

State of the Art Lab Instruments and Facilities at the Department of Natural Sciences

Science and Technology Center



Transmission Electron Microscope (TEM)



Model : JEM-1400plus (Jeol.co)

Where : STC, room 33

TEM is microscope that uses an electron beam to visualize specimens and generate a highly-magnified image. The system has the capability to magnify up to 1 million times

Field Emission Scanning Electron Microscope (FESEM)



Model : JSM7100F (Jeol.co)

Where : STC, room 360

FESEM is a type of electron microscope that produces images of a sample by scanning the surface with a focused beam of electrons.

Our SEM has an energy-dispersive X-ray (EDX) detector that allows for elemental analysis or chemical characterization of a sample

Atomic Force Microscope (AFM)



Model : Solver Next

Where : STC, room 360

AFM is a type of scanning probe microscopy (SPM), with demonstrated resolution on the order of fractions of a nanometer, more than 1000 times better than the optical diffraction limit.

The system offers both qualitative and quantitative information on many physical properties including size, morphology, surface texture, roughness and thin film thickness

Nuclear Magnetic Resonance Spectroscopy (NMR)



Model : Ascend 400

Where : STC, room 103

NMR spectroscopy or magnetic resonance spectroscopy (MRS), is a research technique that exploits the magnetic properties of certain atomic nuclei to determine or confirm the molecular structure of organic/organometallic compounds. The instrument can record both 1D NMR (^1H , ^{13}C , ^{15}N , ^{31}P , ^{19}F), and 2D NMR (COSY, HMBC, HMQC, NOESY, DEPT, DOSY, TOCSY) spectra

MicroTome



Model : Leica EM UC7

Where : STC, room 018

Microtomes are used to cut thin slices of material, known as sections, allowing for the preparation of samples (especially biological samples) for observation under transmitted light (optical microscopes) or electron radiation (electron microscopes)

Atomic Absorption Spectroscopy (AAS)

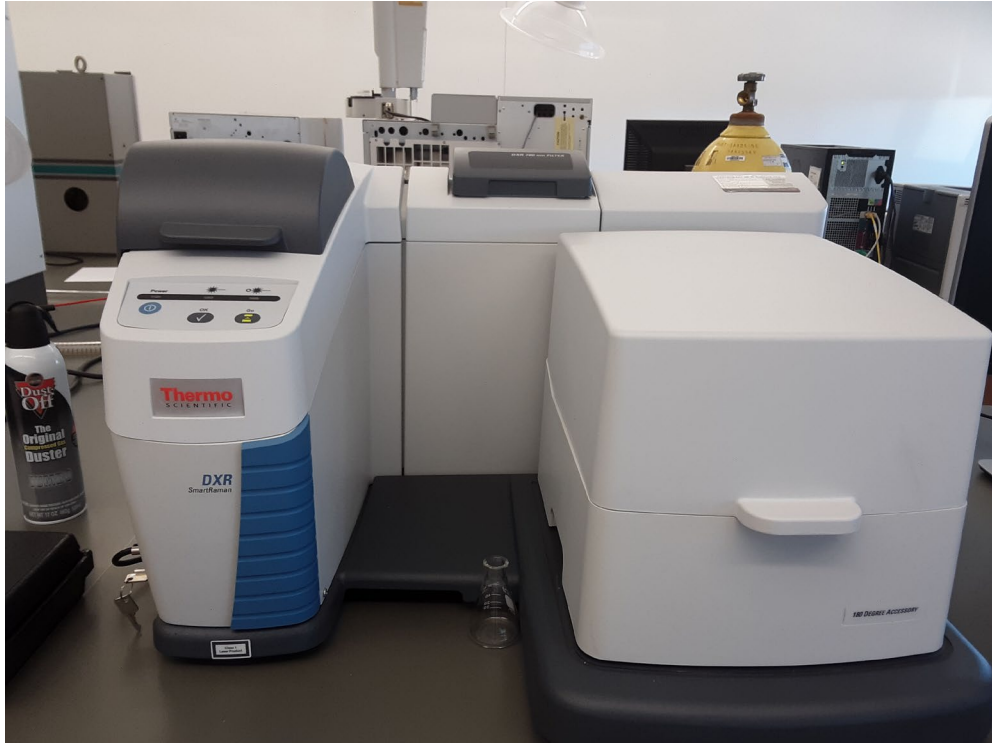


Model : PinAAcle900F
Where : STC, room 486

AAS is an analytical technique used to determine how much of certain elements are in a sample.

AAS gives both qualitative and quantitative data. The system is equipped with numerous lamps (As, Cu, Pb, Hg, Zn, Cd, Si) and an auto sampling easing data collection from large number of samples

Raman Spectroscopy



Model : DXR smart Raman
Where : STC, room 470

Raman Spectroscopy is a non-destructive chemical analysis technique which relies upon inelastic scattering of photons, known as Raman scattering to provides detailed information about chemical structure, phase and polymorphy, crystallinity and molecular interactions.

Ultraviolet-visible Spectroscopy (UV-Vis)

Model : PerKinElmer Lambda 850

Where : STC, room 470



UV-Vis spectroscopy is used to obtain the absorbance spectra of a compound in solution or as a solid. We have three standard UV-Vis systems (200nm to 800 nm scan range) and an advanced UV-Vis-NIR system (200 nm to 2500 nm scan range). The system allows for photometric and kinetic studies

Liquid chromatography-mass spectrometry (LC-MS)



Model : Agilent 6420 Triple Quad
Where : STC, room 244B

LC-MS is a powerful analytical technique used for separation, identification, and quantification of both unknown and known compounds as well as to elucidate the structure and chemical properties of different molecules.

Gas chromatography– Mass Spectrometry (GC-MS)



Model : Agilent G3440B
Where : STC, room 478

GC-MS is an analytical method that combines the features of gas-chromatography and mass spectrometry to identify different substances within a test sample

Thermogravimetric Analysis (TGA) and Differential Scanning Calorimetry (DSC)



Model : TA Discovery Series TG and DSC

Where : STC, room 245

A method of thermal analysis in which changes in physical and chemical properties of materials are measured as a function of increasing temperature, or as a function of time.

TA Instruments' Discovery Hybrid Rheometer



Model : TA Discovery Series HR20
Where : STC, room 245

Rheology is the study of flow and deformation of materials. Deformation and flow are referred to as strain or strain rate, respectively, and indicate the distance over which a body moves under the influence of an external force, or stress. For this reason, rheology is also considered to be the study of stress-strain relationships in materials.

A rheometer is a precision instrument that contains the material of interest in a geometric configuration, controls the environment around it, and applies and measures wide ranges of stress, strain, and strain rate

Glove Box



Model : MBraum Lab master Pro SP
Where : STC, room 470

Glove Boxes provide a leak-tight environment for work with toxic or air sensitive materials

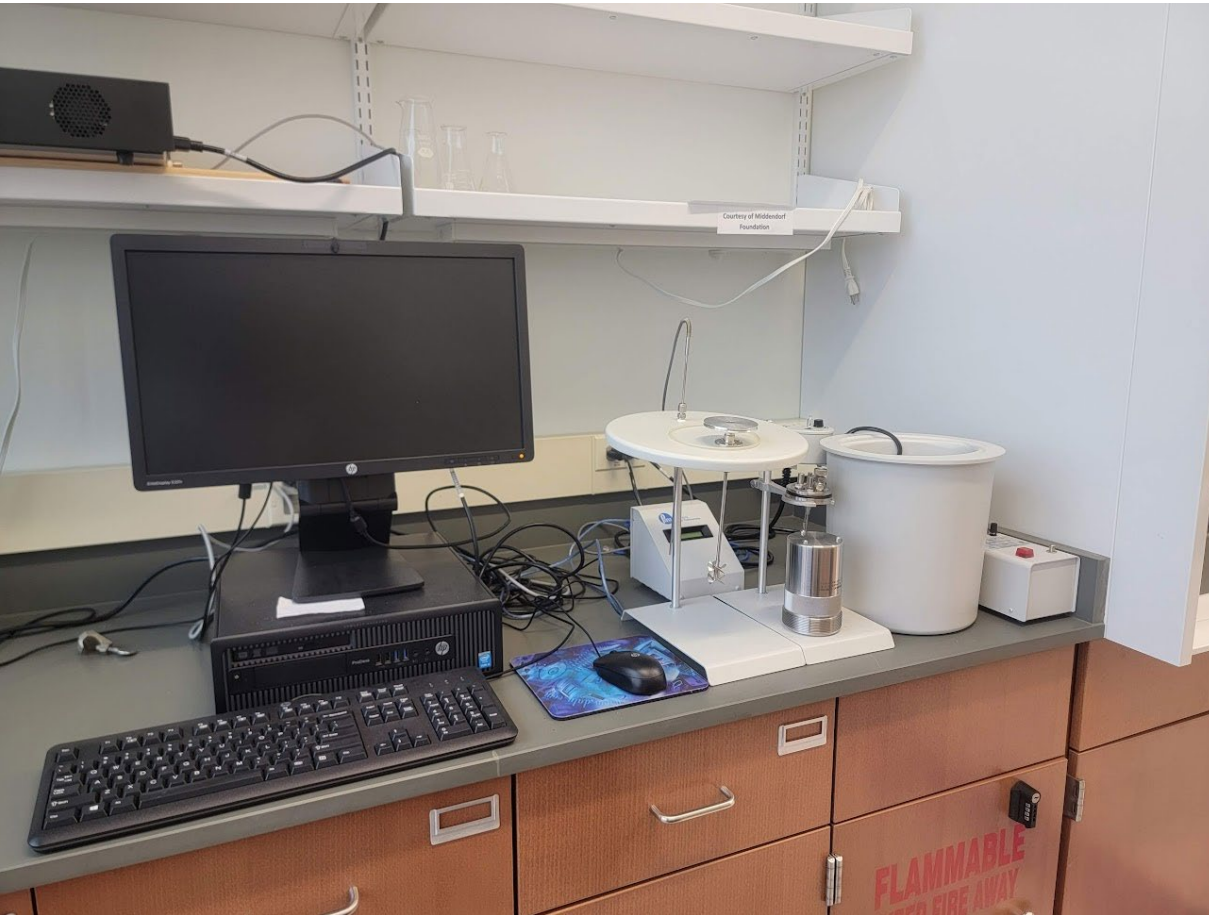
FTIR (Fourier Transform infrared spectroscopy)



Model : Nicolet iS50 FT-IR
Where : STC, room 470

FTIR Spectroscopy is an analytical technique used to identify organic, polymeric, and, in some cases, inorganic materials. The FTIR analysis method uses infrared light to scan test samples and observe chemical properties

Bomb Calorimeter



Model : Parr Instrument
Where : STC, room 481

Bomb calorimeter is an apparatus primarily used for measuring heats of combustion. The reaction takes place in a closed space known as the calorimeter proper, in controlled thermal contact with its surroundings, the jacket, at constant temperature

Biospectrometer - Nanodrop



Model : Biospec-Nano

Where : STC, room 264

It offers superior detection limits, up to 10 times better compared to the competition, making it the perfect instrument for quantitation of DNA, RNA, protein analysis, and photometric measurements.

BIORAD GenePulser Xcell



Model : BIORAD GenePulser Xcell

Where : STC, room 264

This electroporation machine exposes cells to an electrical field that disrupts its membrane enough for the membrane to become permeable. Once permeable, desired components can enter the cell. This technique is typically employed for targeted gene expression.

Aria MX Realtime PCR



Model : Aria MX Realtime PCR

Where : STC, room 264

Real-time PCR/qPCR is used for the rapid and sensitive determination and quantitation of nucleic acid in various biological samples. This technique has diverse applications in the analysis of gene expression.

BIORAD C1000 TOUCH THERMOCYCLER



Model : BioRad C1000 Touch Thermocycler

Where : STC, room 264

Endpoint PCR is used for the qualitative amplification of nucleic acid in various biological samples. This technique has diverse applications in the diagnosis and gene expression.

Ultra Centrifuge

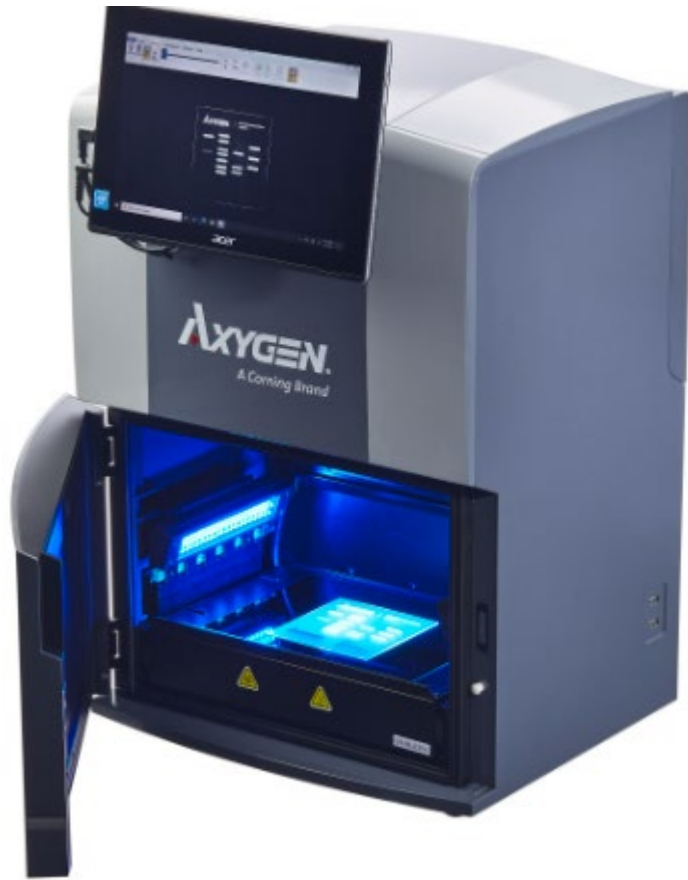


Model : Thermo Scientific Wx + Ultra series

Where : STC, room 470

A **centrifuge** is a device that uses centrifugal force to separate various components of a fluid. Biologically can be used to separate components subcellularly.

Gel Documentation System



Model : Axygen Gel documentation-BL
Where : STC, room 264

Gel Documentation systems easily capture publication quality, 16 bit TIFF images. The systems are quick to set up and have an intuitive user interface for image capture, annotation, and contrast adjustment. Can be utilized to view DNA fingerprints and PCR amplified products.

Capillary Electrophoresis



Model : Agilent capillary
electrophoresis 7100
Where : STC, room 470

Capillary electrophoresis is an analytical technique that separates ions based on their electrophoretic mobility with the use of an applied voltage.

High Performance Liquid Chromatography (HPLC)



Model : Agilent 1260 Infinity
G1316A

Where : STC, room 245

A technique in analytical chemistry used to separate, identify, and quantify each component in a mixture

Fluorescence Lifetime system



Model : DeltaFlex Tm

Where : STC, room 360

The DeltaFlex time correlated single photon counting (TCSPC) system is a time correlated single photon counting lifetime instrumentation. It measures luminescence lifetimes ranging over 11 orders (from 25ps to 1 second) of magnitude

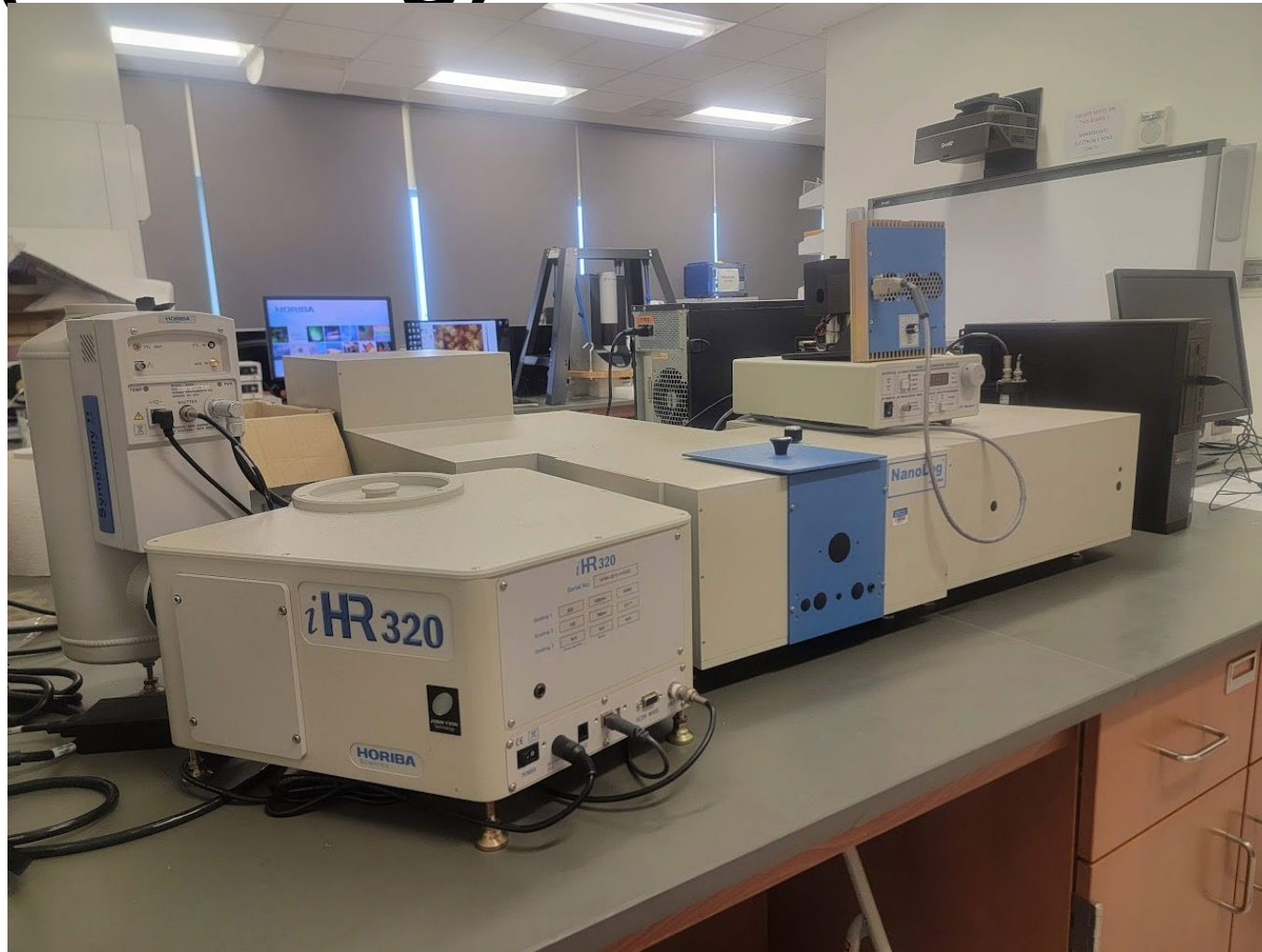
Nanoparticle Analyzer (Dynamic Light Scattering Particle size analyzer)



Model : Horiba SZ-100V2
Where : STC, room 360

Determines particle size by measuring the random changes in the intensity of light scattered from a suspension or solution. The system also has the potential to analyze zeta potential and molecular weight of a sample

Fluorescence spectrometer system (Nanolog)



Model : Horiba Nanolog iHR 320
Where : STC, room 360

Fluorescence spectroscopy (also known as spectrofluorometry) is a type of electromagnetic spectroscopy that analyzes fluorescence from a sample. The system detects fluorescence in the visible and near-IR (from 800 to 1700 nm) and has multiple sample holders with a cryogenic option

Tensile Measurement



Model : United Tensile Instrument
Where : STC, room 481

Tensile testing is a destructive test process that provides information about the tensile strength, yield strength, and ductility of the metallic material. It measures the force required to break a composite or plastic specimen and the extent to which the specimen stretches or elongates to that breaking point.

Voltammetry

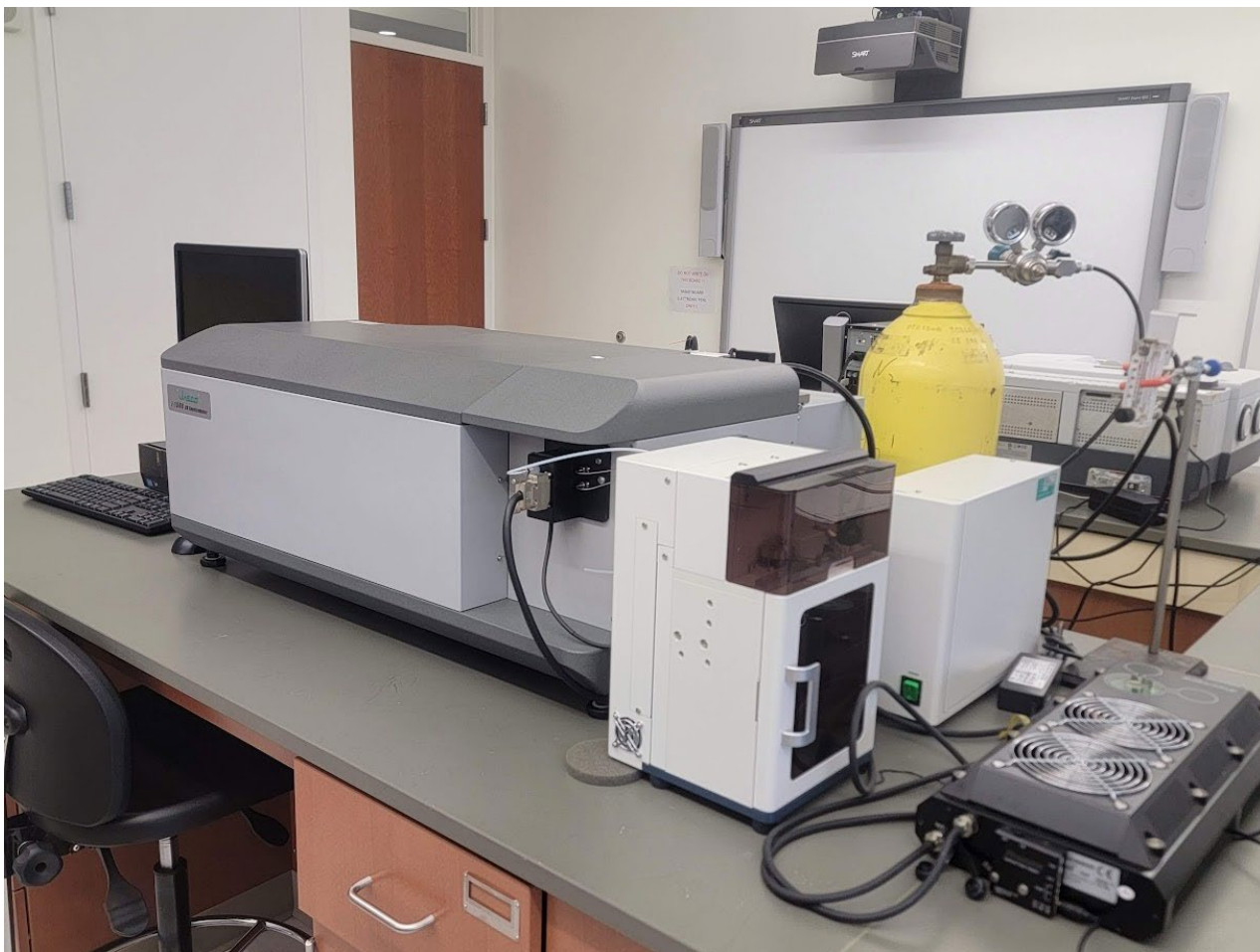


Model : Metrohm Voltammetry
Where : STC, room 362A

Voltammetry is the study of the current response of a compound under an applied potential difference.

Voltammetry encompasses a number of different methods, each of which can tell us about the kinetics and thermodynamics of electron addition (reduction) and electron loss (oxidation)

Circular dichroism (CD) spectrometer



Model : J-1500-150

Where : STC, room 470

Circular dichroism (CD) spectroscopy is a form of light absorption spectroscopy that measures the difference in absorbance of right- and left-circularly polarized light (rather than the commonly used absorbance of isotropic light) by a substance.

Human/Anatomy Physiology lab



Biotechnology/ Genetics Lab



Microbiology/Histology Lab



Organic Chemistry Lab



Physical Chemistry Lab



General Chemistry Lab



Green House

