



Hash BioTech Labs
a group company of Hash Group

Standard Industrial Training Program: Curriculum

WEEK 1: Working & Uses of Laboratory Equipments

- Oven
- Shakers
- Incubator
- pH Meter
- Sonicator
- Autoclave
- Colorimeter
- Micrometry
- Microscope
- ELISA Reader
- Centrifuge
- UV/VIS Spectrophotometer
- Micro Filtration
- Water Purification System
- Soxhlet Extraction
- Muffle Furnace
- Laminar Air Flow
- Fermentor
- Electrophoresis
- Micro-Kjeldahl
- Lyophilizer
- Fast Protein Liquid Chromatography (FPLC)
- Polymerase Chain Reaction (PCR) Machine
- Extraction & Quantification of Plant Pigments.
- Preparation of Standard Curve of Protein & Glucose.
- Flame Photometer
- Viscometer

WEEK 2: Clinical & Pharmaceutical Microbiology

- Types of Culture Media & Preparation
- Staining Techniques
- MIC Determination
- Blood Test
- TLC, DLC, ESR
- Blood Sugar Testing
- Bioassay of Vitamins
- Isolation & Purification of Microflora from Sputum
- Pure Culture Techniques
- Antibiotic Sensitivity Test
- Blood Culture Techniques
- Urine Culture Technique & Analysis
- General Blood Picture
- Haemoglobin Assay
- Sterility Test of Injectables

WEEK 3: Agriculture, Food & Water Microbiology,

- Isolation of N₂-fixing bacteria from Root Nodules
- Isolation of N₂-fixing Cyanobacteria from Soil
- Mushroom Culturing Technology
- Spawn Production & Spawning
- Making and Casing Beds
- Growing Conditions for Mushrooms
- Growing Mushrooms Outside (Pest & Disease Management)
- Harvesting, Storing & Using Mushrooms



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- Vermicomposting
 - Preparation of Vermicompost Unit
 - Types of Worms & their Life Cycle
 - Manure
 - Wormy Wash
 - Advanced Harvesting Technique
 - Cost Benefits
- Food Microbiology
 - Milk Products: Quality Testing
 - Vinegar Processing & Production
- Water Microbiology
 - Testing of drinking water for Colour, Taste, Temperature, Turbidity, pH.
 - Testing of Dissolved Oxygen, BOD, COD, Alkalinity.
 - Total Plate Counts
 - Water Blooms

WEEK 4: Enzymology & Protein Engineering

- Cell Disruption Methods
- Isolation of Protein from Biological Samples
- Ammonium Sulphate Precipitation of Protein
- Dialysis of Protein
- Purification of Protein by Ion Exchange & Gel Filtration Column
- Enzyme Assay
- Quantitative Estimation of Protein by Lowry's & Bradford's method
- Enzyme Kinetics
 - pH
 - Temperature
 - Substrate Concentration
 - Activators & Inhibitors
- Separation & Identification of Amino Acids by TLC (Thin Layer Chromatography)
- Characterization of Protein through SDS-PAGE
- Isolation of Enzyme using Native-PAGE

WEEK 5: Industrial Microbiology

- Introduction, Improvement & Preservation of Industrial Strains
- Basics & Handling of Fermentor
- Cultivation of Microbes in Fermentor
- Production of Alcohol/Wine/Antibiotic by Fermentation Techniques.
- Downstream Fermentation
- Production of Single Cell Protein (Yeast/Spirulina).
- Production of commercially important Enzymes (Amylase/Protease/Lipase)
- Immobilization of Industrial Strains
- Visit to Hash Biotech Farms (On Demand)



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WEEK 6: Plant Tissue Culture & Bio Energy

- Instrumentation in Plant Tissue Culture
- Sterilization Techniques
- Preparation of Culture Media
- Root Callus
- Embryo Culture
- Callus Culture
- Cultivation Techniques for Biodiesel/Medicinal/Aromatic plants.
- Extraction of Lipid & Oil from Jatropha seed (Soxhlet Extraction).
- Bioconversion of Vegetable Oil/ Jatropha Oil in to Biodiesel.
- Bio Gas Production.

WEEK 7: Immunology

- Immuno Electrophoresis
- ELISA Assay (Sandwich ELISA)
- Separation of Lymphocytes
- Isolation of IgG from blood, Purification of IgG
- Salt Precipitation

WEEK 8: Molecular Biology & Bioinformatics

- Standard Growth Curve of Escherichia coli
- Extraction of DNA from Escherichia coli /blood
- General technique of Plasmid DNA Isolation
- Isolation of Total RNA
- Detection of DNA in Agrose Gel Electrophoresis by Staining
- Restriction-digestion of DNA.
- Basics of DNA Fingerprinting, PCR and Primer Designing
- Basics of Bioinformatics and Bioethics
- Lecture on Intellectual Property Rights (IPR) & Career Guidance.