

# **Instrumentation and Equipment List**

Department of Agricultural & Environmental Sciences,  
College of Agriculture, Human, and Natural Sciences  
Tennessee State University

# **Instrument List**

Department of Agricultural & Environmental  
Sciences

**Agricultural Biotechnology Bldg**

# **Environmental Soil Chemistry Laboratory**

**Dr. Sudipta Rakshit  
Ag. Biotechnology Bldg.  
Room # 228  
Phone: 615-963-6058**

# Environmental Soil Chemistry Laboratory

Instrument 1.  
PI: Dr. Sudipta  
Rakshit



## **XRD Instrument MiniFlex 600 (Rigaku):**

- Benchtop powdered X-ray diffractometer can be used to determine the mineralogical content of soil, sediments, and geological materials.
- Special accessory provides the advantage of conducting sample analyses in anaerobic condition.

# Environmental Soil Chemistry Laboratory

Instrument 2.  
PI: Dr. Sudipta  
Rakshit

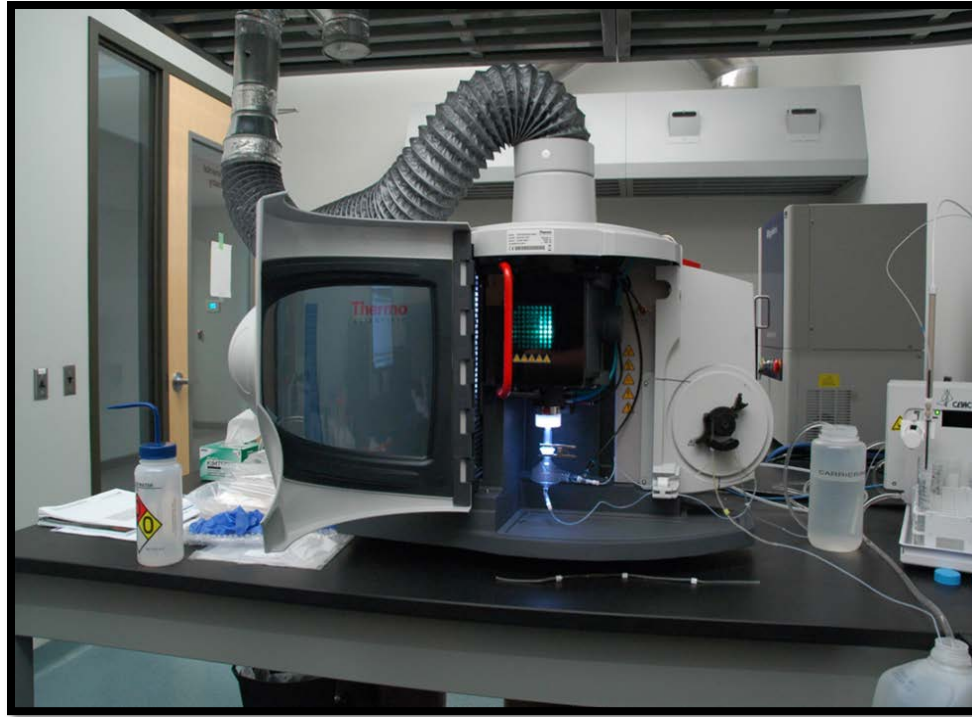


## **Attenuated Total Reflectance Fourier Transform Infrared Spectrometer (ATR-FTIR) (Frontier, Perkin-Elmer) :**

This IR spectrometer comes with advanced accessories by which one can conduct *in situ* flow cell experiments and record the spectra in real time. The instrument has also regular accessories in which one can measure freeze-dried samples or samples mixed in a KBr pellet.

# Environmental Soil Chemistry Laboratory

Instrument 3.  
PI: Dr. Sudipta  
Rakshit



## **Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES) (Thermo, iCAP-7400):**

The ICP-OES is an essential instrument for measuring concentration of transition and heavy metals, metalloids, and some non metals (e.g. total P) in solutions.

# Environmental Soil Chemistry Laboratory

Instrument 4.  
PI: Dr. Sudipta  
Rakshit



## **UV-Visible Spectrophotometer (Perkin Elmer, Lambda 650):**

The UV-Visible spectrophotometer allows one to scan and quantify dissolved inorganic/organic compounds in a non-destructive way.

This instrument is also accompanied with accessories that can scan solid samples. A flow cell attachment can also be constructed to measure fast reaction kinetics.

# Environmental Soil Chemistry Laboratory

Instrument 5.  
PI: Dr. Sudipta  
Rakshit



## **Freeze Dry System “FreeZone, 2.5 Plus” (Labconco):**

The instrument is for freeze-drying of wet pastes. Freeze-drying helps in forming consistent ground samples rather than dry-lumps.



# Environmental Soil Chemistry Laboratory

Instrument 6.

PI: Dr. Sudipta Rakshit



## **Ion Chromatograph (IC) (Metrohm, IC Flex-930):**

The IC Flex 930 is a professional ion chromatograph. It is used for the determination of anions or polar substances with sequential suppression (which reduces background to a minimum). This instrument ensures the rapid and safe determination of anions and some polar substances in the parts per billion (ppb) to the percent range.

# **Bioenergy Laboratory**

**Dr. Jason deKoff**

**Ag. Biotechnology Bldg.**

**Room # 223**

**Phone: 615-963-4929**

# Bioenergy Laboratory

Instrument 1.  
PI: Dr. Jason  
deKoff



## **Isoperibol Calorimeter, “Leco AC 500” (LECO):**

The AC500 instrument determines calorific value, a key indicator of quality and value in solid and liquid fuels, through measurement of the heat released after combustion of a sample.

# Bioenergy Laboratory

Instrument 2.  
PI: Dr. Jason  
deKoff



## **CN Analyzer, “Vario Cube” (Elementar, Inc.):**

For the measurement of carbon and nitrogen elemental content (%) in a wide range of solid sample (dry powder) matrices, sizes and concentrations, with good accuracy and precision.

# Bioenergy Laboratory

Instrument 3.  
PI: Dr. Jason  
deKoff

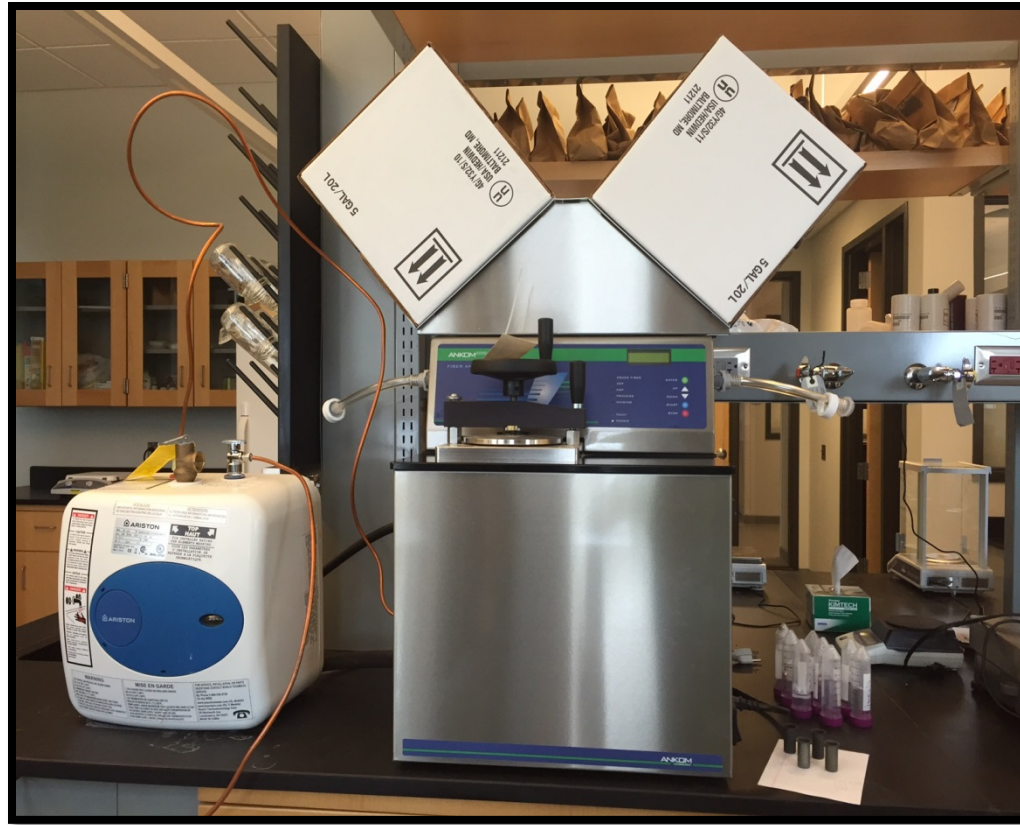


## **Microwave digestion unit, MARS-5 (CEM):**

For a quick digestion/dissolution of plant samples, usually prior to their elemental analysis (by ICP or AAS).

# Bioenergy Laboratory

Instrument 4.  
PI: Dr. Jason  
deKoff



## **Fiber Analyzer, “Ancom 2000” (Ancom Technologies):**

For the fast determination of Acid Detergent Fiber, Neutral Detergent Fiber, and Crude Fiber for all feeds and forages.

# **Food Biosciences Laboratory**

**Dr. Ankit Patras**

**Ag. Biotechnology Bldg.**

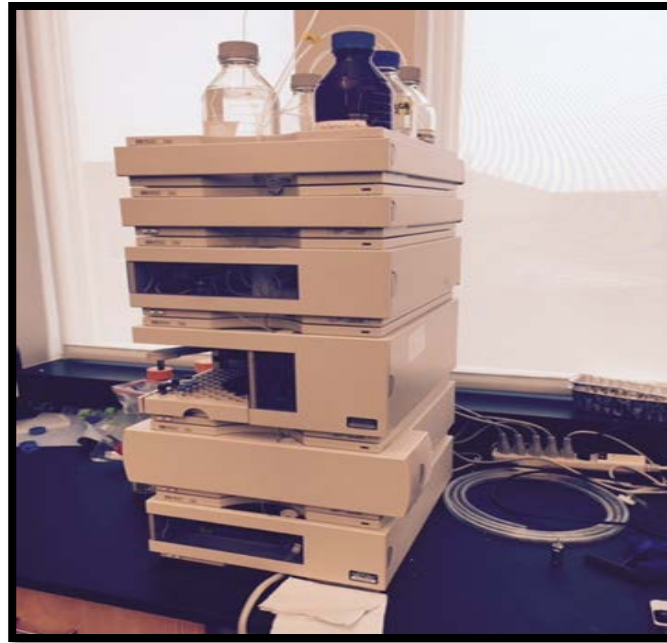
**Room # 240**

**Phone: 615-963-6007**

# Food Biosciences Laboratory

Instrument 1.

PI: Dr. Ankit Patras



## **High Performance Liquid Chromatography (Agilent):**

For identifying, quantifying and purifying the individual components of a complex food matrix. Equipped with photo-diode array UV/Vis absorption detector and an auto-sampler.



# Food Biosciences Laboratory



Instrument 2.  
PI: Dr. Ankit Patras

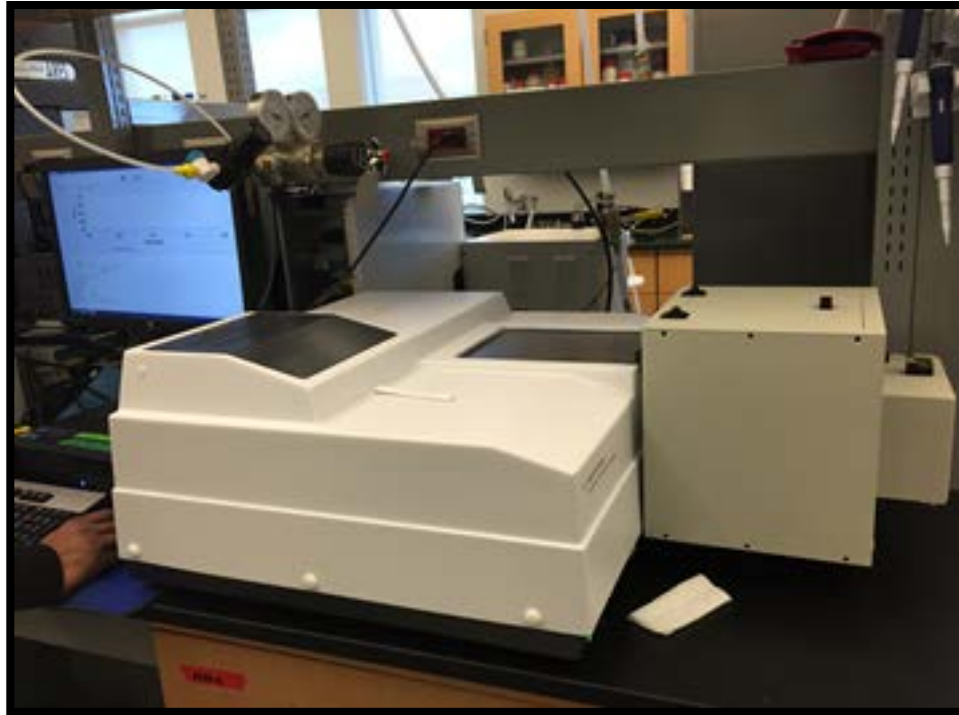
## **High Performance Liquid Chromatography (Shimadzu):**

High Performance Liquid Chromatography system for identifying, quantifying and purifying the individual components of a complex food matrix. Equipped with photo-diode array absorbance detector, electrochemical detector, evaporative light scattering detector, and a auto-sampler.

# Food Biosciences Laboratory

Instrument 3.

PI: Dr. Ankit Patras



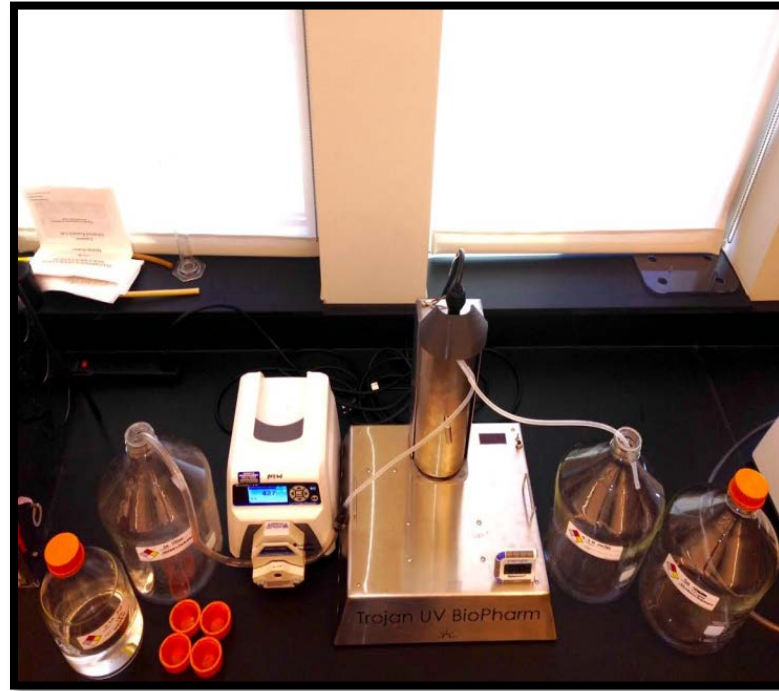
## **UV-Vis Spectrometer, “Cary-100” (Agilent) with “Labsphere DRA-CA-3300” accessory:**

Measurement of absorbance in Ultraviolet and Visible range of electromagnetic radiation allows for quantitative analysis of some organic compounds, anions and metal ions. The DRA accessory provides the means of measuring absorbance or transmission of opaque, turbid and reflecting substances.

# Food Biosciences Laboratory

Instrument 4.

PI: Dr. Ankit Patras



## **UV Thin Film System:**

A flow-through UV system for irradiating fluids with high absorption and scattering properties . This system works in the flow-range of 40 to 700 mL/min and delivers a tight and precise UV dosage.

# Food Biosciences Laboratory



Instrument 5.  
PI: Dr. Ankit Patras

## **Ultrasound System:**

Pasteurize liquid foods using sound energy (1500 W, 20 KHz, 20 mm probe).  
This system is a flow-through reactor connected to a peristaltic pump and a chiller.

# Food Biosciences Laboratory

Instrument 6.

PI: Dr. Ankit Patras



## **Gas Plasma System:**

Plasma generation system capable to disinfect food surfaces.

Pure compressed air is the carrier gas for the plasma generation.

# **Food Biomaterials Laboratory**

**Dr. Ying Wu**

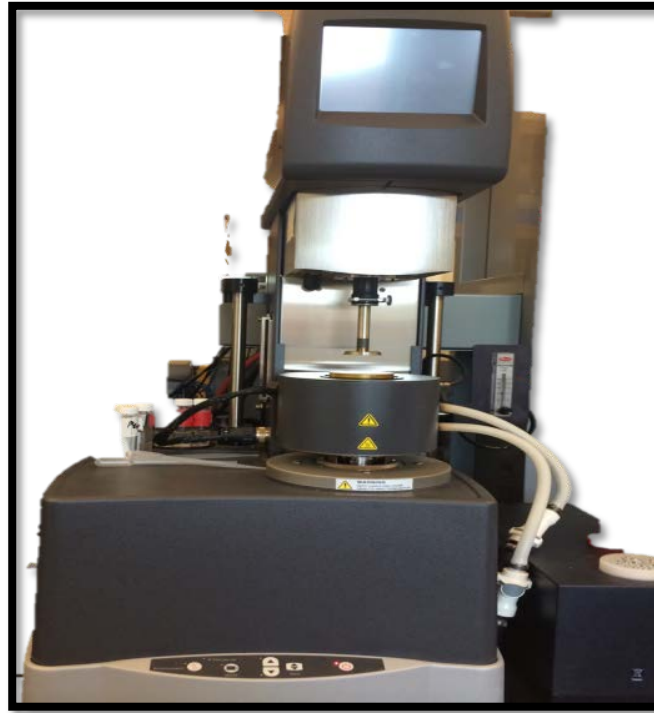
**Ag. Biotechnology Bldg.**

**Room # 240**

**Phone: 615-963-6006**

# Food Biomaterials Laboratory

Instrument 1.  
PI: Dr. Ying Wu



## **ARES-G2 Rheometer:**

This rheometer is the most advanced rotational rheometer for research and material development. It remains the only commercially available rheometer with a dedicated actuator for deformation control, Torque Rebalance Transducer (TRT), and Force Rebalance Transducer (FRT) for independent shear stress and normal stress measurements.

# Food Biomaterials Laboratory

Instrument 2.  
PI: Dr. Ying Wu



## **Mini Spray Dryer B-290 (Buchi):**

This easy-to-operate mini spray dryer is used to spray-dry and encapsulate bioactive ingredients, probiotics and flavors for controlled release, nutraceuticals, functional foods and pharmaceuticals.

It is widely applied in food, feed and encapsulation of materials and nano-technology fields.



# Food Biomaterials Laboratory

Instrument 3.  
PI: Dr. Ying Wu



## **Encapsulator B-390 (Buchi):**

This system is used for controlled encapsulation of bio-actives and materials for innovative lab-scale R&D work. It is applied for mono layer or multilayer encapsulations, as well as single-core or multiple core encapsulates.

It is simplistic and flexible operation enables application in a wide range of fields; pharmaceutical, food, feed, cosmetic, textiles and agricultural applications.

# Food Biomaterials Laboratory

Instrument 4.  
PI: Dr. Ying Wu



## **Zetasizer Nano ZS90:**

This system is for the measurement of particle size and molecular size at a 90 degree scattering angle using Dynamic Light Scattering, also with the ability to measure zeta potential and electrophoretic mobility using Laser Doppler Micro-Electrophoresis, and molecular weight using Static Light Scattering. The measurement range for particle size is 0.3 nm to 5  $\mu\text{m}$ .

# Food Biomaterials Laboratory

Instrument 5.  
PI: Dr. Ying Wu



## **Viscotek TDA System (Malvern):**

This GPC/SEC chromatography system is integrated with Triple Detector Array (TDA) which incorporates RI, Light Scattering, Viscosity detectors. This system measures sample concentration, molecular weight (MW) and intrinsic viscosity. The TDA is ideal for characterizing synthetic and natural macromolecules.

# Food Biomaterials Laboratory

Instrument 6.  
PI: Dr. Ying Wu



## **Microfluidizer:**

This homogenization technology using fixed-geometry high shear interaction chamber, which converts pressure energy more efficiently into shear and impact forces, resulting in targeted nanoparticle size reduction with less sample temperature rise during processing.

This is a bench-top equipment with capacity of treating 6 mL of sample per run.

# Food Biomaterials Laboratory



Instrument 7.  
PI: Dr. Ying Wu

## **Rapid Visco Analyser (RVA):**

The RVA is a cooking, stirring viscometer with ramped temperature and variable shear capability optimized for testing the viscous properties of starch, grain, flour and foods using international standard methods or tailor-made test routines.

# **Molecular Nutrition Laboratory**

**Dr. Hongwei Si**

**Ag. Biotechnology Bldg.**

**Room # 234**

**Phone: 615-963-6017**

# Molecular Nutrition Laboratory

Instrument 1.

PI: Dr. Hongwei Si

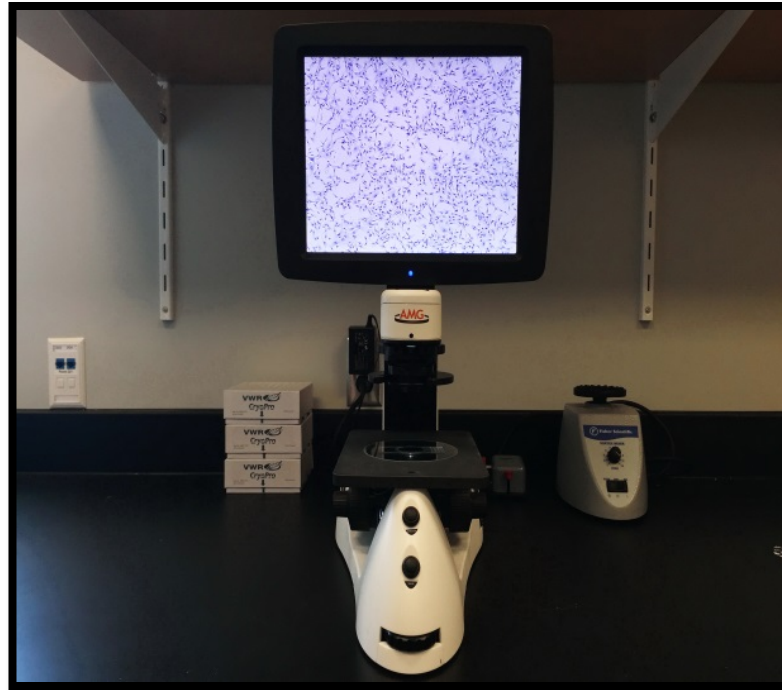


## **Microplate Reader “Synergy H-1”:**

The multifunctional microplate reader can accommodate any plate type from 6 to 384 wells. This system supports top and bottom fluorescence intensity, UV-visible absorbance and high performance luminescence detection and it is extremely flexible, and easy to use for a wide range of assays.

# Molecular Nutrition Laboratory

Instrument 2.  
PI: Dr. Hongwei Si



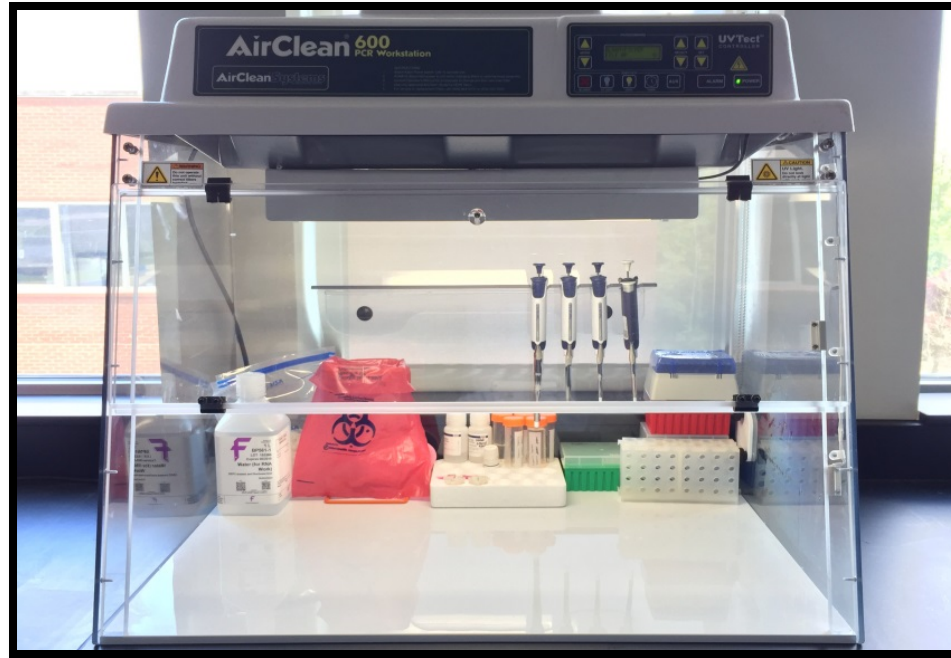
## **Evos XL Core Imaging System :**

The EVOS® XL Core Imaging System is a digital, transmitted light, inverted imaging system for living cell and tissue culture applications and routine cell maintenance. Its color camera and high-quality optical system deliver high-definition images with exceptional ease.



# Molecular Nutrition Laboratory

Instrument 3.  
PI: Dr. Hongwei Si



## **RNA/DNA Workstation:**

AirClean System AC600 Series RNA/DNA Workstation are designed as application solutions for the manipulation and amplification of DNA and RNA. UVTect Microprocessor Controller maintains airflow to provide a clean Class 100 work area to reduce risk of sample contamination during DNA RNA amplification.

# Molecular Nutrition Laboratory

Instrument 4.

PI: Dr. Hongwei Si



## **CO<sub>2</sub> incubator:**

This CO<sub>2</sub> incubator is used to cell culture. The incubator can maintain optimal temperature, humidity and carbon dioxide and oxygen content of the atmosphere inside. This incubator also can do a lot of experimental work in cell biology, microbiology and molecular biology.

# **Animal Biotechnology Laboratory**

**Dr. Samuel Nahashon**  
**Ag. Biotechnology Bldg.**  
**Room # 124**  
**Phone: 615-963-2575**

# Animal Biotechnology Laboratory

Instrument 1.  
PI: Dr. Samuel  
Nahashon

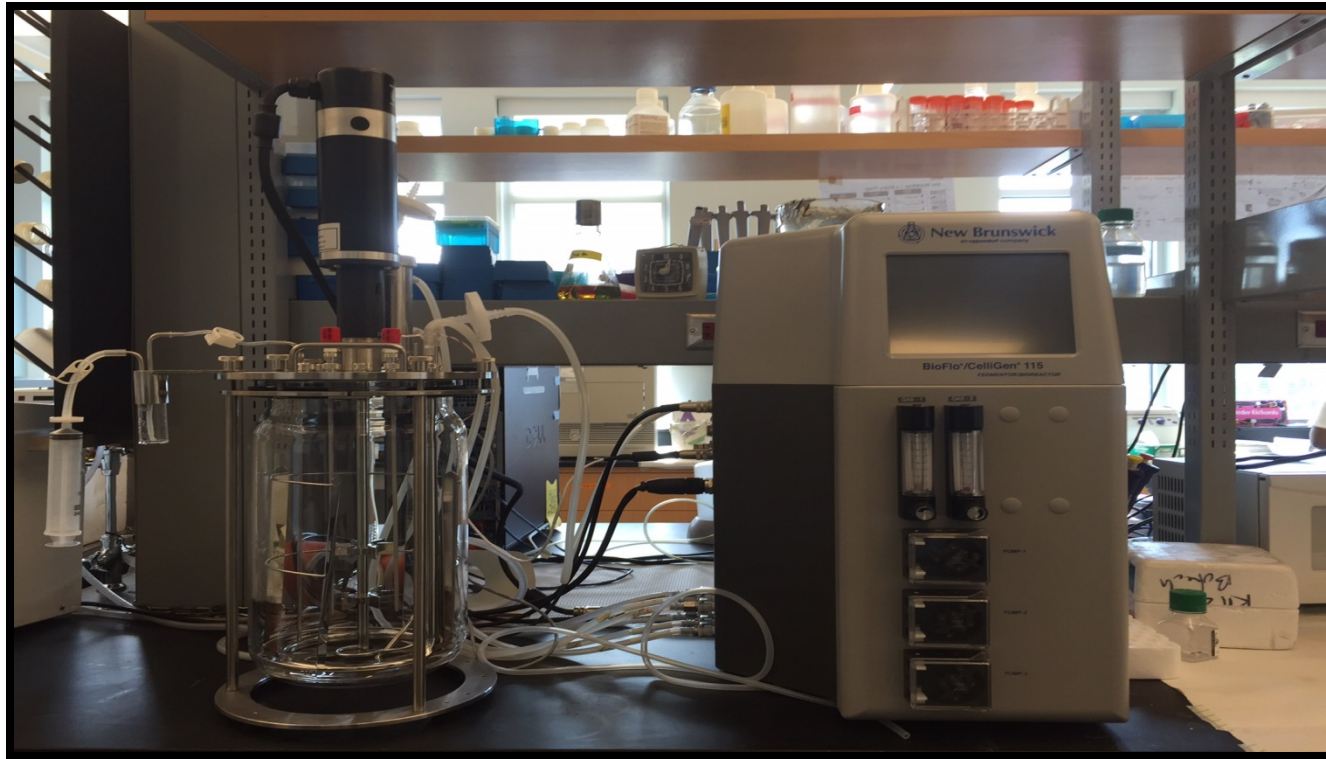


## **Gel Imaging System, Gel Logic 1500 (Kodak):**

The Kodak Gel Logic system offers high image quality and data acquisition for documenting and analyzing electrophoresis gels, and colorimetric blots and plates.

# Animal Biotechnology Laboratory

Instrument 2.  
PI: Dr. Samuel  
Nahashon



## **Benchtop Fermentation Bioreactor “Bio Flo/CelliGen 115 (New Brunswick):**

A versatile entry-level fermenter/ bioreactor ideally suited for a wide range of fermentation and cell culture laboratory experiments.

# Animal Biotechnology Laboratory

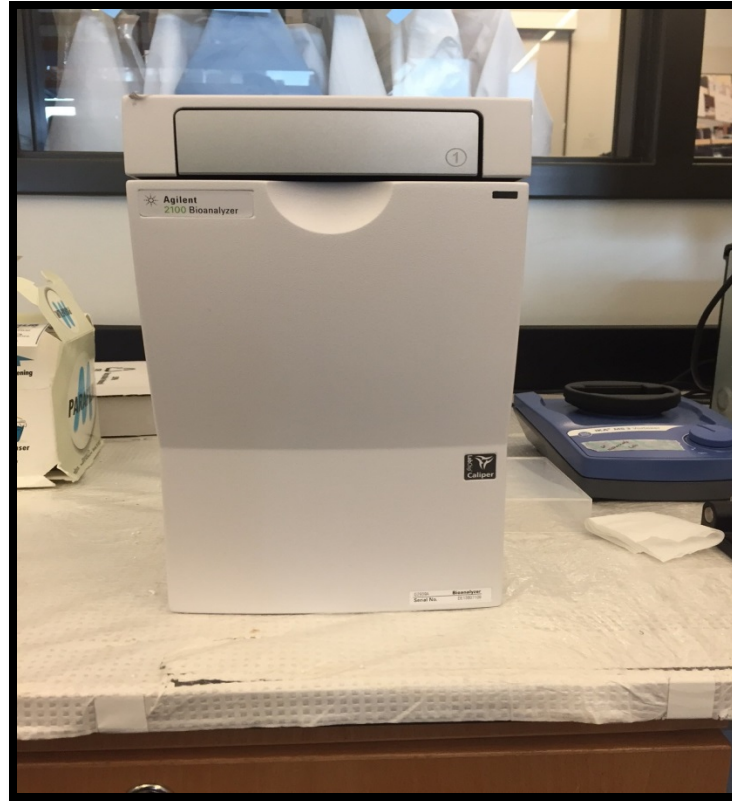
Instrument 3.  
PI: Dr. Samuel  
Nahashon



**Personal Genome Machine (PGM) system “Ion Torrent” (Life Technologies):**  
Very fast sequencing technology underlying the Personal Genome Machine exploits a well-characterized biochemical process.

# Animal Biotechnology Laboratory

Instrument 4.  
PI: Dr. Samuel  
Nahashon



## **DNA Sequencer “ABI 3100 Prism” (ABI):**

The Prism 3100 is a multi-color fluorescence based DNA analysis system with 16 capillaries operating in parallel. It offers high-quality data and efficient sample processing for the research laboratory.

# Animal Biotechnology Laboratory

Instrument 5.  
PI: Dr. Samuel  
Nahashon



## **UV-Vis Spectrophotometer DU 730 (Beckman):**

Good quality laboratory spectrophotometer, which allows for the measurement of light absorption in UV and Visible range.



# **Plant Biotechnology Laboratory**

**Dr. Suping Zhou**

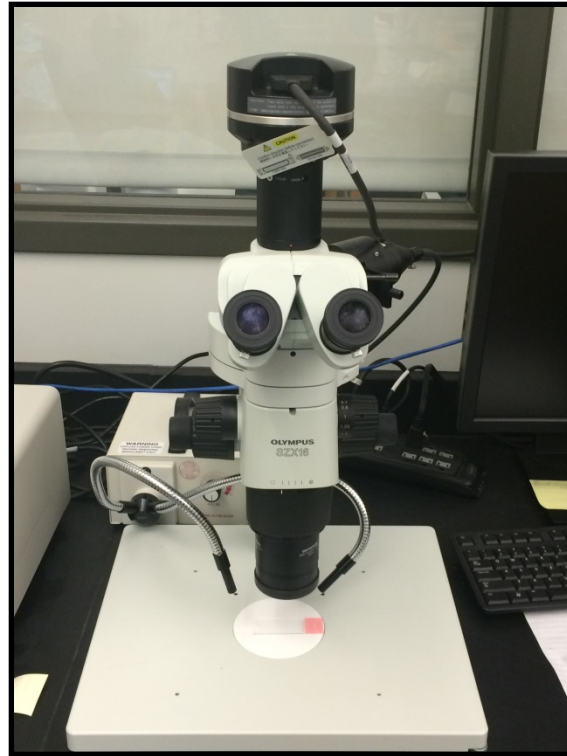
**Ag. Biotechnology Bldg.**

**Room # 135**

**Phone: 615-963-2146**

# Plant Biotechnology Laboratory

Instrument 1.  
PI: Dr. Suping  
Zhou



## **SZX16 optical microscope (Olympus):**

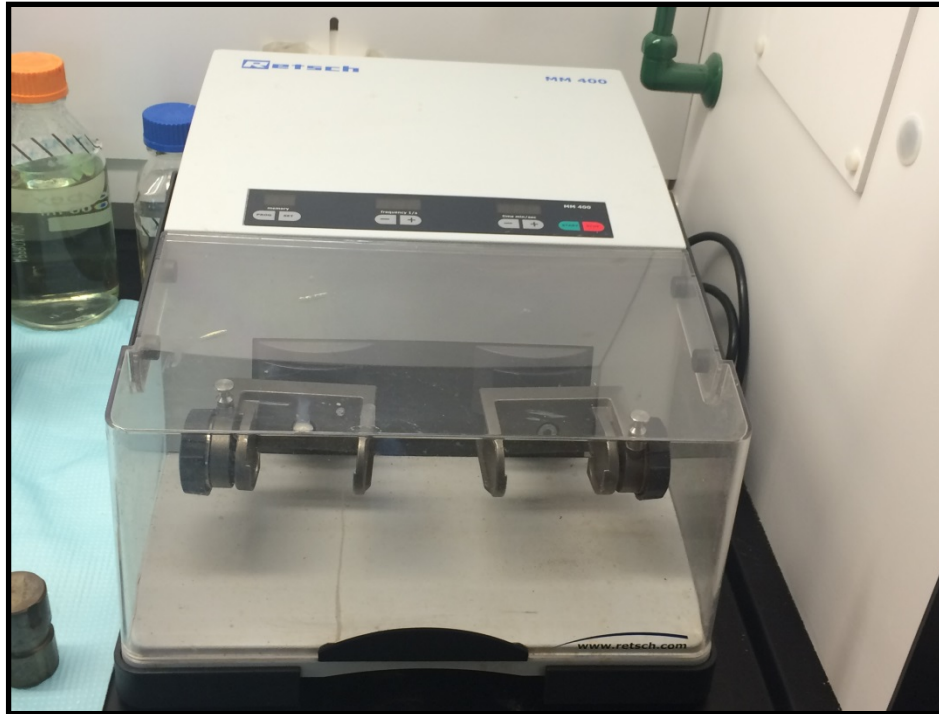
High quality optical microscope.

## **Digital Microscope “Keyence VHX”:**

Optical microscope with a digital camera and software.

# Plant Biotechnology Laboratory

Instrument 2.  
PI: Dr. Suping  
Zhou



## **(Micro) Ball Mill “MM 400” (Retsch):**

The mixer mill MM 400 is a versatile bench-top unit, which has been developed specially for dry, wet and cryogenic grinding of small amounts of sample. It can mix and homogenize powders and suspensions in seconds. It is also perfectly suitable for the disruption of biological cells as well as for DNA/RNA and protein extraction.

# Plant Biotechnology Laboratory

Instrument 3.  
PI: Dr. Suping  
Zhou



## **SpectraMax M5 plate reader (Molecular Devices):**

The instrument for quantifying biomolecules such as nucleic acids and proteins in plate format.

# Plant Biotechnology Laboratory

Instrument 4.  
PI: Dr. Suping  
Zhou



## **Leica CM1950 cryostat (Leica Biosystems):**

The Leica CM1950 clinical cryostat is a highly adaptable platform that can be tailor-made for each laboratory. For higher quality sectioning of plant/animal tissue. Innovation and human-oriented features provide a cryostat with a new level of performance.

# Plant Biotechnology Laboratory



Instrument 5.  
PI: Dr. Suping  
Zhou

## **ABI 7300 Real Time PCR (Applied Biosystems)**

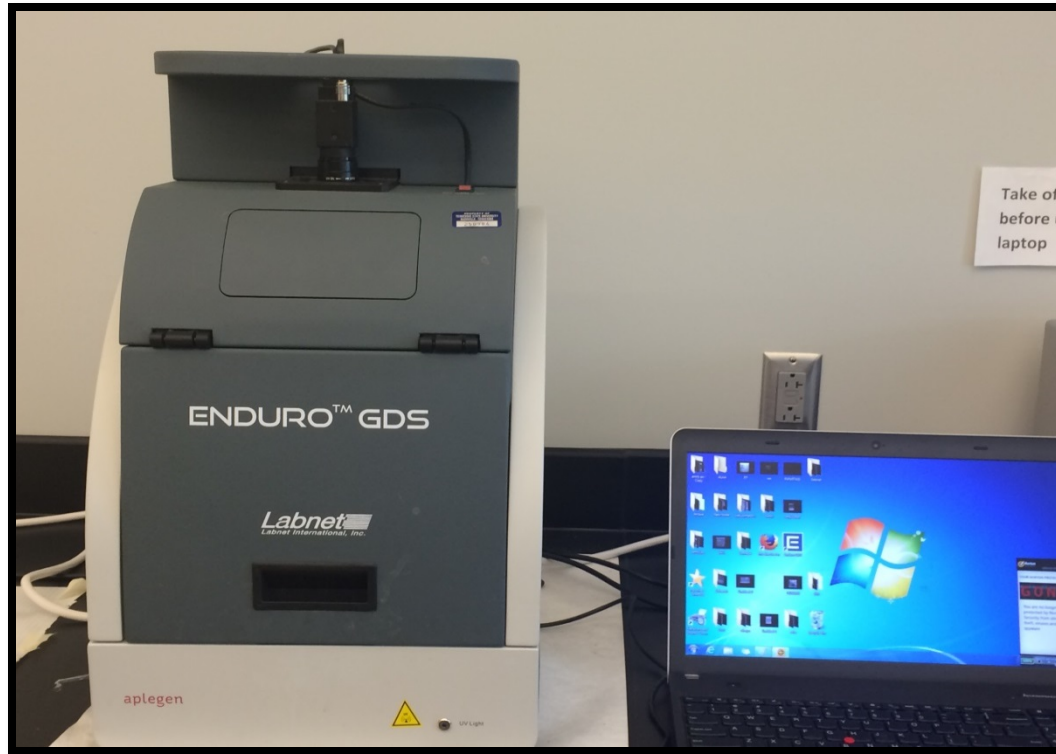
7300 Real-Time PCR System is an affordable platform for the detection and quantification of nucleic acid sequences that will not compromise your data quality or dye choice flexibility. The 7300 Real-Time PCR System combines thermal cycling, fluorescence detection, and application-specific software to measure the cycle-by-cycle accumulation of PCR products in a single-tube, homogeneous reaction.

# **Phytopathology Laboratory**

**Dr. Margaret Mmbaga  
Ag. Biotechnology Bldg.  
Room # 125  
Phone: 615-963-1386**

# Phytopathology Laboratory

Instrument 1.  
PI: Dr. Margaret  
Mmbaga



## **ENDURO™ GDS Gel Documentation System:**

The ENDURO™ GDS Gel Documentation System is state-of-the-art imaging system, which provides an incredible combination of performance and value. It is a perfect fit with the ENDURO™ Electrophoresis and Lab-Net Molecular Biology instruments.



# Phytopathology Laboratory

Instrument 2.

PI: Dr. Margaret  
Mmbaga



**Optical Microscope BX 41 (Olympus):**

High quality optical microscope.

**Optical Microscope DFC 295 (Leica):**

High quality optical microscope.

# Phytopathology Laboratory

Instrument 3.  
PI: Dr. Margaret  
Mmbaga



## **Real-time PCR Instrument AB Step-One (Applied Biosystems):**

Real-Time PCR System is a platform for the detection and quantification of nucleic acid sequences that will not compromise your data quality or dye choice flexibility. The system combines thermal cycling, fluorescence detection, and application-specific software to measure the cycle-by-cycle accumulation of PCR products in a single-tube, homogeneous reaction.

# **Plant Genetics and Genomics Laboratory**

**Dr. Matthew Blair  
Ag. Biotechnology Bldg.  
Room # 238  
Phone: 615-963-7467**

# Plant Genetics and Genomics Laboratory

Instrument 1.  
PI: Dr. Matthew  
Blair



Robotic DNA extraction (24/96)

## **EpMotion Robot (Eppendorf):**

This robot is used for automated DNA extraction and for re-array of DNA samples in preparation for high-throughput PCR amplification.

# Plant Genetics and Genomics Laboratory

Instrument 2.  
PI: Dr. Matthew  
Blair



## **Hydrocycler (LGC):**

Using the classical method of water-bath PCR, this robotically controlled PCR amplification machine has four temperature control chambers for rapid cycling of 96, 384 or 1536 well / sample plates.

# Plant Genetics and Genomics Laboratory

Instrument 3.  
PI: Dr. Matthew  
Blair

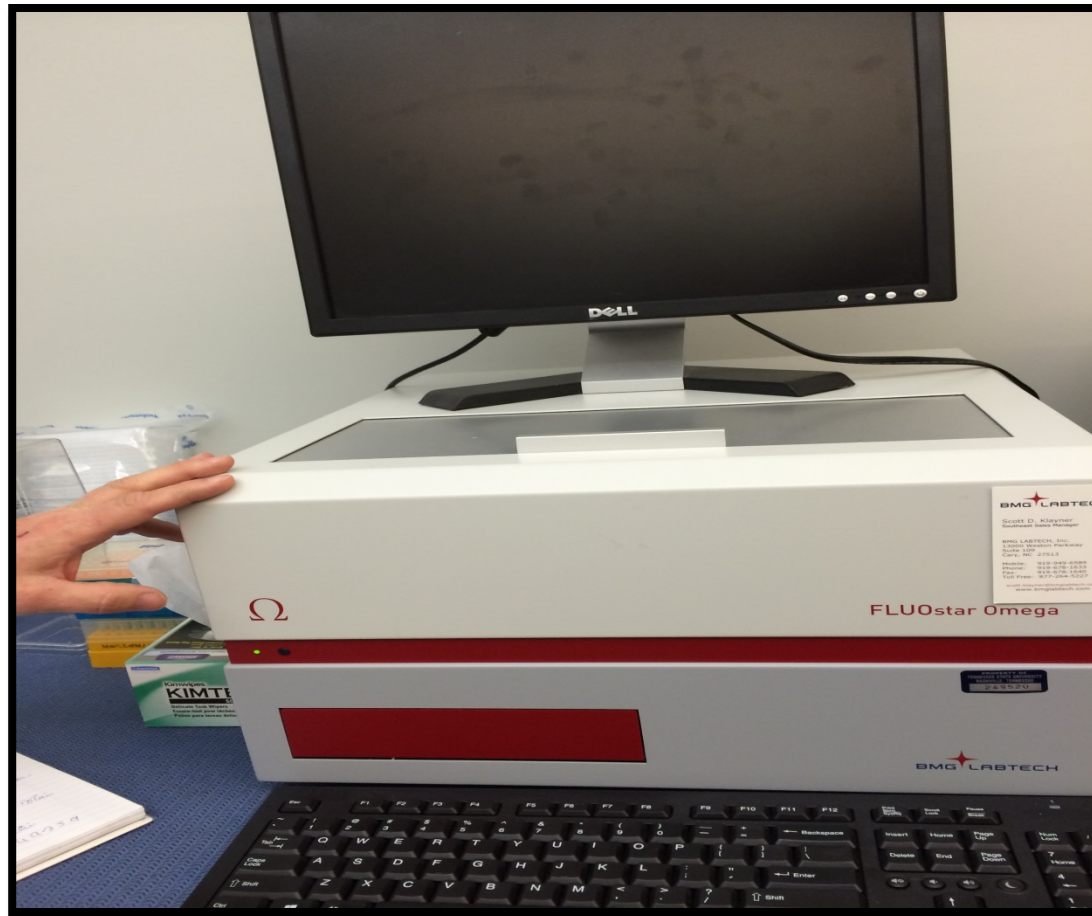


## **Plate Sealer “Kube”:**

The Kube (LGC) heat sealer for 96 and 384 well plates operates on air pressure and seals plastic covers to PCR plates for amplification in the water bath. Plates are optically read by a spectrophotometer from the Omega Corporation.

# Plant Genetics and Genomics Laboratory

Instrument 4.  
PI: Dr. Matthew  
Blair



## **Plate Reader, FluoStar Omega (BMG):**

For quantifying biomolecules such as nucleic acids and proteins, and measuring fluorescence based assays in plate format.

# **Instrument List**

Department of Agricultural & Environmental  
Sciences

**Lawson Hall / CARP**



# **Plant Genetics Laboratory**

**Dr. C. Korsi Dumenyo**

**CARP Bldg.**

**Room # 214**

**Phone: 615-963-5634**

# Plant Genetics Laboratory

Instrument 1.  
PI: Dr. C. Korsi  
Dumenyo



## **Real-time PCR Instrument AB Step-One (Applied Biosystems):**

Real-Time PCR System is a platform for the detection and quantification of nucleic acid sequences that will not compromise your data quality or dye choice flexibility. The system combines thermal cycling, fluorescence detection, and application-specific software to measure the cycle-by-cycle accumulation of PCR products in a single-tube, homogeneous reaction.

# Plant Genetics Laboratory

Instrument 2.  
PI: Dr. C. Korsi  
Dumenyo



## **Synergy H1, Hybrid Reader (Bio-Tek):**

A multi-mode plate reader for quantifying biomolecules such as nucleic acids and proteins, and measuring fluorescence based assays in plate format.

# **Food Safety and Biosensors Laboratory**

**Dr. Fur Chi-Chen**

**CARP Bldg.**

**Room # 103**

**Phone: 615-963-5410**

# Food Safety and Biosensors Laboratory

Instrument 1.  
Dr. Fur Chi-Chen

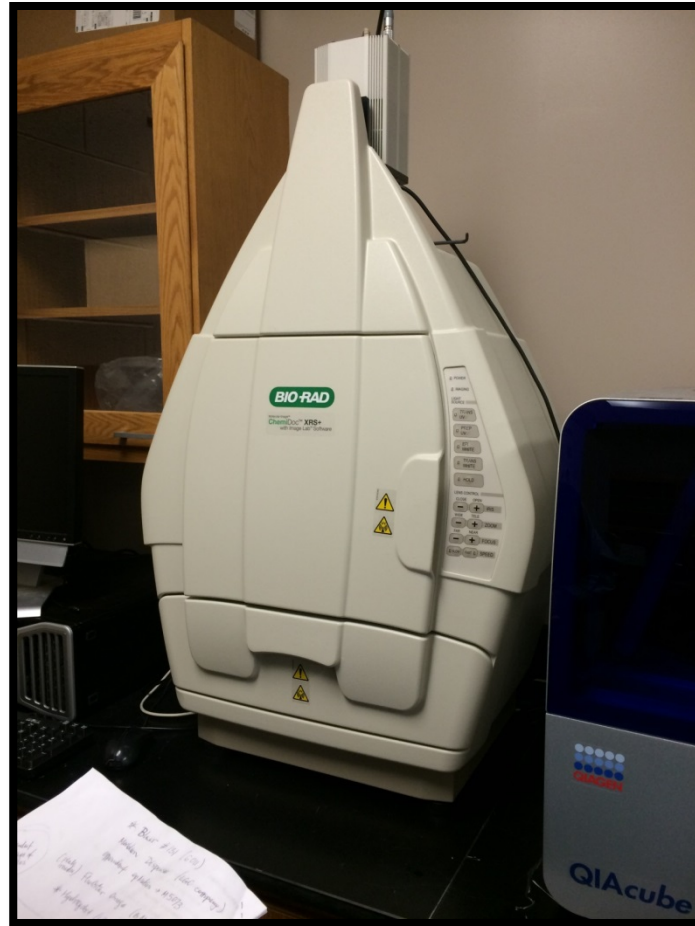


## **Protein Analyzer, Protein Simple, “Simon”:**

Protein Simple’s Simon instrument uses capillary electrophoresis to fully automate the protein immunoblotting process.

# Food Safety and Biosensors Laboratory

Instrument 2.  
Dr. Fur Chi-Chen



## **Gel Reader “Chef III” Gel Reader (Bio Rad):**

This gel imaging system is designed to address multiplex fluorescent western blotting, chemiluminescence detection, and general *gel* documentation applications.

# Food Safety and Biosensors Laboratory

Instrument 3.  
Dr. Fur Chi-Chen



## **Synergy H1, Hybrid Reader (Bio-Tek):**

A multi-mode plate reader for quantifying biomolecules such as nucleic acids and proteins, and measuring fluorescence based assays in plate format.

# **Instrument List**

Department of Agricultural & Environmental  
Sciences

**Farrell-Westbrook Bldg.**



# **Biogeochemistry and Climate Change Laboratory**

**Dr. Jianwei Li**

**Farrell-Westbrook Bldg.**

**Room # 126**

**Phone: 615-963-5208**

# Biogeochemistry and Climate Change Laboratory

Instrument 1.  
PI: Dr. Jianwei Li



## **TOC/TN analyzer (Shimadzu):**

The TOC-L series of TOC/TN (Total Organic Carbon / Total Nitrogen) analyzer adopts the 680°C combustion catalytic oxidation method, maximizes both sensitivity and productivity, making them the ideal choice for monitoring water samples.

Coupled with an auto-sampler, the analyzer provides efficient measurements of TOC and TN concentrations with high precision.

# Biogeochemistry and Climate Change Laboratory

Instrument 2.

PI: Dr. Jianwei Li



## **Picarro *G2131-i* CO<sub>2</sub> Analyzer:**

The Picarro Analyzer can be used to quantify the total CO<sub>2</sub> concentration and  $\delta^{13}\text{C}$  of CO<sub>2</sub>-C emitted from soil and litter materials.

Special accessory provides the advantage of conducting continuous gas analyses in field condition.

# Biogeochemistry and Climate Change Laboratory

Instrument 3.

PI: Dr. Jianwei Li



## **FilterMax F5 Microplate Reader:**

FilterMax F5 Multi-Mode Microplate Reader has UV and visible absorbance, top and Bottom fluorescence intensity, glow luminescence, fluorescence polarization, and time-resolved fluorescence modes, plus temperature control, and linear and orbital shaking for programmable endpoint, kinetic, multiple wavelength, linear scan, and area measurements in well plates. It is used to quantify ten different extracellular enzyme activities in soils associated with C, N, and P acquisitions.

# Biogeochemistry and Climate Change Laboratory

Instrument 4.  
PI: Dr. Jianwei Li



## **EGM-4 Environmental Gas Monitor:**

The EGM-4 Environmental Gas Monitor is a highly portable instrument for use in the lab and field. The EGM-4 is a compact, lightweight instrument with a rugged aluminum enclosure making it a very portable and durable product. The EGM-4 can be supplied with two bench, optimized for measurement ranges of CO<sub>2</sub> up to 30000 ppm. This instrument ensures the rapid and accurate determination of CO<sub>2</sub> efflux rate in the laboratory jar or from land surface in the field.

# **Plant Nutrition Laboratory**

**Dr. Dharma Pitchay**  
**Farrell-Westbrook Bldg.**  
**Room # 125**  
**Phone: 615-963-4890**

# Plant Nutrition Laboratory

Instrument 1.  
PI: Dr. Dharma  
Pitchay



## **Ion Chromatography system IC-5000 (Dionex):**

The applications of ion chromatography include measurement of anion - nitrates, nitrites, chlorides, sulfates, phosphates, iodides etc. and cations, carbohydrates, organic acids, amino acids, proteins, peptides, oligonucleotides, carboxylates, polysaccharides, polyphosphates, fatty acids, metals, phenols, surfactants, ethanolamines, etc. The ion chromatography is used extensively in horticultural science, environmental, , life sciences, chemical, and food industries.

# Plant Nutrition Laboratory

Instrument 2.  
PI: Dr. Dharma  
Pitchay



**UHPLC (Ultra-High Pressure Liquid Chromatography) system**

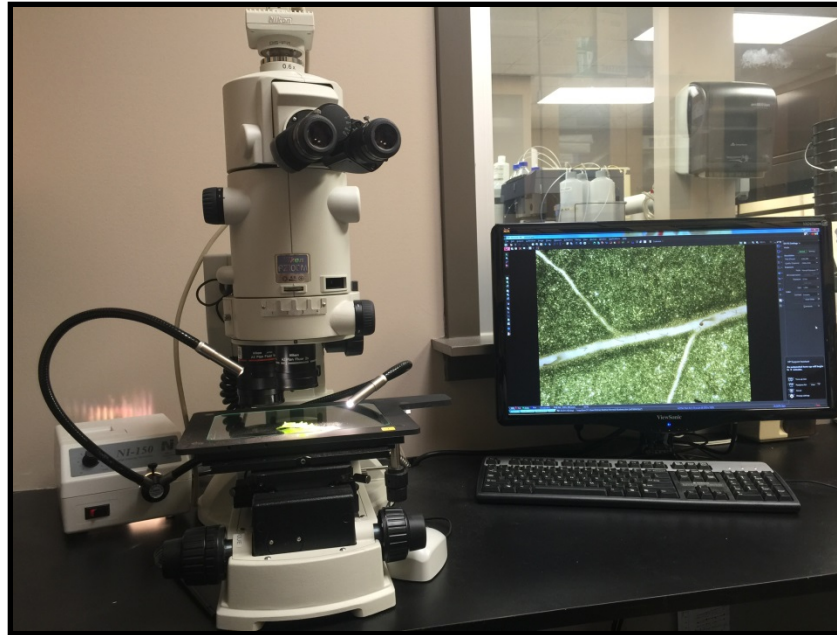
**UltiMate 3000 (Dionex):**

UHPLC is a specialized chromatographic method that runs faster, resolves better and uses less solvent than its cousin, HPLC uses. UHPLC accomplishes this by using higher pressure and a smaller column packed with smaller particles (usually less than 2  $\mu\text{m}$  in diameter).



# Plant Nutrition Laboratory

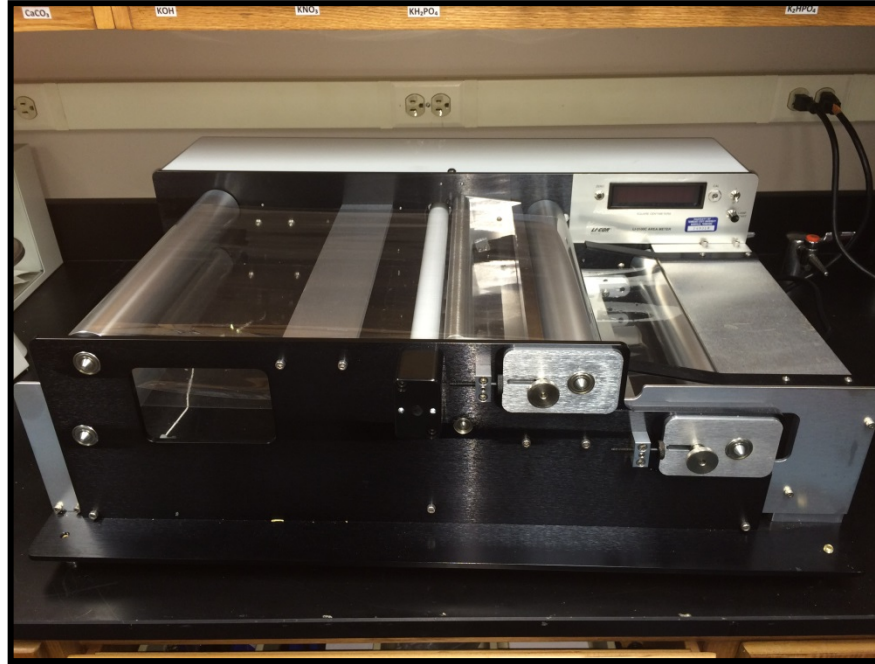
Instrument 3.  
PI: Dr. Dharma  
Pitchay



**Multipurpose Epi-fluorescence zoom microscope with digital camera :** Research requiring cellular level investigations of plant tissues. This new concept in zoom microscopes covers a wide range of magnifications, from 5x to 400x, all in a single microscope. It can continuously switch magnifications extending from macro to micro observation of the same specimen. The combined stereoscopic microscope with a wide field of view, a long working distance, and high-resolution images is critical for research .

# Plant Nutrition Laboratory

Instrument 4  
PI: Dr. Dharma  
Pitchay



## **Leaf Area Meter:**

Measurements of the leaf area of plants spans many scientific disciplines. Monitoring the distribution and changes of leaf area is important for assessing growth and vigor of vegetation. Knowing the leaf area is essential for studies involving photosynthesis, respiration and transpiration under organic and conventional growing conditions.

# **Food Safety Microbiology Laboratory**

**Dr. Agnes Kilonzo-Nthenge**

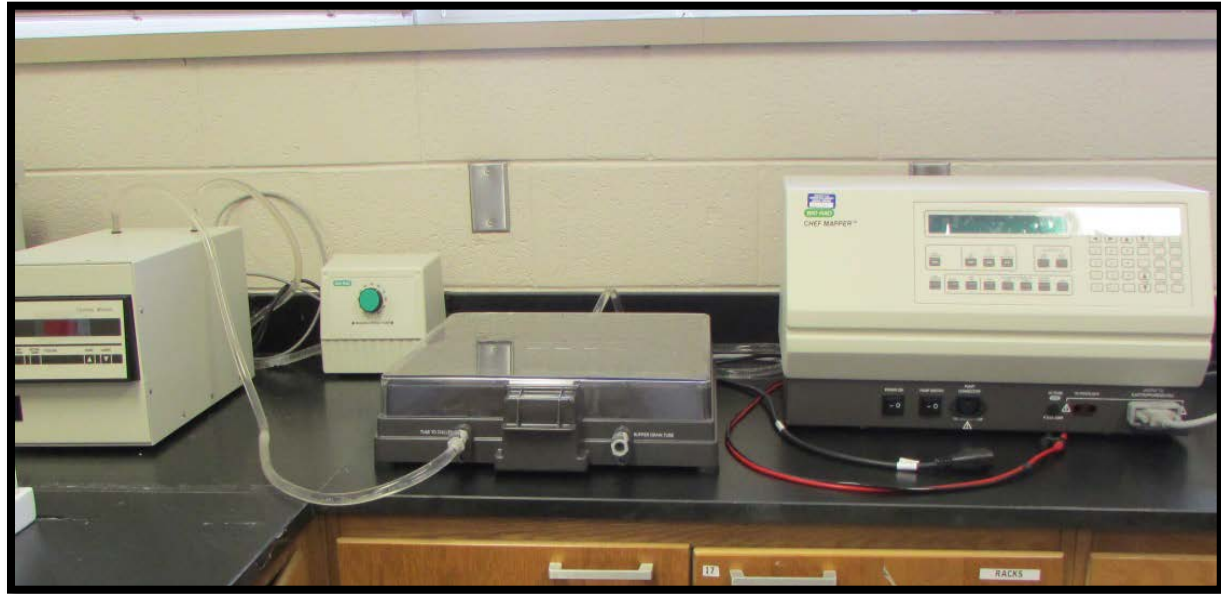
**Farrell-Westbrook Bldg.**

**Room # 208**

**Phone: 615-963-5437**

# Food Safety Microbiology Laboratory

Instrument 1.  
Dr. Agnes Kilonzo-  
Nthenge



## **CHEF Mapper XA Pulsed Field Electrophoresis System (Bio-Rad):**

The CHEF Mapper® system incorporates FIGE and AFIGE\* technologies for resolution in the range of 100 bp to 10 Mb. The CHEF Mapper XA system also includes algorithms for deriving separation conditions. Each CHEF-Mapper XA system is supplied with a power module, embedded auto-algorithm for protocol optimization, interactive algorithm program disk, electrophoresis cell, cooling module, variable-speed pump, and accessory kit.

# Food Safety Microbiology Laboratory

Instrument 2.  
Dr. Agnes Kilonzo-  
Nthenge



## **Cell Imaging System, EVOS XL:**

Cell Imaging System is for transmitted-light microscopy. The system is allows colorimetric applications like H&E staining and immunohistochemistry.

# Food Safety Microbiology Laboratory

Instrument 3.

Dr. Agnes Kilonzo-Nthenge



## **Flash & Go automatic colony counter:**

Image analysis software that can read an entire Petri plate instantaneously. Once inserted in the colony counter, plates are illuminated with a sophisticated LED lighting system, next, a picture of them is taken with a high resolution camera. Instantly, the software detects colonies or haloes according to color and records a count or measure. It can be used in Phage plaque assays and Ames testing for enumeration. It can measure inhibition zones during antibiotic potency measures and antibiotic susceptibility testing (AST).

# Food Safety Microbiology Laboratory

Instrument 4.

Dr. Agnes Kilonzo-Nthenge



## **Eppendorf Mastercycler Nexus Gradient:**

It is a gradient thermal cycler supporting over 12 columns. It has a gradient range of 4-99°C with an aluminum thermal block and 96x 0.2 ml PCR tubes or 77x 0.5 ml PCR tubes or 1x 96 well PCR plate capacity. With a 1-20°C temperature control range and a gradient temperature range of 30-99°C.

# Food Safety Microbiology Laboratory

Instrument 5.

Dr. Agnes Kilonzo-Nthenge



## **AS-580 Anaerobic Chamber :**

The AS-580 Anaerobic Gloveless Chamber creates and maintains an anaerobic environment for the growth and cultivation of anaerobic organisms.

The chamber allows the operator to work with the organisms inside of an oxygen-free environment and provides a method to bring samples in and out of the chamber via the pass-box.



# Food Safety Microbiology Laboratory

Instrument 6.  
Dr. Agnes Kilonzo-  
Nthenge



## **Handheld Automated Cell Counter :**

Handheld Automated Cell Counter provides a fast and convenient method for counting cells or particles with a disposable sensor. The system utilizes the Coulter principle in a miniaturized, handheld, pipette-like format that allows rapid cell counting; what used to take 10 minutes now takes about 30 seconds.

# **Plant Molecular Genetics and Breeding Laboratory**

**Dr. Ali Taheri**

**Farrell-Westbrook Bldg.**

**Room # 124**

**Phone: 615-963-6056**

# Plant Molecular Genetics and Breeding Laboratory

Instrument 1.  
PI: Dr. Ali Taheri



## **Gas Chromatograph (HP):**

Hewlett-Packard, 6890 Series GC system equipped with flame ionization detector. This system will be used for fatty acid profiling in seeds.

# Plant Molecular Genetics and Breeding Laboratory

Instrument 2.

PI: Dr. Ali Taheri



## **PCR machine – BioRad C1000 Thermal Cycler:**

Instrument for routine PCR tasks. It is equipped with 2x48 and 1x96 well block modules.

# Plant Molecular Genetics and Breeding Laboratory

Instrument 3.  
PI: Dr. Ali Taheri



## **QIAcube (Qiagen):**

The QIAcube uses advanced technology to process spin columns, enabling seamless integration of automated, low-medium throughput sample preparation into the laboratory workflow. All steps in the purification procedure are fully automated.

# Plant Molecular Genetics and Breeding Laboratory



Instrument 4.  
PI: Dr. Ali Taheri

## **epMotion 5070 (Eppendorf):**

This system enables us to perform automatic dispensing operations required for high-throughput screenings. It is supplied with a variety of dispensing tools which can be used to dispense quantities of liquid in the volume range from 1  $\mu\text{L}$  to 1,000  $\mu\text{L}$ .

# Plant Molecular Genetics and Breeding Laboratory

Instrument 5.

PI: Dr. Ali Taheri



## **Plate Reader AF2200 (Eppendorf):**

The Plate Reader AF2200 for quantifying biomolecules such as nucleic acids and proteins, and measuring fluorescence-based assays in a plate format.

# Plant Molecular Genetics and Breeding Laboratory

Instrument 6.  
PI: Dr. Ali Taheri



## **NIR Spectrometer DA 7250:**

Near-Infrared (NIR) spectrometer for analyzing moisture, oil, fatty acids, protein and other parameters in soybean seeds, meals and oil.



# Plant Molecular Genetics and Breeding Laboratory

Instrument 7.

PI: Dr. Ali Taheri



## **Tissue Lyser II:**

For medium- to high-throughput sample disruption for molecular analysis. The Tissue Lyser II simultaneously disrupts multiple biological samples through high-speed shaking in plastic tubes with stainless steel, tungsten carbide, or glass beads. Using the appropriate adapter set, up to 192 samples can be processed at the same time.

# **Bioremediation and Phytoremediation Laboratory**

**Dr. E. Kudjo Dzantor  
Farrell-Westbrook Bldg.  
Room # 207  
Phone: 615-963-1839**

# Bioremediation and Phytoremediation Laboratory

Instrument 1.  
PI: Dr. E. Kudjo  
Dzantor



## **Gas chromatograph “Agilent 6890N” with FID and ECD detectors:**

Gas chromatography (GC) is used for separating and analyzing compounds that can be vaporized without decomposition. Typical uses of GC include testing the purity of a particular substance, or separating the different components of a mixture. In some situations, GC may be helpful in identifying a compound. It can also be used for quantitative analysis.

# Bioremediation and Phytoremediation Laboratory

Instrument 2.

PI: Dr. E. Kudjo

Dzantor



## **Biolog Microstation 3™ with Plate Reader:**

A spectrophotometer for quantifying biomolecules such as nucleic acids and proteins in plate format.

# **Molecular Genetics and Biotechnology Laboratory**

**Dr. Ahmad N. Aziz  
Farrell-Westbrook Bldg.  
Room # 206  
Phone: 615-963-1595**

# Molecular Genetics and Biotechnology Laboratory

Instrument 1.

PI: Dr. Ahmad

N. Aziz



## **DNA Analyzer “LI-COR 4300” (Life Technologies):**

The 4300 System is a third generation instrument based on LI-COR’s highly sensitive infrared fluorescence detection technology.

# Molecular Genetics and Biotechnology Laboratory

Instrument 2.

PI: Dr. Ahmad

N. Aziz



## **TC-412 PCR Machine (Techné):**

The instrument made for routine bioanalytical PCR (Polymerase Chain Reaction) tasks.

# **Animal Physiology and Genetics Laboratory**

**Dr. Richard Browning, Jr.**

**Farrell-Westbrook Bldg.**

**Room # 210**

**Phone: 615-963-5867**



# Animal Physiology and Genetics Laboratory

Instrument 1.  
PI: Dr. Richard  
Browning, Jr.



## **Gamma Counter Cobra II (Packard):**

The instrument for counting gamma emitters in biological samples. The gamma ray is detected after it has passed out of the vial and impinges on a crystal of NaI (TI) which is the actual scintillator.

# Animal Physiology and Genetics Laboratory

Instrument 2.  
PI: Dr. Richard  
Browning, Jr.



## **AccuSkan FC (Fisher Scientific):**

A proven ELISA solution—AccuSkan FC and the Fisher Scientific AccuWash washer. The combination of the AccuSkan FC microplate photometer and the Accu-Wash microplate washer offers a convenient modular solution for routine and research ELISA applications.

# **Instrument List**

**Otis L. Floyd Nursery Research Center  
McMinnville, TN 37110**

# **Nursery Production and Sustainability Lab**

**Anthony Witcher**

**Otis L. Floyd Nursery Research Center**

**Room # 163**

**Phone: 931-815-5147**

# Nursery Production and Sustainability Lab

Instrument 1.  
P.I. Dr.  
Anthony  
Witcher



## **Image Acquisition Hardware and Analysis Software (Regent Instruments Inc.):**

- WinFOLIA - Designed for leaf area, morphology and disease analyses
- WinRHIZO - Designed for root measurement of washed roots. Morphology (length, area, volume...), topology, architecture and color analyses
- WinSEEDLE - Designed for needle and seed morphology and disease analyses

# **Woody Ornamental Plant Pathology Laboratory**

**Dr. Fulya Baysal-Gurel**

**Otis L. Floyd Nursery Research Center**

**Room 147 and 169**

**Phone: 931-815-5143**

# Woody Ornamental Plant Pathology Laboratory

Instrument 1

PI: Dr. Fulya Baysal-Gurel



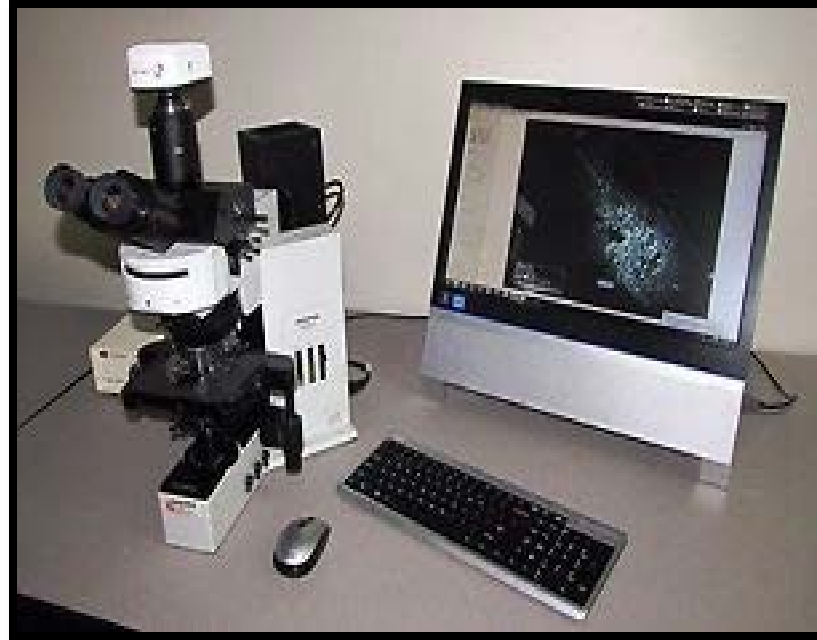
## **Thermo Scientific™ Sorvall™ Legend™ X1 Centrifuge and Rotors:**

This centrifuge is a laboratory product designed to separate components by generation of Relative Centrifugal Force. It features a convenient 1L capacity.

# Woody Ornamental Plant Pathology Laboratory

Instrument 2

PI: Dr. Fulya Baysal-Gurel



**Microscope-Model- BX50 Olympus (compound w/ camera)**  
A very good quality optical microscope.



# Woody Ornamental Plant Pathology Laboratory

Instrument 3  
PI: Dr. Fulya  
Baysal-Gurel



## **CFX96 Touch™ Real-Time PCR Detection System:**

The CFX96™ Optical Reaction Module converts the C1000 Touch™ Thermal Cycler chassis into the powerful CFX96 Touch Real-Time PCR Detection System. This six-channel system combines advanced optical technology with precise thermal control to deliver sensitive, reliable detection. Quickly set up runs and monitor amplification traces in real time on the integrated LCD touch screen.

## Woody Ornamental Plant Pathology Laboratory

Instrument 4.  
PI: Dr. Fulya  
Baysal-Gurel



### **The iMark™ Microplate Absorbance Reader:**

Reader with a wavelength range of 400–750 nm, is an economical, high-performance solution for a wide range of applications, including immunoassays with colorimetric substrates, such as ELISA, and protein assays.

# Woody Ornamental Plant Pathology Laboratory

Instrument 5.

PI: Dr. Fulya Baysal-Gurel



## **NanoDrop 2000 Spectrophotometer:**

Wide spectral range (190-840 nm) for measuring a variety of samples types: DNA, RNA and protein (in low volume samples).

# Woody Ornamental Plant Pathology Laboratory

Instrument 6.  
PI: Dr. Fulya  
Baysal-Gurel



## **The Gel Doc EZ system:**

It is a compact and automated gel imaging instrument designed to yield publication-quality images.

# **Insect Behavior and Chemical Ecology**

**Dr. Karla Adesso**  
**Otis L. Floyd Nursery Research Center**  
**Room # 111**  
**Phone: 931-815-5155**

# Insect Behavior and Chemical Ecology

Instrument 1.  
PI: Dr. Karla  
Addesso



## **Shimadzu QP2010 GC-MS:**

Gas Chromatography – Mass Spectrometry instrument for analysis of small volatile organic compounds from soil, plants and insects.

# Insect Behavior and Chemical Ecology

Instrument 2.  
PI: Dr. Karla  
Addesso



## **Reveleris X2 Flash Chromatography System**

An automated, multi-detection flash chromatography system for bulk separation and collection of bioactive compounds. The patented REVEALX™ detection technology triggers simultaneous fraction collection with advanced signal processing from up to four detector signals (3 UV + ELSD).

# Insect Behavior and Chemical Ecology

Instrument 3.  
PI: Dr. Karla  
Addesso



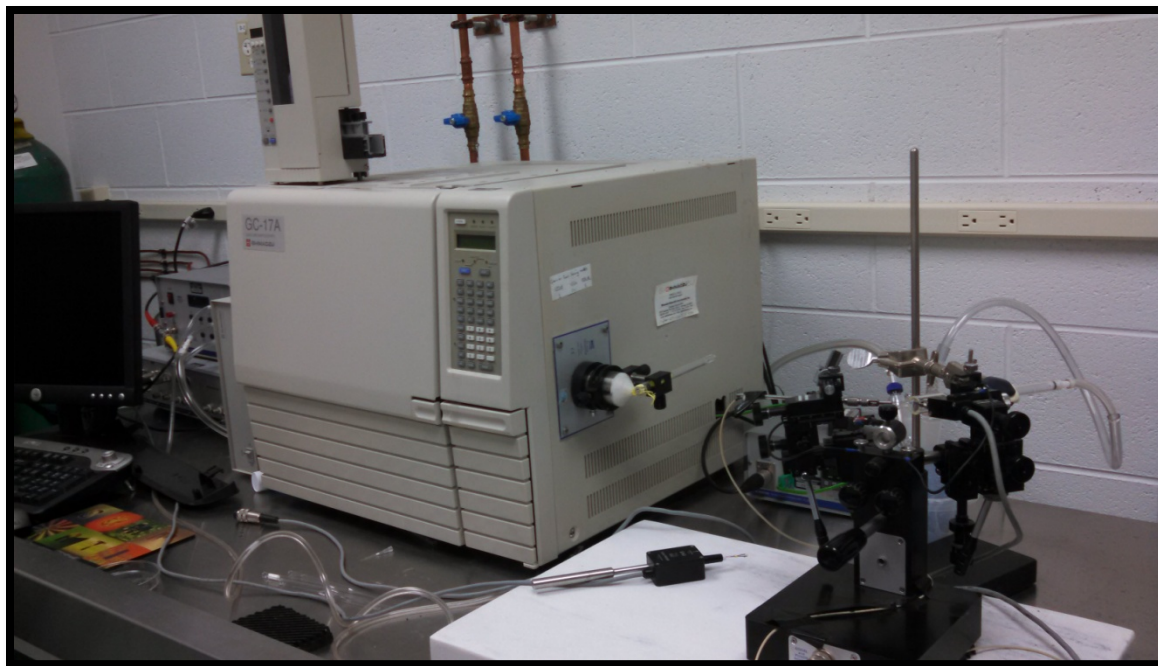
## **Epoch UV-Vis Spectrophotometer (BioTek):**

A compact, low maintenance microplate spectrophotometer with monochromator-base UV-Vis wavelength selection, 200 nm to 999 nm wavelength range and 6- to 384- microplate reading capability, controlled with the Gen5 Data Analysis software interface.



# Insect Behavior and Chemical Ecology

Instrument 4.  
PI: Dr. Karla  
Addesso



## **Electroantennographic Detector (EAD - Syntech):**

This equipment is used to study the olfactory response of insects to plant or insect derived compounds by amplifying the electrical response of the insect antenna. Volatiles of interest may be introduced to the antenna via a puff system or GC.

# Insect Behavior and Chemical Ecology

Instrument 5.  
PI: Dr. Karla  
Adesso



## **Oco Labs Super C Benchtop Supercritical CO2 Extractor:**

This is a quality engineered, benchtop supercritical fluid extractor (SFE). With a one ounce capacity and manual or automated pressure valve. The Super C is used for extraction of essential oils from plant material.

# Insect Behavior and Chemical Ecology

Instrument 6.

PI: Dr. Karla Adesso



## **Potter Spray Tower:**

Suitable for studying the biological effects of chemicals both when applied as a direct spray on the organisms or as a residual film. Equipped with quickly detachable atomizers, pneumatically operated spray table and all air controls mounted on attached instrument panels. A pressure gauge is included.

# Insect Behavior and Chemical Ecology

Instrument 7.  
PI: Dr. Karla  
Adesso



## **Labconco Bench Top Freeze Dryer:**

Used to desiccate plant and animal tissue samples for further molecular or chemical analysis or to prepare soft-bodied samples for permanent display (e.g., larval insect collections).

# **Equipment List**

**Department of Agricultural &  
Environmental Sciences, College of  
Agriculture, Human, and Natural  
Sciences,  
Tennessee State University**

# **Agriculture Education**

**Educational Tools & Equipment**  
**STEM Building**

## STEM Building - Wood Working

Instrument 1.  
PI: Dr. Tom Broyles  
and Dr. John Ricketts



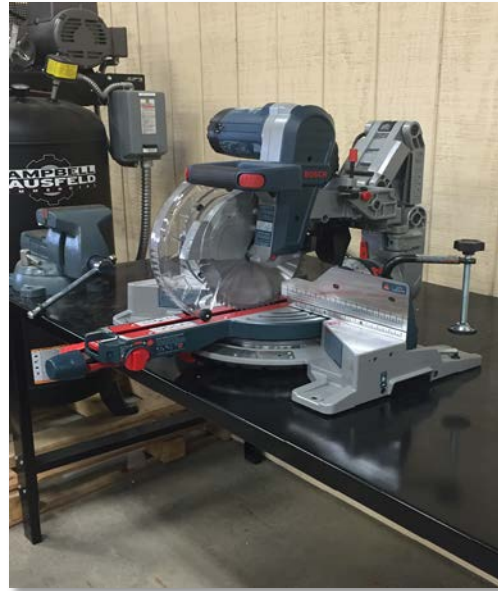
### **Cabinet SawStop Table Saw 10 inch, 5 HP**

The motor is enclosed within the cabinet and drives the blade with three parallel v-belts.

# STEM Building -Wood Working

Instrument 2.

PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Bosch Miter Saw: 10 inch, 2 ¾ HP:**  
Makes a quick, accurate crosscut in a  
workplace at a selected angle.



## STEM Building - Wood Working

Instrument 3.  
PI: Dr. Tom Broyles  
and Dr. John  
Ricketts



**Standing Band Saw 14 inch:**  
Used to make precise curves in wood.

## STEM Building - Wood Working

Instrument 4.

PI: Dr. Tom Broyles and  
Dr. John Ricketts



### **Wilton Combination Disc Sander 6 in. belt & 12 in.:**

A sander that uses a revolving abrasive disk driven by an electric motor.

## STEM Building - Wood Working

Instrument 5.  
PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Powermatic wood planer 20 in. 5 hp:**  
Adjusts thickness of wood and gives a smooth finish.

## STEM Building - Wood Working

Instrument 6.

PI: Dr. Tom Broyles and  
Dr. John Ricketts



**Powermatic dust collector 3 HP:**

Collects saw dusts from equipment in use  
to allow for easier clean up.

## STEM Building - Metal Working

Instrument 7.

PI: Dr. Tom Broyles and Dr.  
John Ricketts



**Jet variable speed drill-press 1 HP:**

Used to drill or enlarge a cylindrical hole in a work piece or part.

## STEM Building - Metal Working

Instrument 8.

PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Jet 8 inch x 13 inch 1.5 hp horizontal band-saw:**  
Has the ability to swivel and make angular cuts.

## STEM Building - Metal Working

Instrument 9.  
PI: Dr. Tom Broyles  
and Dr. John  
Ricketts



**Jet 315 mm manual cold saw:**  
Delivers a precise, burr-free cut and easy  
miters without sparks or generating heat.

## STEM Building - Metal Working

Instrument 10.  
PI: Dr. Tom Broyles  
and Dr. John  
Ricketts



**Birmingham 8 ft. x 10 gauge hydraulic metal shear:**  
Cuts flat sheet metal to desired length.



## STEM Building - Metal Working

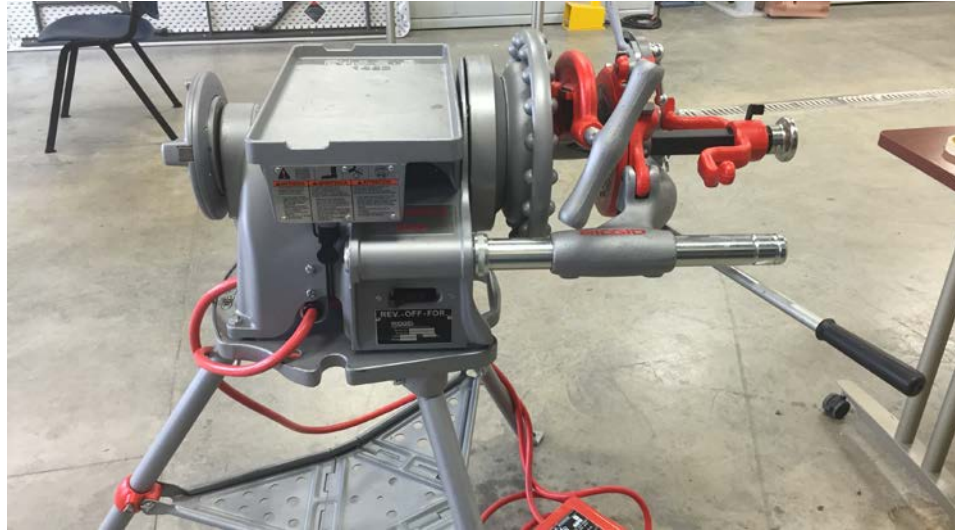
Instrument 11.  
PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Birmingham 8 ft. x 10 gauge hydraulic metal brake:**  
Machine tool for bending sheet and plate material, most commonly sheet metal.

## STEM Building - Metal Working

Instrument 12.  
PI: Dr. Tom Broyles  
and Dr. John Ricketts



### **Rigid pipe bender & threader:**

Bends pipe to desired angle and adds threads so you can piece pipe together.

## STEM Building - Metal Working

Instrument 13.  
PI: Dr. Tom  
Broyles and Dr.  
John Ricketts



### **Adjustable Pedestal Rollers:**

Allows for easy maneuverability with feeding long material through.

## STEM Building - Metal Working

Instrument 14.

PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Jet 2 hp 15.5 inch vertical metal band-saw:**  
A bandsaw whose blade operates in the vertical plane; ideal for contour cutting.

## STEM Building - Metal Working

Instrument 15.  
PI: Dr. Tom Broyles and  
Dr. John Ricketts



### **Jet 10 inch industrial bench grinder:**

Used to sharpen tools and drill bits, depending on the grade of the grinding wheel.

## STEM Building - Metal Working

Instrument 16.  
PI: Dr. Tom Broyles and  
Dr. John Ricketts



### **Jet metal lathe with stand:**

Holds the material and rotates it about a horizontal axis against a tool that shapes it.

## STEM Building - Metal Working

Instrument 17.

PI: Dr. Tom Broyles and  
Dr. John Ricketts



**Jet 2 hp phase mill & drill with power down feed:**

Combines a belt driven drill press with the dual coordinate ability of the milling machine table for flexibility and efficiency.

## STEM Building - Metal Working

Instrument 18.  
PI: Dr. Tom Broyles  
and Dr. John  
Ricketts



**Scotchman 65 ton hydraulic punch station:**  
Makes various shaped holes and cutouts on sheet metal and plate material.



## STEM Building - Metal Working

Instrument 19.  
PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Wilton 6 inch mechanic's vise:**

Used to secure an object to allow work to be performed on it.

## STEM Building - Metal Working

Instrument 20.  
PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Wilton 7.5 inch mechanic's vise:**

Used to secure an object to allow work to be performed on it.

## STEM Building - Welding Work

Instrument 21.

PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Torchmate 4 ft. x 4 ft. computer numeric controlled (CNC) plasma cutter:**  
Can move torch in a path directed by a computer.

## STEM Building - Welding Work

Instrument 22.  
PI: Dr. Tom Broyles and  
Dr. John Ricketts



### **Miller 225 amp stick welder:**

A manual arc welding process that uses a consumable electrode covered with a flux to lay the weld.

## STEM Building - Welding Work

Instrument 23.  
PI: Dr. Tom  
Broyles and Dr.  
John Ricketts



### **Miller 211 wire welders:**

The filler metal wire supplies the electric current to maintain the arc, which is shielded from the access of air an inert gas.

## STEM Building - Welding Work

Instrument 24.

PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Miller 375 Plasma cutter with 12 inch torch:**  
Used to cut steel, aluminum, brass, and copper.

## STEM Building - Welding Work

Instrument 25.  
PI: Dr. Tom Broyles  
and Dr. John  
Ricketts



### **Miller portable welding tables:**

Provides a steady, flameproof surface for welding parts and components.

## STEM Building – Welding Work

Instrument 26.  
PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Portable welding power source Miller Electric Shopmate 300 DX:**

Provides an electric current to perform welding.



## STEM Building – Welding Work

Instrument 27.  
PI: Dr. Tom  
Broyles and Dr.  
John Ricketts



**Weld Station Clean Air welding station:**  
Keeps hazardous smoke associated with welding by utilizing a preferred backdraft filtration method.

# STEM Building – Welding Work

Instrument  
28.  
PI: Dr. Tom  
Broyles and  
Dr. John  
Ricketts



**Gorbelt 2 ton over-head crane:**  
Consists of parallel runways with a traveling bridge spanning the gap. Used for manufacturing and maintenance applications.

## STEM Building – Welding Work

Instrument 29.  
PI: Dr. Tom Broyles  
and Dr. John  
Ricketts



**Campbell Hausfeld 80 gallon air compressor:**  
Converts power using an electric motor into potential energy storage in pressurized air (compressed air).

## STEM Building – Welding Work

Instrument 30.  
PI: Dr. Tom Broyles  
and Dr. John Ricketts



**Pressure-Pro 3000 psi hot/cold water pressure sprayer:**  
A high-pressure mechanical sprayer used to remove loose paint, mold, grime, dust, mud and dirt from surfaces and objects such as buildings, vehicles and concrete surfaces.