday), from 8:00 am to 3:00 pm.

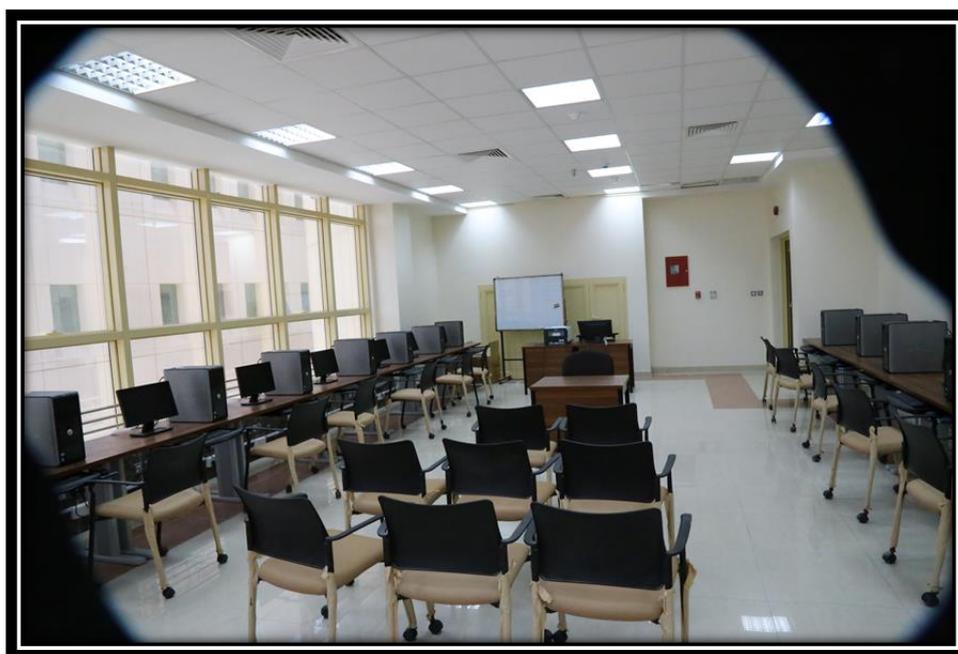


Figure 6: Computer laboratory

LIBRARY FACILITIES

The University library (Prince Mesha'al Library) is centrally located within the University campus. Among all of its collections, 80% books are of Science and Engineering and 20% books are of Humanities and Social Sciences. The library has online access through the internet to more than 300 international databases covering humanities, social sciences, sciences and engineering. The resources of the library are summarized in the following table:

Total Number of Books	More than 3 lacs
Number of Civil Engineering books and Periodicals	361books
Total Number of Publishers	More than 300

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Number of Periodical Titles/ Electronic Journals Subscription	2513
Number of IEEE/IEE standard Journals' Subscription	More than 600
Number of IEEE/IEE Standard Conference Periodicals Subscription	1300
Number of Earlier Issues in Microfilm	37,522 reels

In addition to the online searching and use of international databases, teachers and students can go directly to the central library and take loan of the books for a duration of one academic semester. Besides the central library, there is another departmental library from which only the faculty members can take loans according to their necessity.

OFFICES AND CLASS ROOMS

The Civil Engineering Department has 16 offices including the Chairman's Office and the Coordinator's Office. Each faculty member has individual furnished office supported by a desktop, a laptop, full access to intranet and internet, printer and Cisco based intercom system. There is central support for photocopying, scanning and large volume printing facilities also.

NU uses a central scheduling system to assign general purpose classrooms. The system can assign courses in any discipline to any room on campus; however, the system has pre-programmed priorities which result in almost all courses of electrical engineering being assigned to the rooms that are dedicated to the Civil department. The dedicated classrooms for the department are shown in the following table:

Sl.	Room #	Table	Seat	Project or	Wi-Fi	Whiteboard
1.	CE201	40 Chairs with writing board		√	√	√
2.	CE202	12	12	√	√	√
3.	CE203	12	12	√	√	×
4.	CE204	12	12	√	√	√
5.	CE205	12	12	√	√	√
6.	CE206	24 Chairs with writing board		√	√	√
7.	CE211	11	20	√	√	√
8.	CE212	12	16	√	√	√
9.	CE213	12	16	√	√	×
10.	CE214	12	10	√	√	√
11.	CE215	12	12	√	√	×

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12.	CE216	12	24	√	√	√
13.	CE217	12	10	√	√	×
14.	CE218	12	10	√	√	×
15.	CE133: Auditorium	192 Chairs with writing board		√	√	√

The rooms in which whiteboards are not mounted due to the fact of having a column in the place of mounting. The large Auditorium, described in the table, are used for meeting, conference and other similar occasions. Sometime the rooms are used for the admission test and other exams with large number of students also. The central air-conditioning system and Wi-Fi coverage of the building makes it suitable for its occupants to spend most of their time in performing their jobs appropriately.



Auditorium

A typical Classroom

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LAB RESPONSIBILITY

Every Faculty member is affiliated, at least, with one lab as shown in the following table-

Affiliation	Name	e-mail	Office /Mobile
Lab Co-ordinator	Dr. Ahmed Abd El Aal	Akahmed@nu.edu.sa	0592375765
Highway Engineering Laboratory	Dr GamilMahyoub	aboashraf_76@yahoo.com	0507538134
Surveying Laboratory	Dr. Ismail El Khrashy	iaelkhrachy@nu.edu.sa	0551419524
Soil Mechanics Laboratory	Dr.GamilMahyoub& Dr. Abdullah Al-Homidy	aboashraf_76@yahoo.com aaalhomidy@nu.edu.sa	0507538134 0554240938
Water Resources & Environmental Engineering Laboratory	Dr.Abulnoor Ghanim	dr_noor96@yahoo.com	0545529898
Computer Laboratory	Dr. Ahmed Maglad	ahmedmaglad@gmail.com	0553608503

إعداد لجنة المعامل والسلامة بالقسم:

رئيساً

د. احمد عبد العال

عضواً

د. احمد مقلد