

COLLEGE OF **SCIENCES**





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APPLIED BIOLOGY DEPARTMENT

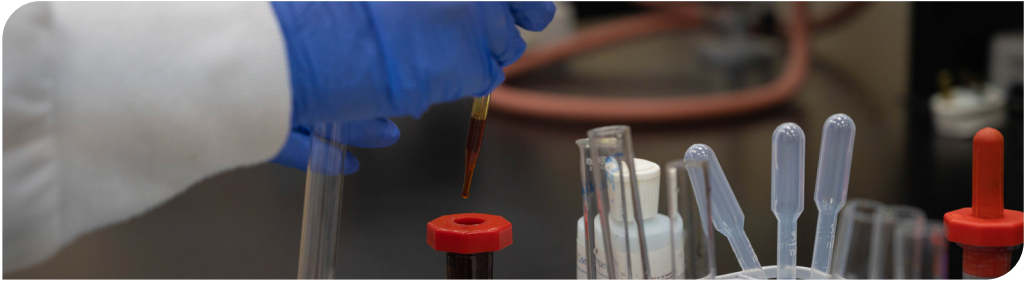
Applied Biology Laboratories

Lab Name	Location	Person in Charge	Programs Served	Courses Served
General Biology Lab	W12-039	Mona Al Ali	Applied Biology Dept.	General (Basic Course)
General Microbiology Lab	M12-132	Aisha Echtibi	Applied Biology Dept.	<ul style="list-style-type: none"> - Tissue Culture & Hybridoma Technology - Molecular Genetics - Plant Biotechnology - Microbial Processing & Biotechnology - Environmental Biotechnology
Immunology & Serology Lab	W12-205	Mona Al Ali	Applied Biology Dept.	Immunology & Serology Lab
Tissue Culture & Hybridoma Technology	M12-132	Mona Ibrahim	Applied Biology Dept.	<ul style="list-style-type: none"> - Tissue Culture & Hybridoma Technology - Student Research Project - Microbial Genetics
Molecular Genetics Lab	W12-039	Mona Ibrahim	Applied Biology Dept.	Molecular Genetics
Molecular Biology Lab	M12-131	Mona Mahfood	Applied Biology Dept.	<ul style="list-style-type: none"> - Molecular Biology - Microbial Genetics - Student Research Project - M.Sc. Thesis
General Biochemistry Lab	W12-227	Mona Al Ali	Applied Biology Dept.	General Biochemistry
Protein Biochemistry & Engineering Lab	W12-039	Mona Mahfood	Applied Biology Dept.	Protein Biochemistry & Engineering Lab
Plant Biotechnology Lab	W12-039	Maryam Ghaleb	Applied Biology Dept.	<ul style="list-style-type: none"> - Plant Biotechnology - Student Research Project
Microbial Processing & Biotechnology Lab	W12-205	Maryam Ghalib	Applied Biology Dept.	Microbial Processing & Biotechnology
Environmental Biotechnology Lab	M12-132	Mona Ibrahim	Applied Biology Dept.	Environmental Biotechnology
Microbial Genetics Lab	M12-132	Mona Mahfood	Biotechnology Department	General Biochemistry

Applied Biology Lab Staff

#	Name	Title	Ext.	Email
1	Aisha Alketbi	Sr. Lab Officer	065053476	Aisha77@sharjah.ac.ae
2	Mona Ibrahim	Sr. Lab Officer	065052437	mmusa@sharjah.ac.ae
3	Mona Al Ali	Lab Officer	065052473	Muna.alali@sharjah.ac.ae
4	Mona Mahfood	Lab Officer	065052416	mmahfood@sharjah.ac.ae
5	Mariam Ghaleb	Lab Officer	065053408	malawbathani@sharjah.ac.ae

GENERAL BIOLOGY LABORATORY



Location	Lab Staff in Charge	Contacts
W12-039	Mona Al Ali	065052473

INTRODUCTION

Experiments involve the use of the microscope detailed parts and functions. Furthermore, the chemical and physical characteristics of macromolecules will be illustrated, as well as the structure and composition of plant and animal cells. A section of this lab will also be devoted to respiration, cell division and genetics. Finally, the last section will mainly focus on the study of animal tissues in addition to human anatomy.

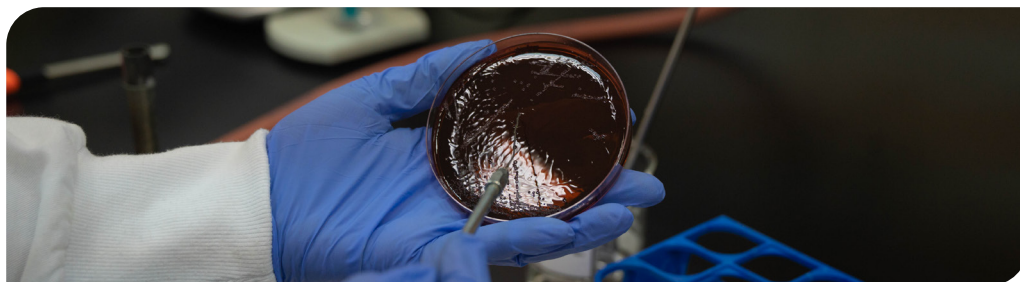
EQUIPMENT AND INSTRUMENTS

- Light compound microscope
- Dissecting microscope
- Water bath
- Microcentrifuge
- U.V. light
- Electrophoresis Apparatus and gel documentation system

EXPERIMENTS

- Microscopy
- Biomolecules of Living Cells
- Enzyme Action
- Respiration and Photosynthesis
- Cell Division
- Human Genetics
- Extraction of DNA
- Animal Tissues & Anatomy

GENERAL MICROBIOLOGY LABORATORY



Location	Lab Staff in Charge	Contacts
M12-132	Aisha Ectibi	065053476

INTRODUCTION

This Laboratory is designed to provide practical and hands-on experience of a variety of microbiological techniques. Laboratory work includes microscopy, staining, aseptic and sterile transfer techniques, assessment of morphological and biochemical properties of microorganisms and microbial identification.

EQUIPMENT AND INSTRUMENTS

- Compound microscopes
- water-baths
- visible spectrophotometer
- Incubators, orbital shaker
- Phase contrast Research Inverted Microscope,
- Cytoflex system
- Countess Autocell counter

EXPERIMENTS

- Lab Safety
- Microcopy and Simple Staining
- Culturing and Isolation Techniques
- Selective and Differential Staining of Microbes
- Microbial Morphology
- Selective and Differential Media & Demonstration of Bacterial Culture Characteristics
- Control of Microorganisms by Physical & Chemical Factors
- Bacterial Growth Curve
- Microbial Control
- Biochemical Testing
- Identification of Unknown

IMMUNOLOGY & SEROLOGY LABORATORY



Location	Lab Staff in Charge	Contacts
W12-205	Mona Al Ali	065052473

INTRODUCTION

This course is designed to prepare the student to function at the career-entry skill level in the immunology laboratory. This course presents basic principles of immunological and serological techniques. The experiments were designed to study the immune response, principles of antigen-antibody reactions and the principles of serological procedures. The lab includes other areas of study concerning the fundamentals of immunity and the immune response such as antibody structure and interactions, the complement system, hypersensitivity reactions and disorders of the immune response.

EQUIPMENT AND INSTRUMENTS

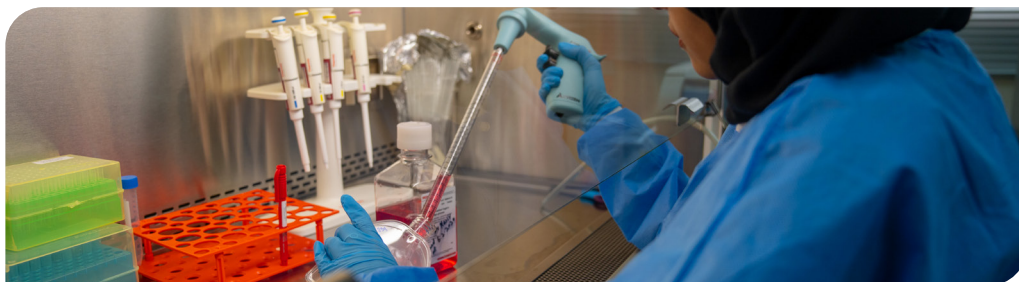
- Compound light microscopes
- Fluorescent microscope with digital camera and PC
- Elisa plate reader
- Incubator
- Serum electrophoresis apparatus and flow cytometer

EXPERIMENTS

- Concept of Different Types of Dilutions in Immunology and their Importance in Clinical Laboratory
- Introduction to the organs of Immune system and observation through different tissue slides (Bone marrow, lymph node, blood cells, thymus, spleen)
- Observation of blood cells using compound light microscope by preparing blood smear using wright field stain
- Qualitative and semi quantitative Latex Agglutination (Rheumatoid Factor Latex Test and C Reactive Protein Test)
- Indirect Hemagglutination Agglutination

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- Immunochromatography (Mononucleosis as an example)
 - Precipitation Reactions using Double Immunodiffusion technique.
 - ELISA (Enzyme Linked Immunosorbent Assay)
 - Allergy Screening Test

TISSUE CULTURE & HYBRIDOMA TECHNOLOGY LABORATORY



Location	Lab Staff in Charge	Contacts
M12-132	Mona Ibrahim	065052437

INTRODUCTION

This course is designed to establish, maintenance and subculture animal cells will. The course will also introduce the student to basic hybridoma technology and isolation of monoclonal antibodies.

EQUIPMENT AND INSTRUMENTS

- Inverted microscope with digital camera and PC
- Automated colony counter
- Flow cytometer
- Phase contrast microscope with digital camera
- Incubators
- Biological safety cabinets class II
- Fluorescent microscope with digital camera and PC
- Fridge, -80 °C freezer,
- Liquid nitrogen freezer
- PCR, SDS-PAGE apparatus and water bath.

EXPERIMENTS

- Lab Safety & Aseptic Techniques
- Introduction to Cell Culture: Media & Cell Types
- Subculturing, Cell Quantification & Viability Studies
- Cell Differentiation
- Detection & Control: Mycoplasma & Bacteria
- Cryopreservation
- Isolation of Primary Cells
- Culturing Primary Cells

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- Growing Hybridoma
 - Isolation of Monoclonal Antibody

MOELCULAR GENETICS LABORATORY



Location	Lab Staff in Charge	Contacts
W12-039	Mona Ibrahim	065052437

INTRODUCTION

This course is an introduction to many areas of modern genetics and emphasizes the principles of genetics in each of two main areas, transmission and molecular genetics. Different model organisms will be studied and analyzed by students to understand the segregation of mendelian genes. Moreover, experiments of the two main modes of gene's transfer in bacterial genetics (conjugation and transduction) conducted. Some sections of this lab will arm students with good experience in karyotyping. Moreover, bacterial mutagenesis is covered in this lab. The last section of students will apply bimolecular engineering using PCR; site directed mutagenesis, to introduce or create a mutation at a defined site into target known DNA sequence. It leads to changing the naturally occurring amino acid to another or terminating the polypeptide in order to identify information on the role of the amino acid that has been replaced at the functional level (phenotypes).

EQUIPMENT AND INSTRUMENTS

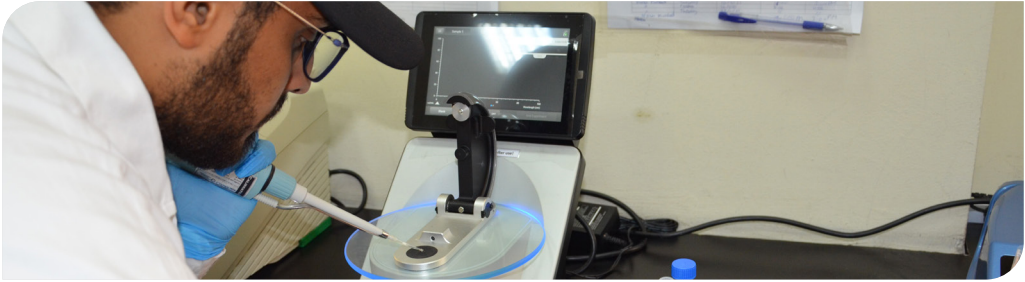
- Dissecting microscope
- PCR machine
- Electrophoresis equipment
- Gel documentation system
- Compound microscopes
- Agilent 2100 bioanalyzer

EXPERIMENTS

- Introduction, Probability & Statistics
- Independent Assortment and Gene Interaction in Maize
- Drosophila Familiarization
- Mendelian Inheritance in Drosophila

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- Sex-Linked Inheritance in *Drosophila*
 - Crossing over in *Drosophila*
 - Salivary Gland Chromosomes of *Drosophila*
 - Mutations in Bacteria
 - Ames Test
 - Karyotyping
 - Bacterial conjugation
 - Transduction
 - Transformation
 - PCR & Site-Directed Mutagenesis
 - Sequencing

MOLECULAR BIOLOGY LABORATORY



Location	Lab Staff in Charge	Contacts
W12-131	Mona Mahfood	065052416

INTRODUCTION

This course is designed to enhance the preparation of students for careers in research, biotechnology and science education. The laboratory experience will introduce students to the field of molecular biology where they will learn all the basic methodologies and instrumentation commonly used in biotechnology and molecular biology laboratories. Students will learn bacterial transformation, plasmid DNA purification, restriction digestion and ligation along with gel electrophoresis, polymerase chain reaction (PCR), cloning DNA fragments, and selection of recombinants. This course will give students who plan a career in research or biotechnology practical experience that mimics the realities of the laboratory setting.

EQUIPMENT AND INSTRUMENTS

- Agarose gel electrophoresis apparatus
- Microcentrifuges
- Mini centrifuges
- Refrigerated centrifuges
- Gel documentation system
- NanoDrop one
- PCR machines
- Agilent 2100 Bioanalyzer
- Quantitative real-time PCR
- Tissuelyser
- Automated Microbiology Identification & Susceptibility System
- Cryoplus storage System
- SAS-1 Plus Gel Electrophoresis machine
- Microvolume Spectro/Fluorometer
- Autocell counter

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- Chemidoc Imaging system
 - Microplate Spectrophotometer and Nano Drop One Spectrophotometer

EXPERIMENTS

- DNA Isolation from Prokaryotic Cells
- RNA Isolation from Eukaryotic Cells
- DNA and RNA Concentration Calculations, Purity
- Recombinant DNA Technology
- Restriction Enzyme Digestion and Ligation
- DNA Gel Electrophoresis
- DNA Basics: Bacterial Transformation
- Selection of Recombinants: Antibiotic Resistance and Blue White Screening
- Designing Primers for PCR Amplification
- Classical and Real Time PCR
- cDNA synthesis

GENERAL BIOCHEMISTRY LABORATORY



Location	Lab Staff in Charge	Contacts
W12-227	Mona Al Ali	065052473

INTRODUCTION

The aim of this Laboratory course is to introduce general laboratory techniques routinely used in Biochemistry with an emphasis on the qualitative as well as quantitative aspects of biochemical experiments. The course deals with principles and practices of Biochemistry such as titration and chromatography for the investigation of amino acids, quantitative determinations by spectroscopic methods of protein concentration and introductory experiments about kinetics of enzyme action. The course also covers basic protein purification methods and SDS-PAGE analysis.

EQUIPMENT AND INSTRUMENTS

- pHmeter,
- Visible spectrophotometer,
- Microcentrifuge,
- SDS-PAGE apparatus

EXPERIMENTS

- Laboratory Calculations and Instrumentation
- Preparation of solutions
- pH Measurement and Buffer Preparation
- Titration of Unknown Amino Acid
- Chromatographic Analysis of Amino Acids
- Spectrophotometers and Protein Determination
- Enzyme Kinetics
- Determination of Protein Isoelectric Point
- Protein Purification and Analysis on SDS-PAGE

PROTEIN BIOCHEMISTRY & ENGINEERING LABORATORY



Location	Lab Staff in Charge	Contacts
W12-039	Mona Mahfood	065052416

INTRODUCTION

This course covers basic biochemical principles of proteins along with a comprehensive survey of products currently available or under development by the protein biotechnology industry.

EQUIPMENT AND INSTRUMENTS

- SDS-PAGE apparatus
- refrigerated centrifuges
- ultra-low freezer
- incubator shaker, digital dry bath, vortex mixers, balances
- visible spectrophotometer
- Speed Vac, sonicator
- pH meter
- Chemi Doc imaging system and turbo transfer system

EXPERIMENTS

- Protein Purification
- Salting Out
- Dialysis
- Gel Filtration
- Expression and Characterization of a Recombinant Enzyme in *E. coli*
- SDS Gel Electrophoresis, Molecular Weight Measurements
- Protein Gel Staining (Including the Whole Cell Homogenates)
- Western Blotting Concepts

PLANT BIOTECHNOLOGY LABORATORY



Location	Lab Staff in Charge	Contacts
W12-039	Maryam Ghaleb	065053408

INTRODUCTION

This course will introduce the students to the subject of plant biotechnology. The biotechnological methods involved in the production of transgenic plants will be described – plant tissue culture and plant genetic engineering. The application of these techniques to improve the important agricultural species.

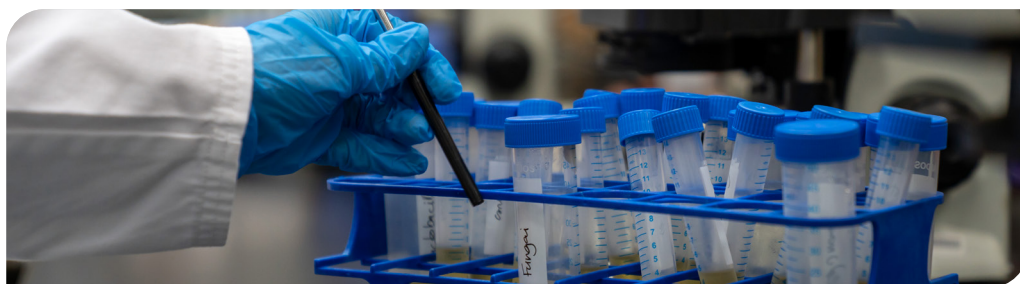
EQUIPMENT AND INSTRUMENTS

- Laminar air- flow hood
- Autoclave
- Magnetic stirrer
- Microcentrifuge
- ice maker-thermal cycle
- agarose gel electrophoresis
- Plant growth Chamber
- Vapor Pressure Osmometer
- Tissuelyser

EXPERIMENTS

- Aseptic Techniques and Introduction to Plant Tissue Culture
- Nutrient Media Preparation for Plant Tissue Culture
- Seed Sterilization- Seed Germination
- Plant Response to Hormones
- Plant Regeneration by Organogenesis
- Leaf Disc Transformation by Agrobacterium
- RNA Extraction from Plants
- cDNA synthesis and PCR for candidate genes in plant.

MICROBIAL PROCESSING & BIOTECHNOLOGY LABORATORY



Location	Lab Staff in Charge	Contacts
W12-205	Maryam Ghaleb	065053408

INTRODUCTION

The course focuses on the vast array of applications of microorganisms, aimed to highlight the potential of wild or genetically modified microorganisms such as cell factories to produce goods and services. It introduces the student to the new era of biotechnology & familiarizes the student with the several areas of industrial application of microorganisms: medical and pharmaceutical, protein production (enzymes, yeast, and single cell protein), production of biochemicals (primary/secondary metabolites), food and beverage technology, agriculture and environmental technologies and alternative energies (bioengineering)

EQUIPMENT AND INSTRUMENTS

- Incubator
- Water bath shaker
- Compound microscopes
- pH meter
- Fermenter
- Vortex mixers
- Fridge
- VITEK 2 Bacteria Identification System

EXPERIMENTS

- Laboratory characteristics of microorganisms used in biotechnology and industry (Bacteria and Fungi).
- Isolation of Streptomycetes from Soil Samples and Testing their Potential to Produce Antibiotics.
- Standardization of Antimicrobial Susceptibility Testing of New Antibiotics
- Pickle Fermentation
- Using Chymosin to Make Cheese
- Fermentation
- Testing quality of milk
- Detection of Antibiotic-resistant Strains using VITEK 2 Bacteria Identification System

ENVIRONMENTAL BIOTECHNOLOGY LABORATORY



Location	Lab Staff in Charge	Contacts
M12-132	Mona Ibrahim	065052437

INTRODUCTION

This course gives an overview of how biotechnical tools are applied in waste handling, prevention and removal. The specific application of metabolic capability and molecular biology of microorganisms to degrade environmental contaminants and remediate environmental media emphasized. The course format is a combination of lecture, laboratory, visits, projects and oral presentations. The labs will be field-based hands-on experiences designed with a goal to acquaint the students with some of the concepts that are critical to understanding issues in environmental management. The course will focus on topics that range between environmental monitoring, sewage treatment, bioremediation and clean technology to renewable energy and biofuels. One or two field trips that will highlight the application of biotechnology to reverse environmental problems will also be included.

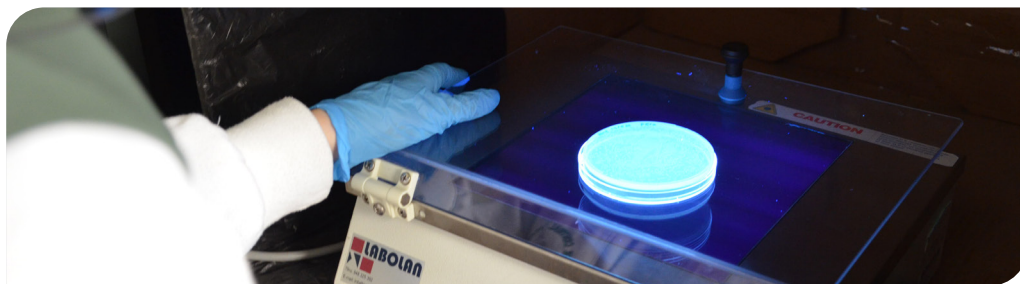
EQUIPMENT AND INSTRUMENTS

- Incubator
- Compound microscopes
- PCR machines
- Spectrophotometer
- Shaker incubator
- Gel documentation system
- pH meter
- VITEK 2 Bacteria Identification System

EXPERIMENTS

- Introduction to Contaminants in UAE
- Identifying Bacterial Consortium in Soil Contaminated with Crude oil
- Identification of hydrocarbon degrading bacteria using Vitek® Bacterial Identification System
- Examination of Treated Sewage Water: Coliform MPN Test Experiment
- Composting, Building Your Own Bioreactor
- The Ability of Bacteria to Degrade Diesel Fuel
- Using Alkane Hydroxylase B (alkB) Gene as a Biomarker for Hydrocarbon Degradation
- Preparation of Biodiesel from Cooking Oil

MICROBIAL GENETICS LABORATORY



Location	Lab Staff in Charge	Contacts
M12-132	Mona Mahfood	2416

INTRODUCTION

In this laboratory, students will develop their practical skills on genetic complexity & the Lateral/Horizontal genetic transfer (LGT/HGT) processes in bacteria such as conjugation, transformation and transduction, CRISPR-Editing, & visit to the human insulin production unit in Julphar, industry. The practical training includes microbial DNA isolation, purification, quantitation, standardization, optimization, restriction mapping, cloning & expression using Lux-gene cluster (*vibrio fischeri*) & GRP-gene cluster (*Aquaria victoria*) with different plasmids such as pVIP, pGLO, pBR322.

EQUIPMENT AND INSTRUMENTS

- Compound Microscopes
- Nanodrop
- Incubators
- Bunsen Burners
- Loops And Needles
- Agarose Gel Electrophoresis Apparatus
- Microcentrifuges
- Gel Documentation System
- Incubator Shaker
- Vortex Mixers
- Microwave
- Agilent 2100 Bioanalyzer
- Quantitative Real-Time PCR
- Heating Blocks

EXPERIMENTS

- Introduction to Laboratory Safety

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- DNA Isolation & quantification from E. coli
 - Plasmid extraction and purification from E. coli
 - DNA Standardization (construction of standard curve of DNA using microbial DNA Bacteriophage model).
 - Restriction mapping of microbial DNA
 - Engineering of Transgenic E. coli by cloning and transformation.
 - Bacterial Conjugation
 - Bacterial transduction using Enterobacteria phage
 - 16S rDNA gene (1448 bp) sequencing for bacterial phylogenetic-ID.
 - Gene-Editing of staphylococcus epidermidis and its phage Andhra using CRISPR-Cas9 defense system.