Chemistry and Biochemistry Instrumentation

Techniques/Tools	Instrumentation/Equipment
Spectroscopy	
Atomic spectroscopy	PerkinElmer AAnalyst 800 atomic absorption spectrometer
Fluorescence spectroscopy	Agilent Cary Eclipse Fluorescence Spectrometer with microwell plate reader
Mass spectrometry	PerkinElmer NexION 1000 ICP-MS Agilent 6890N GC with 5975B inert XL MSD Agilent 6545XT Advance Bio LC/Q-TOF
NMR	Magritek Benchtop Spinsolve Carbon 43 MHz NMR
Thermal analysis	Parr 6765 Calorimeter
UV-Vis spec	Shimadzu UV-2501PC UV-Vis Spectrometer Thermo Scientific Biomate3S UV-Vis Perkin Elmer UV-Vis Spectrometer LAMBDA 850 Agilent Cary 300 UV-Vis Beckman Coulter Spectrometer DU-640
Vibrational spectroscopy	Thermo Scientific Nicolet Is50 FT-IR spectrometer
Separation	
Gas chromatography	Agilent GCMS 5975B/ 6890N with Gerstel Auto-sampler Agilent 7890A GCS
Liquid chromatography	Agilent 1260 Infinity II HPLC Agilent 1290 Infinity II UHPLC Agilent 1100 HPLC Auto-sampler
Electrophoresis	Bio-Rad Electrophoretic Chambers
Centrifugation	Beckman Coulter Microfuge 22K Eppendorf Centrifuge 5417C
Gene amplification, detection, and concentration	
Thermal cycling	Bio-Rad Genecycler MJ Research Minicycler
Gel imaging	Kodak Gel Logic 1500 Imaging System Ultra Lum Transilluminator
Concentration	Labconco Freeze dry System 4.5 Savant Speedvac Plus SC110A
Molecular models and graphics	
	Pymol Molecular Graphics System ApE Plasmid Editor Snapgene Viewer Spartan molecular model
Miscellaneous	
	Milestone Microwave Marshall Shaker-incubator series Labconco Purifier Class II Biosafety Cabinet Cold room Class A fume hoods

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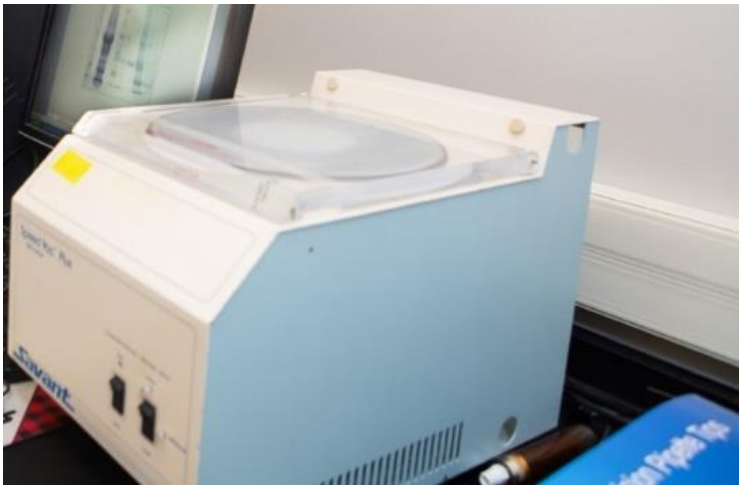
Savant Speedvac Plus SC110A Centrifuge



The ***Savant SC110A-115 SpeedVac Plus*** is located in the Biochemistry prep laboratory workspace in **Science & Technology 361**.

It is designed to rapidly evaporate liquids to concentrate or dry solutes, analytes, and residues in aqueous and organic solvents. Built to include an automatic valve for the use of a vacuum, the SC110A-115 can handle a variety of applications including concentrating oligonucleotides, ethanol precipitates of DNA, hydrolysates of proteins, chromatography fractions, solid phase eluants and samples for analysis by HPLC, GC/MS, immunoassay, and bioassay.

Agilent Cary Eclipse Fluorescence Spectrometer with Micro-well Plate Reader

The ***Agilent Cary Eclipse Fluorescence Spectrometer*** with micro well plate reader is located in the Bio and Macromolecular Chemistry laboratory workspace in **Science & Technology 361**.

Fluorescence spectroscopy can be coined as one of the most prominent applied domain of spectrophotometry. It is an inherent property of many aromatic/organic compounds. Fluorescence is not an isolated event. It typically occurs alongside phosphorescence, which together makeup luminescence. Luminescence is emission of light from a substance resulting from changes in excited states, but with fluorescence and phosphorescence, differ based on the nature of the excited state. When an electron is excited, and occupies an excited-state orbital, it possesses an opposite to the electron in the ground state. Thus the return to the ground state from excited state is spin allowed and occurs via emission of a photon.

The Agilent Cary Eclipse fluorescence spectrometer can perform fluorescence, phosphorescence, luminescence and time resolved analyses. This instrument is equipped with highly sensitive detector and optics, making it suitable for through put and kinetic applications.

Agilent GCMS 5975 w/ Gerstel Multipurpose Auto Sampler

Agilent Gas Chromatography Mass Spectrometry (GC/MS) is located in the **Analytical laboratory workspace in Science & Technology 262.**

The Agilent GC-MS targets small and volatile molecules. It has high performance for a broad range of samples and applications. It is the analysis method of choice for smaller and volatile molecules such as alcohols, aromatics, and simple molecules such as steroids, fatty acids, and hormones. It can be used for the analyses of lipids, hormones, and fatty acid content in foods (Agro industry), environmental contaminants, and blood toxins (toxicology/forensics), etc.

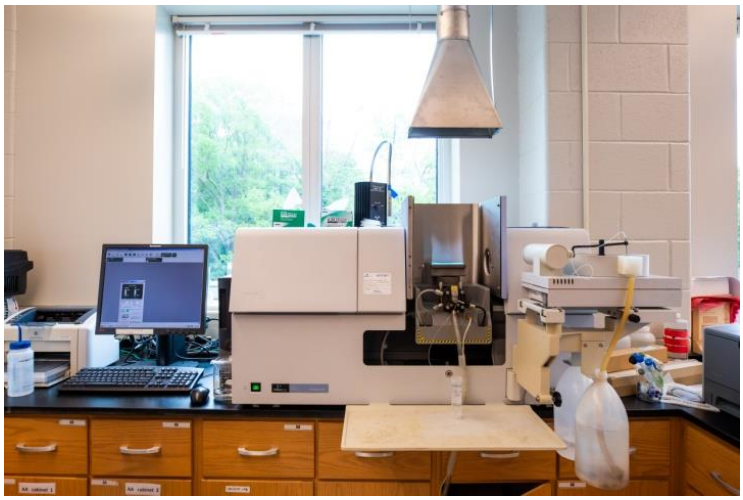
This instrument has a high retention time and area reproducibility due to its unique temperature and pneumatic control. Its digital range supports the quantification of small and larger sample peaks in one run. This instrument has standard atmospheric pressure and temperature balance; hence fluctuations in the lab environment do not impact results.

Milestone MTCSC Microwave

ETHOS UP Microwave Digestion System MTCSC is located in the Analytical laboratory workspace in **Science & Technology 263**

Offers a complete first-class solution for microwave solvent extraction, organic and inorganic synthesis, protein hydrolysis, and vacuum evaporation.

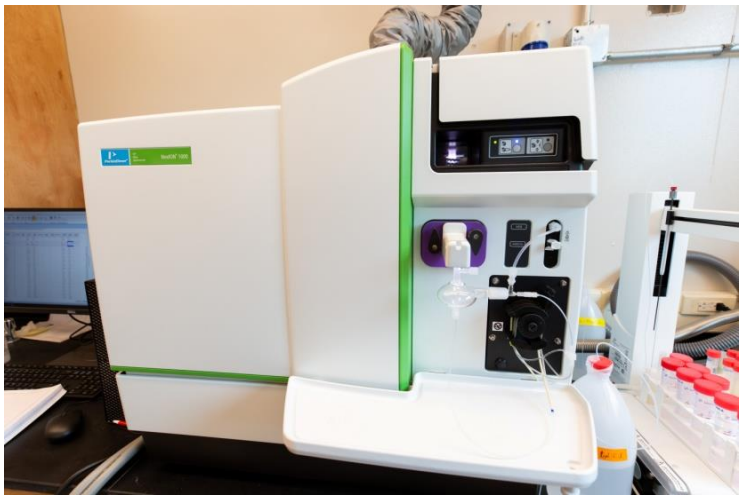
PerkinElmer AAnalyst 800 Atomic Absorption Spectroscopy



Atomic Absorption Spectroscopy is located in the Instrumentation laboratory workspace in Science & Technology 262.

The PerkinElmer Aanalyst 800 spectrometer is a robust spectrometer with state-of-the-art performance. It quantifies elements in solution by passing them through an acetylene flame, and concentrations determined by comparisons to known standards. This instrument contains a unique temperature control system, ensuring an interference-free metal analysis.

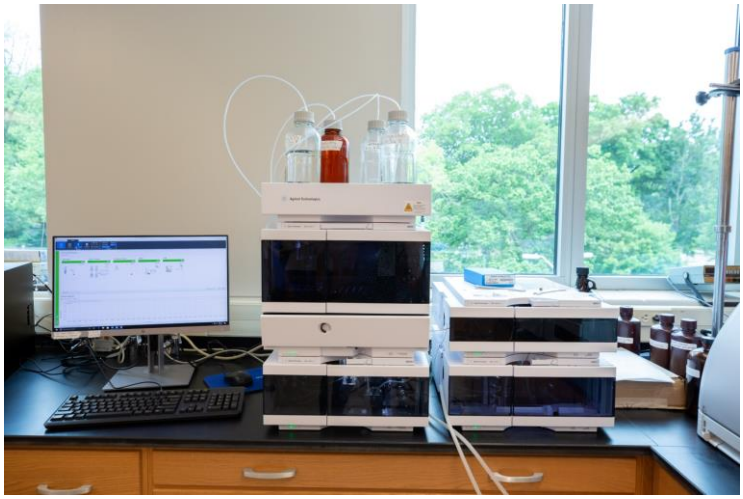
PerkinElmer NexION ICP 1000



The NexION® 1000 ICP-MS is located in the **Instrumentation laboratory Science & Technology 262.**

The NexION 100 ICP-MS is an excellent tool for elemental analyses. It houses the automated, robust and highly efficient S23 autosampler. Its extended dynamic range offers it a unique LOD and ULD. The ICP-MS analyses are simplified using an argon stream, resulting in high quality data. Detection and quantification of heavy metals in water, detection of contaminants in eye drops, metal analysis in cannabis, are a few applications of this instrument.

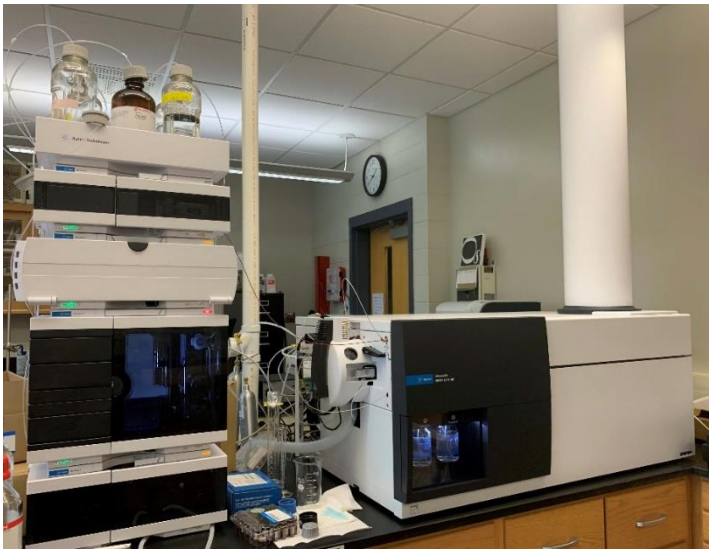
Agilent HPLC 1260 Infinity



High performance liquid chromatography (HPLC) is located in the Instrumentation laboratory in **Science & Technology 262**.

It is a technique in analytical chemistry used to separate, identify, and quantify each component in a liquid mixture. The Agilent 1260 Infinity Quaternary HPLC offers the most flexibility for solvent selection and automation in HPLC method development, research and all HPLC applications requiring continuous access to a wide range of solvent choices. It is ideally suitable for multi-method, high-throughput workflows.

Agilent LC/Q-TOF Mass Spec G6549AA/ 6545XT



Agilent LC/Q-TOF Mass spec is located in the Instrumentation laboratory workspace **in Science & Technology lab 262.**

Liquid chromatography (LC) separates the sample components and then introduces them to the mass spectrometer (MS). The MS creates and detects charged ions. Once detected, spectra of relative abundance against the ratio of mass/charge (m/z) are generated. These spectra are used to determine molecular masses of molecules under investigation, provide more data for structural elucidation, detect reaction (by)products, etc.

Leopold the LCMS - Agilent 6545XT AdvanceBio MS QTOF is coupled with the 1260 Infinity II LC system. This LC offers a broad range of analytical applications with high reliability, performance, and precision. The QTOF is designed to optimize the characterization of biomolecules. It possesses the SWARM autotune function for optimal performance and detection at the sub-nanogram level with mass accuracies within 10 ppm. Its application in proteomics includes peptide mapping, detection of PTMs, intact protein analysis, etc. It is also suitable for metabolomics, forensic analyses, environmental analyses, and clinical applications, etc..

Magritek Spinsolve Benchtop NMR

Magritek Spinsolve Benchtop NMR is located in the Instrumentation laboratory **Science & Technology 262.**

It is ideal for chemists where it can be used for reaction completion checks, identification, structure elucidation, quantification, purity measurements, online reaction monitoring and quality control (QA/QC).

Nicolet™ iS20 FTIR Spectrometer

Thermo Scientific Nicolet™ iS20 FTIR Spectrometer is located in the **Organic Chemistry laboratory in Science & Technology 260**.

Fourier Transform Infrared Spectroscopy, also known as FTIR Analysis or 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

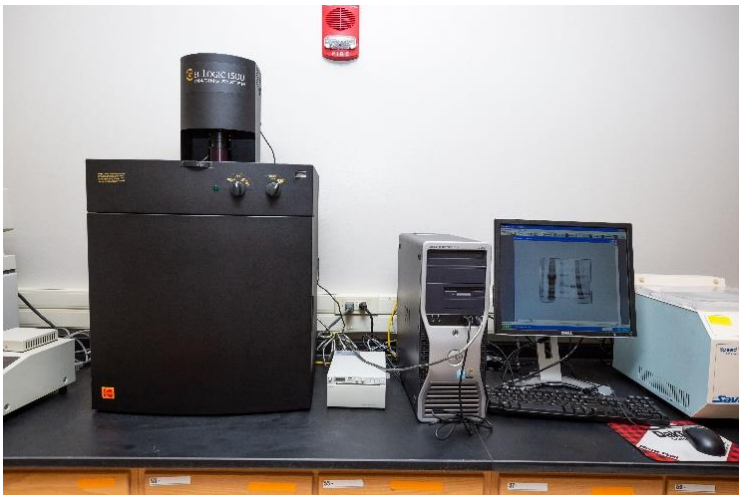
The Nicolet FTIR provides flexibility in sampling. It has a broad range of applications and measures many aspects of a sample automatically. It eliminates several stages of manual handling of optical components. This instrument can analyze a broad range of chemical reagents with very little sample preparation. The Nicolet FTIR performs analyses from a vast range of fields including pharmaceutics, Food industry, forensics, polymer science, etc.

Labconco Freeze Dry System 4.5

The *Labconco Freeze dry System* is located in **Biochemistry lab 361**

This is a 4.5L benchtop lyophilizer, capable of attaining -50oC. It provides the user with a real time display of temperature, vacuum pressure level. It has several outlets and can be used to freeze-dry multiple samples. it is typically used to dry samples and prepare them for shipping or preservation.

Imaging System



Imaging System Located in **Biochemistry lab Science & Technology 361**

A gel imager is an equipment used in many biochemistry and molecular biology laboratories. It is used to images of stained agarose or polyacrylamide gels. Agarose and polyacrylamide gels are typically used to separate nucleic acids and proteins, respectively. Agarose gels can be stained with fluorescent compounds like ethidium bromide, GelRed, GelBright, etc., and polyacrylamide gels with Coomassie stain, silver, fluorescent dyes like SYPRO orange, etc.

The KODAK Gel Logic 1500 is an advanced imaging system for chemiluminescence, fluorescence, other chromogenic gels, blots, plates, etc. This system is very sensitive, with an integrated 1.4 million pixel cooled CCD camera with mega pixel resolution, a wide sample loading chamber with ultra transluminescence lighting and data analysis software. the enhanced sensitivity is attributed to the cooled camera at -25 degrees Celsius from room temperature to increase signal to noise ratio.

It is applicable for broadband UV detection, nucleic acid gels, protein gels, colorimetric and chemiluminescence analyses. It can be used to excite a variety of dyes using its different illumination modes; Epi UV, Epi white, white-light transillumination, UV transillumination, etc

Nuclear Magnetic Resonance (NMR)

Nuclear Magnetic resonance, is located in the NMR lab in **Science & Technology 259**.

It exploits the change in energy levels after exposure to a strong magnetic field, forms the basis of some powerful analytical research tools. Magnetic resonance spectroscopy (MRS) encompasses a variety of related techniques, such as nuclear magnetic resonance (NMR) and electron paramagnetic resonance (EPR) that have a diverse array of research, clinical and industry applications. The non-invasive, non-destructive nature of the technology allows the study of living cells and tissues as well as detailed analysis of solutions and body fluids. A combination of magnetic resonance analyses can provide both functional information and anatomical information, allowing relationships between the two to be determined.

The Nuclear Magnetic Resonance facility (in Science and Technology Center, 259) is insulated, vibration free facility, home to a Varian Inova 600 MHz actively shielded NMR, with a 14.1 Tesla standard bore magnet and a 5 mm triple resonance inverse cryoprobe. This is essential for structure elucidation, monitoring reactions, quantification of molecules in complex mixtures.

Ultrasonic Cell Sonicator 1204P16

The ***Sonicator*** is located in the Biochemistry teaching laboratory workspace in **Science & Technology 362**.

The sonicator uses ultrasonic waves to homogenize, lyse or disrupt particles in suspension. It has a variety of applications including extracting pigments, proteins, nuclear material, and other cell organelles from plants, algae, bacteria, yeast, heart, skin tissue, etc. The intensity of the sonication process is regulated based on the cell/tissue type under investigation.