



COLLEGE OF **ENGINEERING**

CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT

Civil & Environmental Engineering Laboratories

Lab Name	Location	Person in Charge	Programs Served	Courses Served
Structure Lab	M12-001	Ahmed Shweiki	Civil and Environmental Engineering (BSC & MSCE & PhD)	- Material for Civil Engineering - Master Thesis
Materials Lab	M12-001	Nabila Hawawini	- Civil and Environmental Engineering (BSC & MSCE & PhD) - Mechanical Engineering - Architectural Engineering	- Material for Civil Engineering - Advanced Concrete Technology - Advanced Materials in Construction
Geotechnical Lab	M12-006	Mohamad Qaisiah	Civil and Environmental Engineering (BSC, MSCE & PhD)	- Geotechnical Engineering - Advanced Geotechnical Engineering - Soil Improvement - Soil Dynamics
Surveying Lab	W12-019	Priya kaimal	Civil and Environmental Engineering (BSC & MSCE & PhD)	Surveying
Fluid Mechanics and Water Resources Lab	M12-012	Tarek Alhomsy	- Civil and Environmental Engineering (BSC & MSCE & PhD) - Sustainable and Renewable Energy	- Fluid Mechanics - Hydraulics - Water Resources - Hydraulic Structures - Fluvial Hydraulics
Transportation Laboratory & Pavement Lab	W12-020	Ahmed Shweiki	Civil and Environmental Engineering (BSC & MSCE & PhD)	- Transportation - Applied Traffic Operations - Pavement Design
Environmental & Sanitary Lab	W12-013	Loubna Chaabi	Civil and Environmental Engineering (BSC & MSCE & PhD)	- Introduction to Environmental Engineering - Wastewater Treatment and Reuse
Engineering Workshop	M12-002	Madhu Keezhilah	Engineering College	Industrial Manufacturing serves all the College of Engineering in different student projects

Civil & Environmental Engineering lab Staff

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4	Ahmed Shweiki	Lab Engineer	065052426	ashweiki@sharjah.ac.ae
5	Loubna Chaabi	Lab Engineer	065053439	lchaabi@sharjah.ac.ae
6	Tarek Al Homsy	Lab Supervisor	065052464	talhomsy@sharjah.ac.ae
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8	Madhu Keezhilath	Lab Technician	065052447	mkeezhilath@sharjah.ac.ae

STRUCTURE LABORATORY



Location	Lab Staff in Charge	Contacts
M12- 001	Ahmed Shweiki	065052426

INTRODUCTION

The Heavy Structures Lab in the Civil & Environmental Engineering Department is equipped with state-of-the-art testing machines, equipment, frames, and various data loggers, which are considered unique to the entire Arabian Gulf region. The experimental set-ups in the lab are capable of performing most standard and nonstandard tests that carried out on almost all building materials and structural elements used in construction. Such experimental capabilities and with expertise of the Civil & Environmental Engineering staff are considered a great asset to the local industry. The size of the testing machines and their variety make them ideal for teaching, research and consultancy work because of their high capacity and their capability of testing both standard and large-scale specimens under static or cyclic horizontal and vertical loads. The experimental set-ups utilizes modern data acquisition systems with versatile sensors such as LVDTs, strain gauges, accelerometers, and load cells, which all could measure many required parameters.

EQUIPMENT AND INSTRUMENTS

- Universal Testing Machine (UTM) (1500kN)
- Universal Testing Machine (UTM) (100kN)
- Portal Frame (500kN)
- Hydraulic cyclic Actuator (500kN)
- Hydraulic cyclic Actuator (1000kN)
- Hydraulic cyclic Actuator (100kN)
- Campbell CR 3000 Micro Logger
- Vishay 7000 Data Acquisition System
- DT9837 data acquisition system for dynamic signal analysis up to 105.4KS/s.
- Fiber reinforced concrete flexure testing machine 300 kN
- Two Axis shaking table 70x70cm, 100kg max payload

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- Creep testing frames for ASTM concrete beams
 - Drop load testing Frame and support
 - Quanser Shake Table III and Smart Structure System (Stand Alone System)
 - Dual Extruder 3D Printer

Students usually find it fascinating to see theory in practice. The main function of the following educational and training set-ups is to teach the students both the basic principles and the advanced concepts of structural analysis. Students put theory into practice and become more interested and involved in the subject matter.

TESTS AND SERVICES

- Tensile Test
- Bending Test
- Compression Test
- Cyclic Compression and Tension Test
- Dynamic Force, Deflection, Strain Control Tests
- Friction load tests
- Shear Force in a Beam
- Flexural Test (also Fiber Reinforced Concrete)
- Round and Square Panel with Fiber Reinforced Concrete Test
- Large Scale Specimens, Scaffoldings, Beams, Columns, Walls..etc.
- Sensor Data Acquisition
- Creep test
- Drop load test
- Earthquake simulation tests
- Active and passive damping test

MATERIALS LABORATORY



Location	Lab Staff in Charge	Contacts
M12- 001	Nabila Al Hawawini	065052485

INTRODUCTION

The Materials Laboratory for the Civil & Environmental Engineering Department is located on the UOS main campus, and it has constructed over an enclosed area of 200 square meters. This facility is fully equipped and supported by a highly qualified technical staff to respond to the needs of academic institutions, researchers, engineers, and construction industries for the testing of concrete, asphalt, metals, and their related constituents.

EQUIPMENT AND INSTRUMENTS

Latest state-of-the-art equipment, mostly fitted with computerized data collection and used to perform various types of materials and durability testing to the highest standards. Some of these machines include:

- Abrasion Machines
- BS & ASTM Sieves
- Flakiness & Elongation Gauges
- Blain & Vicat Apparatus
- Concrete Gradient Analyzer
- Concrete Mixer
- Compacting & Kelly Ball Apparatus
- Slump and V-B time Apparatus
- Concrete Permeability System
- Fully Automated Compression Machine (3000 kN)
- Fully Automated Compression Machine (4000 kN)
- Flexural (Beams) Frame
- ISAT
- Bond Tester
- Rebar Location & Cover Meter

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- Corrosion Mapping System
 - Concrete Test Hammer
 - Ultrasonic Concrete Tester
 - Windsor Probe System
 - Windsor Pin System
 - Microscope for Crack Width Measurement
 - Free Shrinkage Apparatus
 - Friction Tester
 - Walk in Temperature & Humidity Chamber
 - Rapid Chloride Testing
 - Measurement of Corrosion Activity
 - Restrained Shrinkage Cracking (Ring Test)
 - Calorimeter I-Cal 2000 HPC
 - Heavy-duty mixer

TESTS AND SERVICES

The following are the tests that are performed in UOS Laboratories:

FRESH CONCRETE TESTINGS:

- Mix Design
- Workability
- Air Content
- Density

AGGREGATE, CEMENT & MORTAR TESTINGS:

- Sampling of Aggregate
- Specific Gravity & Water Absorption
- Abrasion of Aggregates
- Particles Size Distribution (Sieve Analysis)
- Flakiness and Elongation Indexes
- Consistency and Setting Time of Cement & Gypsum
- Cement Setting Time and Compressive Strength
- Heat of Hydration of Cement
- Setting Time Estimation & Prediction using Isothermal Calorimetry

HARDENED CONCRETE TESTINGS:

- Permeability
- Flexural Strength
- Compressive Strength
- Indirect Tensile of Concrete

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- Density & Water Absorption
 - Chloride Penetration
 - Shrinkage of Concrete & Restrained Shrinkage Cracking

NON-DESTRUCTIVE TESTING OF HARDENED CONCRETE:

- Cracks Detection and Movement, Width Measurement
- SHMIDT Hammer Testing for Compressive Strength
- Ultrasonic Testing for Concrete
- In situ Moisture Content Measurement
- Steel Rebar Location & Cover (Cover meter)
- Chloride Ion Penetration Tester (CIP)
- Free Shrinkage Measurement
- Corrosion Activity of Rebar

GEOTECHNICAL LABORATORY



Location	Lab Staff in Charge	Contacts
M12- 006	Mohamad Qaisiah	065052935

INTRODUCTION

The Geotechnical Laboratory is one of the most important laboratories in the Civil and Environmental Engineering Department. The laboratory is fully equipped with modern facilities and machines to meet local and international standards accommodating most laboratory and field soil testing. A highly qualified and experienced technical staff, not only meeting the need of quality teaching and research, but also the needs of academic institutes, industries and governmental agencies, supports this laboratory.

EQUIPMENT AND INSTRUMENTS

Major equipment fitted with computerized data collection to perform various soil analysis; the following is a list of the major equipment in the lab:

- Triaxial Machine
- Autonomous Data Acquisition Unit (ADU)
- Unconfined Compression Machine
- Direct/Residual Shear Apparatus
- Consolidation Apparatus
- Permeability Apparatus
- Automatic Compactor
- CBR Machine
- Vane Shear Test Apparatus
- Test Sieves (BS & ASTM)
- Hydrometer Test Apparatus
- Atterberg Limits Apparatus
- Cone Penetrometer
- Sand Cone Apparatus
- Soil Electrical Resistivity Meter

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- Resonant Column (Torsional Shear Test Equipment)
 - Vapor Sorption Analyzer (VSA Testing)
 - Soil Hydraulic Conductivity Tester
 - 3meter Large Scale Sandbox with 100kN loading actuator
 - Unsaturated Soil testing system

TESTS AND SERVICES

SOIL STRENGTH TESTINGS:

- Unconsolidated Undrained (UU) test
- Consolidated Drained (CD) test
- Consolidated Undrained (CU) test
- Unconfined Compressive Strength test
- Direct and Residual Shear Box test
- Vane Shear test
- Dynamic Characteristics of Soils (Shear or Elastic modulus of soils) using resonant column test

ROCK TESTINGS:

- Point Load test
- Unconfined Compression test

SOIL CONSOLIDATION TESTINGS:

- One-Dimensional Consolidation test
- Measure Consolidation Characteristic test
- Soil Permeability Coefficient Determination test
- Swell/ Collapse tests

IN-SITU TESTINGS:

- Field Density test
- Manual Subsurface Boring tests
- Dynamic Cone Penetrometer test
- Digital Load Cell Penetrometer test
- In-situ and Lab Electrical Resistivity test

SOIL PERMEABILITY TESTINGS:

- Falling Head Permeability test
- Constant Head Permeability test

PARTICLE SIZE AND INDEX PROPERTIES TESTINGS:

- Grain Size Distribution by Sieve Analysis test
- Grain Size Distribution by Hydrometer Analysis test
- Liquid Limit test
- Plastic Limit test
- Shrinkage Limit test

SOIL COMPACTION TESTS:

- Standard & Modified Proctor tests
- Field Density test

SOIL AND WATER CHEMICAL TESTINGS:

- Content tests: (Sulfate, Chloride, Carbonate Organic Matter & Gypsum)
- Soil Conductivity test
- PH Measurement test

SURVEYING LABORATORY



Location	Lab Staff in Charge	Contacts
W12-019	Priya Kaimal	065053498

INTRODUCTION

The Surveying Laboratory enables students to understand the basic principles of surveying by conducting field exercises using surveying equipment. Most of the field exercises were conducted outside the laboratory room to gather field survey data using state-of-the-art surveying equipment. Reduction and calculation of the field data results that are performed in the laboratory room. Prior to the commencement of field surveys, field exercises are discussed and explained to the students by the laboratory instructor inside the surveying laboratory room. Care and proper handling of surveying equipment is also emphasized before, during and after the field survey.

The use of CAD programs and CIVIL 3D incorporated in the surveying exercises. This development helps the students to follow a fast, easy, and reliable method of survey processing.

Develop team working and writing skills through completing several field projects while working in groups and writing a report for each project. In the reports students should estimate, do analyses and correct errors in the measurement.

EQUIPMENT AND INSTRUMENTS

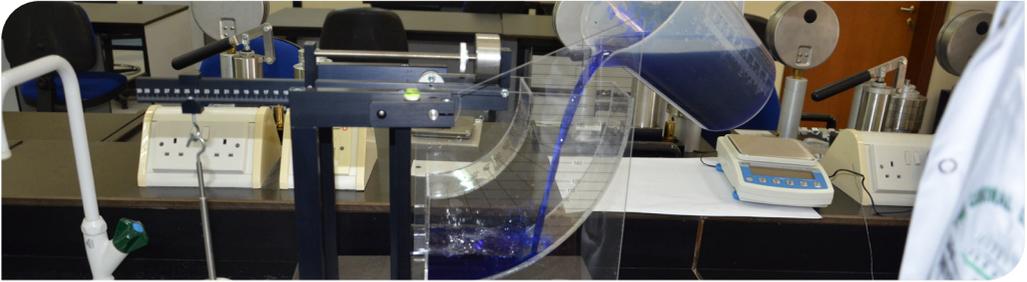
- Land Chain 20m & 30m
- Measuring Tape 30m & 50m
- Digital Walking Measures
- Digital Handled Laser Distance Meter
- Electronic Distance Meter (EDM)
- Double Right Angle Prism
- Stereotype Plotting Instrument
- Digital Planimeter
- Automatic Level
- Automatic Laser level

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- Hand Level
 - Tilting Level Model
 - Optical Theodolite
 - Digital Theodolite
 - Total Station
 - Global Positioning System (GPS –Trimble R10)
 - Ground penetration radar (Bridge Scan System SIR-4000)

EXPERIMENTS

- Linear Measurement by Pacing
- Tape Measurements
- Basic Principles of Linear Surveying and Offsetting
- Leveling –Introduction
- Differential Leveling
- Contour Mapping
- Two Peg test
- Profile and Cross Section Leveling
- Angle Measurements –Introduction to Theodolite (Optical Theodolite)
- Measurement of the Internal Angle of a Closed Traverse (Digital Theodolite)
- Total Station (Measurement of Internal Angle and Area Measurement of a Closed Traverse)
- Introduction to GPS (Setup, Measuring the Ground Control Points, Stake Out)

FLUID MECHANICS & WATER RESOURCES LABORATORY



Location	Lab Staff in Charge	Contacts
M12-012	Tarek Alhomsy	065052464

INTRODUCTION

The Fluid Mechanics and Water Resources Laboratory has modern instruments and apparatuses for teaching and research purposes. Some of the instruments and equipment are utilized for industrial use with minor modifications. Experienced teaching staff and technicians supervise the laboratory with services meeting the highest international standards.

EQUIPMENT AND INSTRUMENTS

- Pressure Gauges Calibrator
- Determination of Fluid Properties Apparatus
- Pelton Wheel
- Centrifugal pump apparatus
- Bernoulli's Principal Apparatus
- Center of Pressure Apparatus
- Free and Forced Vortices Apparatus
- Open Channel-Flow Visualization Bench
- Osborne Reynolds' Apparatus
- Air Flow Bench Apparatus
- Rainfall-Runoff Hydrographic Apparatus
- Rainfall Simulator Apparatus
- Field Drain filter Test Apparatus
- Network of Pipe Apparatus
- Falling Sphere Viscometer Apparatus
- Losses in Pipes and Fittings Apparatus
- Hydrostatic Force Apparatus
- Flow Measuring Apparatus
- Impact of Jets Apparatus

EXPERIMENTS

- Fluid Properties, Viscosity, Mass Density Specific Weight & Specific Gravity
- Calibration of Pressure Gauges (Bourdon Gauge – Dead Weight Calibrator)
- Hydrostatic Forces and Centre of Pressure
- Vortex Flow Formation (Free and Forced Vortices)
- Verification of Bernoulli's Principle
- Horizontal Osborne Reynolds (Flow Regimes and Characteristics)
- Impact of Jets (Verification of Impulse-Momentum Theorem)
- Losses in Pipes and Fittings (Estimation of Major and Minor Losses)

TESTS AND SERVICES

- Comparing the Performance of Different Types of Pumps and Investigating Cavitation Phenomenon
- Determination of Density, and Specific Gravity, Dynamic and Kinematic Viscosity of Different Liquids
- Simulation of Hydroelectric Power Generation
- Measurement of Flows through Pipes and Open Channels
- Investigation of Flow Regimes
- Simulation of Hydroelectric Power Generation by Studying Impact of Jets on Belton Wheel

TRANSPORTATION LABORATORY



Location	Lab Staff in Charge	Contacts
W12-020	Ahmed Shweiki	065052426

INTRODUCTION

The Transportation Laboratory is furnished with a great deal of state-of-the-art equipment. This equipment used to collect and analyze data needed for the study and development of diverse types of transportation systems used on streets to major freeways. Students trained on the use of this equipment to a high level of accuracy and safety. Much of the equipment used for traffic data collection and to run traffic counts at different types of locations such as minor and major interchanges. They also can be utilized to analyze existing traffic problems, such as congestion and accidents.

EQUIPMENT AND INSTRUMENTS

- Lane Traffic Counters
- Lane Traffic Detectors
- Video Detectors
- Intersection Turning Movement Counters (Digital and Mechanical)
- Traffic Analysis Software
- Speed Radar Guns
- Digital Measuring Wheel
- Miovision traffic count system
- Wavetronix radar multilane traffic count system

EXPERIMENTS

- Traffic Surveys
- Traffic Trend Analysis
- Traffic Studies
- Traffic Impact Studies

TESTS AND SERVICES

- Highway and Roads Traffic survey
- Highway and Roads traffic studies

PAVEMENT LABORATORY



Location	Lab Staff in Charge	Contacts
W12-019	Ahmed Shweiki	065052426

INTRODUCTION

The Pavement Laboratory is equipped with a great deal of state-of-the-art equipment. This equipment used to collect and analyze asphalt binder specimens and test asphalt concrete material (Asphalt, bitumen, and asphalt mixes, etc.)

EQUIPMENT AND INSTRUMENTS

- Super pave Gyrotory Compactor
- 30 kN Universal Testing Machine (UTM) with Environmental Chamber-20 to 70C
- Marshall Test Apparatus
- Digital Measuring Wheel
- Brookfield Rotational Viscometer
- Bitumen Automatic Consistency and Penetration
- Bitumen Content by Ignition Method
- Dynamic Hybrid Rheometer (DHR)
- Pressure Aging Vessel (PAV)
- Rolling Thin Film Oven (RTFO)
- Automatic Closed System Asphalt Analyzer
- Rotary Evaporation Apparatus
- Softening Point Automatic tester
- Flash point Automatic tester
- Asphalt equipment and sample washing machine
- Asphalt mixtures volumetrics setup
- Ultra-sonic mixer.
- High Shear Mixer.
- Sand Equivalent setup.
- Bending Beam Rheometer.
- Moisture Induced Sensitivity Testing- MIST

TESTS AND SERVICES

AGGREGATES:

- Specific Gravity of Coarse Aggregates
- Specific Gravity of Fine Aggregates
- Specific Gravity of Mineral Filler
- Bulk Density of Fine Aggregates
- Bulk Density of Coarse Aggregates
- Sand Equivalent Test of Fine Aggregates
- Elongation and Flakiness Index of Coarse Aggregates
- Particle Shape of Coarse Aggregates
- Particle Shape of Fine Aggregates
- Particle Shape of Mineral Filler
- Sieve Analysis of Coarse Aggregates
- Sieve Analysis of Fine Aggregates
- Lose Angeles Abrasion Test

ASPHALT CEMENT:

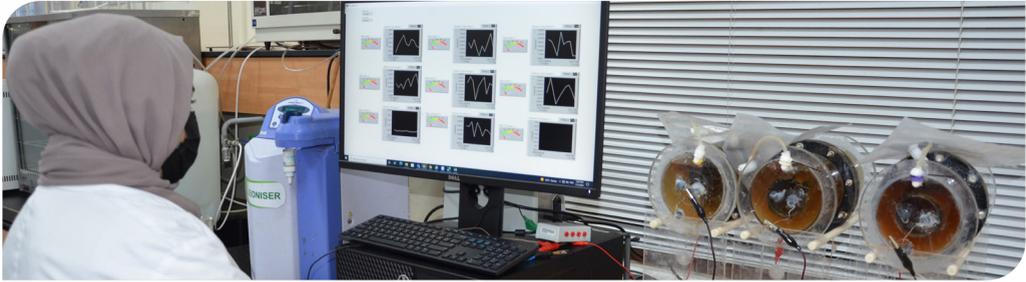
- Specific Gravity of Asphalt
- Penetration Test
- Softening Point Test
- Rotational Viscosity Test
- Short Term Aging RTFO
- Long Term Aging PAV
- Dynamic Shear Modulus Test
- Fatigue Test
- Multiple Stress Creep and Recovery Test MSCR
- Linear Amplitude sweep test
- Binder performance test
- Binder low performance grade using BBR.
- Ignition Oven Test for Binder Extraction
- Binder Extraction Test by Solvent
- Binder Recovery Test
- Binder mass loss using RTFO

ASPHALT CONCRETE MIX:

- Theoretical Maximum Specific Gravity Test
- Bulk Specific Gravity
- Marshal Mix Design
- Superpave Gyratory Compaction
- Dynamic Modulus Test

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- Resilient Modulus Test of Asphalt Concrete
 - Resilient Modulus Test of Unbounded Materials
 - Triaxial Repeated Load Permanent Deformation (Flow Number) Test
 - Triaxial Static Permanent Deformation (Flow Time) Test
 - Uniaxial Fatigue Test
 - Indirect Tensile Strength Test
 - Triaxial Shear Test
 - Semi-Circle Bending Test
 - C* Fracture Test
 - Moisture Damage Lottman Test

ENVIROMENTAL & SANITARY LABORATORY



Location	Lab Staff in Charge	Contacts
W12-013	Loubna Chaabi	065053439

INTRODUCTION

The Environmental & Sanitary Laboratory carries out scientific investigations on fresh and marine water quality, wastewater treatment, industrial waste management, solid waste management, environmental impact monitoring, environmental information systems, geo-environmental studies and environmental site investigations.

EQUIPMENT AND INSTRUMENTS

- Gas Chromatography/ Mass Spectroscopy (GC/MS)
- Gas Chromatography (GC)
- Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)
- Bench Top Stirred Pressure Reactor
- Ion- Chromatograph
- Automatic Weather Station
- Deep Wells Water Quality & Velocity Apparatus
- Multi Parameter of Data Logger
- Total Organic Carbon (TOC-VCPH)
- Spectrophotometers (DR/4000, DR2800, DR/2010)
- Fast Fat Extraction System
- Binocular Microscope
- Biotrace Uni-Lite Xcel Illuminometer
- Digestion System (Digesdahl digestion Apparatus, Microwaves Digestion)
- Jar Tester
- PH Meter, Turbidity Meter, Conductivity Meter, Dissolved Oxygen Meter, BOD Track, COD Reactor, Furnaces, Ovens, and etc ...
- Water, Soil and Sediment Sampling Equipment
- Deep Wells Water Quality & Velocity Apparatus

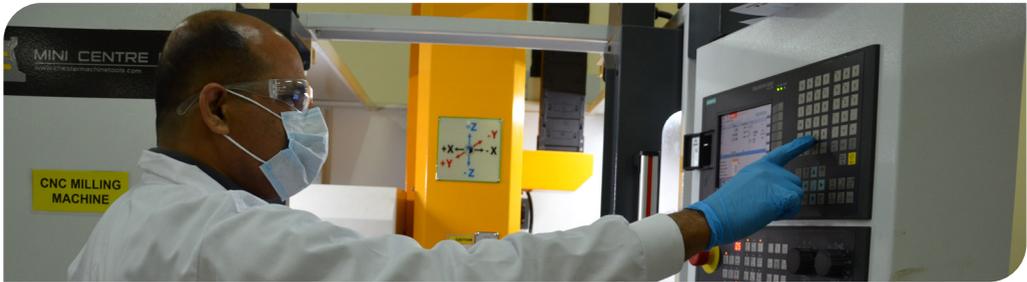
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- Multi Parameter of Data Logger System
 - Automatic Weather Station

TESTS AND SERVICES

- Fresh Water, Groundwater and Marine Water Quality *pH, Salinity, Conductivity, BOD, COD, TOC, Coliform Bacteria, Nitrogen, Heavy metals, Ammonia, Sulphates, Phosphorus, Turbidity, Color, hydrocarbons, Gravimetric Analysis for Solids, Transparency, Chlorophyll ...etc .
- Water and Wastewater Treatability Testing (Physical, Chemical and Biological Treatment).
- Industrial Waste Management (Characterization, Waste Management Plans, Treatability Testing Using Physical, Chemical and Biological Processes).
- Contaminated Site Investigation and Remediation (Including Soil and Groundwater Testing, Contaminants Leach ability Testing, and Development of Appropriate Remediation Alternatives).
- Solid Waste Management (Including Planning, Landfill Process Design, Waste Characterization, and Recycling and Reuse).

The environmental laboratory is continuously upgraded and plans to expand and include air pollution monitoring that are currently being evaluated. An interdisciplinary team of staff members and from our highly equipped workshops supports research activities .

ENGINEERING WORKSHOP



Location	Lab Staff in Charge	Contacts
M12-002	Keezhilath Madhu	065052447

INTRODUCTION

The Workshop Laboratory exposes students to the practical use of industrial tools that are common in the construction and manufacturing industry. Safe and proper handling of workshop equipment and tools are emphasized before, during, and after project making. The presence of an instructor is needed to guide students in the proper operation of workshop equipment, especially during the project making for courses.

EQUIPMENT AND INSTRUMENTS

- Air Compressor
- Alumina Chip Forge
- ARC Welding Machine
- Band Saw Machines
- Bench Grinder
- Brazing Hearths
- Cutting-off Machine
- Drilling Machine
- Dust Collector
- Gas Welding Machine
- Guillotine
- Hollow Chisel Mortiser
- Lathe Machine
- MIG Welding Machine
- Pipe Bending Machine
- Planer Thicknesser
- Power Hacksaw Machine
- Shaping Machine

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- Spindle Moulder
 - Spot Welding Machine
 - Surface Grinder
 - Surface Table
 - Tilt Arbor Saw Bench
 - Universal Milling Machine
 - Metal Sheet Binder
 - Metal Binder(Pipes, Rods, Bars)

EXPERIMENTS

- Gear Manufacturing Practice
- Turning and Taper Turning
- Welding Practice
- Carpentry Practice

TESTS AND SERVICES

- Lathe Machine:
 - This equipment is very useful in fabricating threaded, nuts and bolts for heavy equipment machinery (cars, oil drilling machineries etc.)
- Welding Machine:
 - This machine is especially useful in fabricating welded steel structures like steel beams and steel columns.
- Universal Milling Machine:
 - This machine could be used in the manufacture of gears, grooves, slots, and many others.