



قسم الجيولوجيا

Geology department

المختبرات البحثية بقسم الجيولوجيا

Research Laboratories

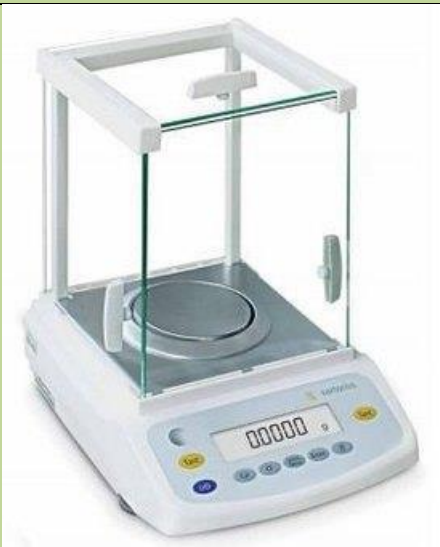
- 1. Sedimentary Rock and Engineering Laboratory**
- 2. Rocks and Minerals Laboratory**
- 3. Geophysics Laboratory**
- 4. Hydrogeological Modeling Laboratory**
- 5. Paleontology Laboratory**

Sedimentary Rock and Engineering Laboratory

Services Provided by the Laboratory:

- Identification of unknown minerals and materials using x-ray diffraction analysis.
- Quantitative determination of unknown minerals and materials by x-ray diffraction analysis.
- Determining the sizes of nano-scale materials, metals, and unknown materials using x-ray diffraction analysis.
- Determining the microtexture of metals by x-ray diffraction analysis.
- Identifying defects of atomic crystal structures of metals by x-ray diffraction analysis.
- Determining the burning temperatures of building materials and archaeological pottery (potteries and bricks) by x-ray diffraction analysis.
- Determining the burning temperatures of building materials and archaeological pottery (potteries and bricks) by x-ray diffraction analysis.
- Determine the necessary specifications for white sand for use in the manufacture of ordinary glass, eyeglass glass, and microscopes.
- Valuation of minerals that fall within the scope of precious stones.
- Evaluating building materials such as sand, gravel and quarry gravel and determining their suitability for various engineering purposes (concrete, mortar and paving purposes).
- Evaluating shale ore and mudstones, as well as natural products of rocks affected by erosion factors, and determining their suitability for the manufacture of clay bricks, ceramics, flooring, and paper industry.
- Study the granular and mineral composition of clay and claystone to serve as a database for the cement industry for decision makers in Sohag Governorate.
- Study the granular and mineral composition of old soil and new reclamation lands to become a database for decision makers in Sohag Governorate for the areas to be reclaimed.
- Conducting all geotechnical laboratory tests on different types of soil and rocks and fully analyzing their results.
- Measurements of swelling and subsidence of clay soil to determine the extent of its danger to the structures that may be above it.
- Study the suitability of various types of replacement soil, supervise their implementation, and conduct an integrated program to monitor their quality during implementation.
- Contributing to identifying the most suitable locations for new cities and desert roads by identifying the geological and engineering properties of the surface and subsurface soil of the proposed sites for these projects.

Lab Instruments

Device name	Device image		Description /use
Digital balance			Measurement of exact volumes of soil samples
Centrifugs			Separation of fine components into layers according to size
Burning furnace			Burning samples to determine their suitability for use

Drying oven		Determination of moisture content of samples
Incubator		for preserving samples Keeping samples at a constant temperature
Cylinder		Separating the fine components less than 4 microns in size
Oedometer Apparatus		Swelling pressure and swelling percent determination of fine-grained Soils □ Soil Settlement of fine-grained Soils

Manual scales		measuring different sizes
Distillatin machine		water distillation
Water pass		for evaporation and concentration of samples

Separatin funnels		Separation of heavy metals
Refrigeror		Preservation of different samples
Sand cone device		Determinatio n of sand density

Electric vibrators (shaker)		Separating soil samples into their different sizes
Casagrande Apparatus		measuring the plasticity and fluidity of samples
Ultrasonic		Separation of fine samples

Ph meter		pH measurement of samples
Marsh funnel		Viscosity measurement of samples
stainless steel mixer		Distribution of different sample sizes by dispersion

manual mill		for grinding samples
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Staff Members

NB	Name	Scientific degree	e-mail	Specializations
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8	Esraa Hassanain	Teaching Assistant	Esraa.Hassanien@science.sohag.edu.eg Esraahassaneen24@gmail.com www.linkedin.com/in/esraa-hassaneen-a739b51bb/	Sedimentary rocks

Rocks and Minerals Laboratory

Services Provided by the Laboratory:

- Determining the presence of igneous and metamorphic rocks that are used as decorative stones (marble).
- Determining the presence of igneous rocks, which are considered a source of rare metals.
- Determine the presence of metamorphic rocks as a source of talc.
- Determining the presence of feldspar minerals that are used in ceramics.
- Identifying ring complexes as a source of aluminum, which is used in ceramics.
- Determining the occurrences of granite rocks carrying radioactive elements.
- Identifying beryl, tourmaline, and chromite minerals in some rocks in the southern Eastern Sahara.
- Determine the geochemical properties of rocks.
- Mining field (evaluation of metallic and non-metallic ores, minerals and rocks).
- Quarrying field (evaluation of quarry raw materials).
- The field of geoscientific consulting.
- The field of industrial materials and raw materials (cement - fertilizers - medical drugs).
- The field of land reclamation and improving soil properties.
- The field of building and construction.
- The field of ornamental stones (marble of all kinds).
- There is a lab belonging to this lab for cutting and grinding rocks and creating scientific process thin-sections to examine and identify them.

Lab Instruments

Device name	Device image	Description /use
Microscope		Polarized microscope: Is for petrographic studies Optical system: Plan achromatic optical system Trinocular Bright field, polarizing Objective: 2.5X,10X,40X,60X Stage: Round rotating stage Illumination: LED Transmission illumination Polarizing: Analyzer 0~360° Adjustable
Grinder machine		The Automatic Mortar Grinder Pulverisette 2 is ideal for universal grinding of medium-hard-brittle to soft-brittle materials (dry or in suspension) to analytical fineness, as well as for formulation and homogenisation of pastes and creams at laboratory scale.
cutting machine		Discoplan-TS is a precision cutting and grinding machine for mineralogical, petrographic, and ceramic thin sections. The left side of the machine has a table with a diamond cut-off wheel and holders for initial cutting and re sectioning of the specimen. The right side has a diamond cup wheel and a vacuum holder for simultaneously grinding up to three specimens almost to their final thickness with an accuracy of 2 m.

Microscope		Fully polarizing microscope type "Primotech" for transmitted and reflected light illumination light Built in IP camera for petrographic studies and making photomicrographs
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Staff Members

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8	Yasmeen Abdelhameed	Teaching Assistant	yasmin.mohammeed@gmail.com	Geochemistry

Geophysics Laboratory

Services Provided by the Laboratory:

- The geophysics laboratory contains some modern and advanced devices such as: (a ground radar scanning device - a seismic surveying device - a ground magnetometer - an electrical resistance measuring device - an electromagnetic device).

- **Ground radar scanning device:** used in subsurface scanning using electromagnetic waves.

- **Applications:** examining the soil to indicate the quality of geological layers before construction work to identify voids and cracks without excavating traditional foundations - detecting buried remains of buildings that reach depths of 30 meters below the surface of the earth - conducting a survey of the facilities located on roads and streets without digging asphalt to identify all types of pipes and cables Electricity: Determining the depths and locations of groundwater - Examining asphalt sections and their thickness to ensure their safety - It is used in environmental and engineering studies, such as examining concrete sections to show cracks, voids, and steel reinforcement or the extent of its corrosion, and knowing columns, beams, and ceilings - It is used for mining purposes - Studying subsurface layers in sanitary landfill sites To bury solid waste - detect buried antiquities - it has applications in the field of crime detection - to detect buried bodies - it has applications in the field of agriculture - to detect water paths in the soil.

- **Seismic scanning device:** used for subsurface detection using seismic waves.

- **Applications:** geotechnical assessment - determining seismic areas - groundwater exploration - drawing the boundaries of subsurface layers - detecting subsurface structures - detecting cavities and cracks - determining soil properties.

- **Terrestrial magnetometer device:** used to measure the strength of the magnetic field.

- **Applications:** archaeological exploration - delineating the boundaries of subsurface layers - detecting subsurface structures - mineral exploration - determining the thickness of sediments.

- **Electrical resistance measuring device:** used for subsurface detection using electrical characteristics.

- **Applications:** geotechnical assessment - groundwater exploration - drawing the boundaries of subsurface layers - detecting subsurface structures - detecting cavities and cracks.

- **Electromagnetic device:** It is a low frequency system, characterized by the presence of 3 multi-directional transmission stations for VLF data - frequency range 15 - 30 kHz.

- **Applications:** resistivity imaging and foundation mapping - determining differences in conductivity at depth - geological mapping and faults - searching for mineral objects - searching for water.

Lab Instruments

Device name	Device image	Description /use
GEM - Portable VLF System	 Robust GEM - GSM 19V VLF show	Portable fast resistivity solutions. Map resistivity up to 100 metres. Inversion model produced with EMTOMO software. The GEM GSM-19V portable VLF system is a robust tool for environmental and exploration purposes. Technically Superior This new evolved system builds off our proven airborne technology. The GEM VLF takes true measurements of the Vertical in-phase & Out-of-phase components as % of total field within the VLF frequency range of 15 – 30kHz. Applications are many; • Resistivity imaging and bedrock mapping • Delineate contrasts in conductivity at depth • Map geological contacts, faults • Search for mineralized bodies • Water exploration
GEM Overhauser Magnetometer system (Magnetometer / Gradiometer)		GEM Systems Overhauser Magnetometer system. It can be configured with additional survey sensors for simultaneous gradiometer readings as well as VLF. System configurations can also include walking mode and GPS. GEM Systems GSM-19 Overhauser total field magnetometer and the GSM-19G Gradiometer provide improved data quality and greater absolute accuracy than Proton magnetometers, while providing a robust and comparable system to costlier Cs magnetometers for ground applications. The GSM-19 is a standard in many fields, including: • Mineral exploration • Environmental and engineering • Pipeline mapping • Airborne basestation

		• Unexploded Ordnance Detection • Archaeology • Magnetic observatory measurements • Volcanology and earthquake prediction
Ground Penetrating Radar “GPR” GSSI System Model SIR-4000		Applications: Archaeology, Geotechnical assessment, Shallow water investigation, Fill Zones, Contamination mapping, Mines outline, Shallow Structure. Antennas: 100Mhz, 200 MHz, 270 MHz, 400MHz, 900MHz and Multi-Frequency antenna (16MHz-80MHz)
Geometrics 24 Channel Seismograph Shallow Seismic Refraction (Geode Seismograph)		Applications: Geotechnical assessment, Seismic zonation, Structure mapping, Tectonic, Seismic hazard, Oil exploration, Water exploration, Modulus calculations, Buildings codes, Soil amplification. Accessories: 24 Channel, P-Wave geophones, S-Wave geophones, 3- Components geophones, Batteries Software: SeisImager
Topcon Positioning Systems (GNSS HiPer SR)		Applications: 1. Geopositioning 2. Surveying 3. Used in the precision measurement systems and technologies. 4. It helps the students in surveying, engineering, GIS, agriculture and construction.

ROYAL ANALYSER Model (BR SYSTEM)		The device is used in metal detection and therefore can be used in many areas: 1- The field of prospecting for gold and precious metals. 2- Explore the ancient pharaonic monuments and tombs. 3- Exploration of groundwater located below the surface.
JEOTARA		The device is used in metal detection and the field of prospecting for gold and precious metals. Explore the ancient pharaonic monuments and tombs.
Electrical resistance measuring device model (ARES - Automatic Resistivity System)		The device is used to measure electrical resistance and therefore can be used in many areas: Exploration of ground water and its distribution. Engineering exploration and knowledge of the sub-surface layers. Knowledge of subsurface geological structures.
Ground Resistance		Ore deposits mapping, Shallow to deep water investigation, Soil distribution, Contamination mapping, Archaeology, Shallow Structure, Mining and quarries.
Magnetic intensity measuring device model (Magnetometer- Land G- 856, Geometrics Company)		The device is used to measure the strength of the magnetic field, and therefore it can be used in many fields: The field of detecting metals and economic ores. Knowledge of subsurface geological structures. Applications: Structure mapping, Tectonic, Oil exploration, Archaeology, Ore deposits investigation.
		Applications: 1. Geopositioning

Garmin GPS 64X		2. Surveying Used in the precision measurement systems and technologies.
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Staff Members

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Hydrogeological Modeling Laboratory

Services Provided by the Laboratory:

-Implementing scientific research and studies on exploring groundwater reservoirs and determining their efficiency in terms of quantity and type using the latest technological means, devices and computational models with a high level of experience and efficiency, including:

- Determining the depth and thickness of water-bearing layers using various surface electrical and geophysical sensors.
- Determine safety factors for withdrawal from underground reservoirs through pumping experiments, analyze their results, develop the optimal method for exploitation, and determine the specifications of depth pumps in light of the capabilities of the underground reservoir.
- Identifying different methods to address the problems of underground wells in terms of their low productivity - corrosion of pipes - addressing drilling problems...etc.
- Determine the quantities of underground reserves and their continuity.
- Determine the best locations for drilling underground wells.
- Drilling groundwater wells and designing them in a way that ensures efficient production of the wells while maintaining the type of pipes and filters used and following up on their implementation to reach safe withdrawal transactions from them.
- Conducting chemical analyzes to determine their suitability to serve the purposes of agricultural investment projects, animal production, etc., and studying the sources of pollution and treating its effects.
- Implementing feasibility studies for agricultural reclamation projects.
- Study, inventory and classify drainage basins and flood streams, protect urban areas, industrial facilities and roads, and propose solutions to benefit from flood water.
- Inventorying and classifying the lands, analyzing the soil, and proposing the appropriate agricultural cycle in light of the natural and chemical properties of the soil.
- Implementing training programs for those interested in the field of groundwater and land to use expert systems in the fields of water and land resources management and development of groundwater reservoirs.
- Assessing the environmental impact of water and agricultural projects.
- Groundwater studies - studies of environmental pollution and water sources.
 - Modeling groundwater reservoirs - modeling drainage basins - modeling rivers, lakes and water channels - studies of deep reservoirs - models for managing underground and surface reservoirs and drainage systems - modeling water source pollution - models for managing water sources.
- Studies of biological contamination of water sources.
- River water management and flood control studies.

- Scientific consulting.

Staff Members

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4	Dr. Ashraf Ismail	Associated Professor	ashraf_2004e@yahoo.co.uk	Hydrogeology

Paleontology Laboratory

Services Provided by the Laboratory:

- Identifying and defining rock units.
- Determining geological times through the use of fossils and setting their own ranges for distinction.
- Scientific and research consultations in the field of petroleum and petroleum companies, especially during well drilling.
- Study the impact of environmental pollution on the coasts of coastal cities using microfossils to determine the extent of the danger of these pollution to the population in those cities.
- Studying ancient geological climate change with climate change at the present time through geochemical studies on microfossils and giving advice on those changes that may occur in the future.
- Using fossils to identify geological stratigraphic problems and link them to each other.

Lab Instruments

Device name	Device image	Description /use
ZEISS Axio LAB A1 microscope		Axio Lab. A1 shines in laboratories for microbiology, cytology, hematology, and pathology. The micro- scope is ideally suited for work in parasitology and immunofluorescence and is a valuable working tool in schools and universities. 1- Routine examination of various micro-fossil plant slides prepared for examination. 2- Photographing slices of various micro-plant fossils using a color camera with the possibility of showing their various characteristics in a complete and good manner.

ZEISS Stereo Zoom-Microscope (Stemi 305)		Stemi 305 is your compact Greenough stereo microscope with 5:1 zoom for biological education, labs and industrial production environments. Observe your samples as they are: three-dimensional and crisp in contrast - no preparation required. 1. Routine examination of microfossil slides prepared for examination. 2. Photographing using a color camera, showing all the different characteristics of the microfossils, and also displaying them using a display screen in a complete and good way.
ZEISS Stereo Zoom-Microscope		- Routine examination of microfossil slides prepared for examination. - Showing all the different characteristics of the microfossils.
Olympus trinocular compound microscope with digital camera		Used for examining micro-samples, such as micropaleontological slides, geological thin sections, or biological specimens under precise magnification.

Staff Members

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