

Microbiology ¹ (MIBI)				
General				
	Course Unit	Status	Pre-requisite	Co-requisite
Year 1 Sem 1	BIOL 11012 Basic Microbiology (Lecture cum Laboratory)	C	A/L Biology	
Year 1 Sem 2	MIBI 12014 Taxonomy of Bacteria, virus and Eukaryotic Microorganisms	C	BIOL 11012	MIBI 12022
	MIBI 12022 Taxonomy of Bacteria, virus and Eukaryotic Microorganisms laboratory	C	BIOL 11012	MIBI 12014
Year 2 Sem 1	MIBI 21014 Microbial Genetics and Microbial Physiology & Biochemistry	C	MIBI 12014 MIBI 12022	MIBI 21022
	MIBI 21022 Microbial Genetics and Microbial Physiology & Biochemistry laboratory	C	MIBI 12014 MIBI 12022	MIBI 21014
Year 2 Sem 2	MIBI 22034 Environmental and Agricultural Microbiology	C	MIBI 21014 MIBI 21022	MIBI 22042
	MIBI 22042 Environmental and Agricultural Microbiology laboratory	C	MIBI 21014 MIBI 21022	MIBI 22034
	MIBI 22054 Environmental Microbiology²	C	ENCM 21032	MIBI 22062
	MIBI 22062 Environmental Microbiology Laboratory²	C	ENCM 21032	MIBI 22054
Year 3 Sem 1	PRPL 31012 Professional placement	O	All MIBI compulsory units offered in levels 1 & 2	
	MIBI 31014 Food Microbiology, Food Hygiene and Food Technology	C	MIBI 21014 MIBI 21022	MIBI 31022
	MIBI 31022 Food Microbiology, Food Hygiene and Food Technology laboratory	C	MIBI 21014 MIBI 21022	MIBI 31014
Year 3 Sem 1&2	MIBI 33034 Medical, & Veterinary Microbiology and Microbial Technology	C ³ /O	MIBI 21014 MIBI 21022	MIBI 32041
Year 3 Sem 2	MIBI 32041 Medical, & Veterinary Microbiology laboratory	C ³ /O	MIBI 21014 MIBI 21022	MIBI 33034
	MIBI 32056 Internship in microbiology	C ³ /O	MIBI 31014 MIBI 31022	
Year 3 Sem 1&2	MIBI 33062 Industrial Microbiology laboratory	C ³ /O	MIBI 31014 MIBI 31022	MIBI 33034

1 Restricted enrolment

2 Compulsory only for the students follow the B.Sc. Degree programme in Environmental Conservation and Management

3 Compulsory only for the Microbiology special students.

MICROBIOLOGY

Level-1

Course Code : BIOL 11012
Title : Basic Microbiology (Lecture cum Laboratory)
Pre-Requisite : G.C.E. (A/L) Biology

Learning Outcomes:

At the end of the course unit student will be able to

- identify the contributions made by the scientists to the development of microbiology,
- demonstrate the understanding of principles of taxonomy and basic physiological characteristics of microorganisms,
- demonstrate the understanding of the basic laboratory methods used in the study of microorganisms,
- demonstrate the understanding of microbiology related to food, soil and wastewater treatment.

Course Content:

Origin and Scope of Microbiology, Major divisions of the living world, Prokaryotic structure & functions, Diversity of microbial world: General introduction, Bacteria, Fungi, Virus etc.

Basic Microbiological methods: Pure culture techniques, Principles of microbial nutrition, Formulation of culture media, Different types of culture media.

Microbial growth: the definition of growth and growth curve of bacteria

Control of microorganisms; the theory and practice of sterilization and disinfections.

Introduction to Food microbiology, soil microbiology and Water & wastewater microbiology

Practical Sessions:

Examination of living Micro-organisms – Wet Mount Techniques, Examination of living Micro-organisms in natural environment, Microscopic examination of bacteria, endospores, capsules Preparation of culture media, Isolation of pure cultures

Method of Teaching and Learning: Combination of lectures laboratory classes and tutorials

Assessment: End of course examination.

Recommended Reading:

1. Atlas, R.M. (1996). *Microbiology Fundamentals and applications*. Wm. C. Brown Publishers
2. Tortora, G.J., Funke, B.R., Case, C.L (1998) *Microbiology*. Benjamin Cummings

Level- 1

Course Code : **MIBI 12014**
Title : Taxonomy of Bacteria, virus and Eukaryotic Microorganisms
Pre-Requisite : BIOL 11012
Co-Requisite : MIBI 12022

Learning Outcomes:

At the end of the course unit student will be able to,

- discuss the major differences and criteria used in taxonomic divisions,
- describe basic characteristics of some selected groups of bacteria and their economic importance,
- explain the classification of viruses and their structure,
- describe the eukaryotic microorganisms, their lifecycles and behavior.

Course Content:

Diversity of Prokaryotic & Eukaryotic Microorganisms:

Introduction to taxonomy; Taxonomic ranks, Problems of bacterial taxonomy, major characteristics used in bacterial taxonomy. Systematic study of important groups of chemoorganotrophic bacteria: Enterobacteriaceae, Lactobacillaceae, Bacillaceae, Micrococcaceae and Pseudomonadaceae, Photosynthetic bacteria and Archaeobacteria.

Characteristics of algae, major divisions of algae. Characteristics of unicellular algae and a brief study of cyanobacteria.

Characteristics of fungi:

Nutrition and reproduction, Brief study of major divisions of fungi, slime molds and their industrial, agricultural and medical importance.

Virus:

Structure of Viruses, and other acellular forms: Viroids, Prions. Detection, Identification and Classification of viruses. Lifecycles of the major groups of bacterial viruses, animal viruses, plant viruses and other virus-host associations.

Method of Teaching and Learning: A combination of lectures and tutorials.

Assessment: End of course examination.

Recommended Reading:

1. Atlas, R.M. (1996). *Microbiology Fundamentals and applications*. Wm. C. Brown Publishers
2. Tortora, G.J., Funke, B.R., Case, C.L (1998) *Microbiology*. Benjamin Cummings Publishers, Addison Wesley Longman, Inc
3. Dimmock, N. J. and Primrose, S. B. (1998). *Introduction to Modern Virology*. Oxford University Press

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Course Code : MIBI 12022
Title : Taxonomy of Bacteria, virus and Eukaryotic Microorganisms
Pre-Requisite : BIOL 11012
Co-Requisite : MIBI 12014

Learning Outcomes:

At the end of this unit, the student will be able to,

- demonstrate the basic techniques of handling, culturing, examination and identification of selected groups of microorganisms,
- explain the genomic variability for identification and characterization of microbial pathogens and viruses.

Course Content:

Laboratory exercises to illustrate the contents and special features emphasized in lecture course MIBI 12014. Enumeration of bacteria, Quantitative estimation of Microbial growth, the Biochemical examination of Bacteria, Identification of characteristic compound, Identification of unknown bacteria. Isolation and enumeration of soil fungi, Identification of fungi and algae. Detection and differentiation of viruses using Enzyme Linked Immunosorbent Assay (ELISA) test.

Method of Teaching and Learning: Laboratory practical and demonstration classes.

Assessment: End of course examination.

Recommended Reading:

1. Atlas, R.M. (1996). *Microbiology Fundamentals and applications*. Wm. C. Brown Publishers
2. Tortora, G.J., Funke, B.R., Case, C.L (1998) *Microbiology*. Benjamin Cummings Publishers, Addison Wesley Longman, Inc
3. Francki, R.I.B., Fauquet, C.M., Knudson, D. L. and Brown, F. (1991). *Classification and Nomenclature of Viruses. Fifth Report of the international Committee on Taxonomy of Viruses*. Springer-Verlag, Wien, New York.

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Level-2

Course Code	:	MIBI 21014
Title	:	Microbial Genetics and Microbial Physiology & Biochemistry
Pre-Requisite	:	MIBI 12014 & MIBI 12022
Co-Requisite	:	MIBI 21022

Learning Outcomes :

At the end of the course unit student will be able to,

- differentiate the fundamental and advance concepts of microbial genetics,
- explain the principles of the recombinant DNA technology and the bacterial transformation,
- discuss the application of recombinant DNA organisms and their usage in Agricultural, Medical & Industrial activities,
- describe the different methods of carbohydrate metabolism present in bacteria,
- discuss the production of various metabolic products via fermentation.

Course Content:

Microbial Genetics

Structure and function of prokaryotic genetic material: Chromosome structure, Prokaryotic gene and gene code. Molecular basis of inheritance: Regulation of bacterial gene expression: Induction, repression and Catabolic repression. Mutations: Types, detection and selection of mutations, Mutagens, Expression of mutations. Genetic transfer and recombination: Plasmids, Transposable elements, Transformation, Conjugation and Transduction. Genetic manipulations: recombinant DNA technology, DNA cloning and cloning vectors, Expression of foreign genes in bacteria. Genetic engineering: Industrial, Agricultural and Medical applications.

Microbial Physiology & Biochemistry

Nutrition of bacteria: Major & minor bio – elements, nutrients as energy source, growth factor requirements of bacteria. Carbohydrate metabolism in bacteria: EMP, HMP, ED & phosphoketolase pathways, Heterotrophic generation of ATP in bacteria: fermentation, Autotrophic generation of ATP: Chemolithotrophy, bacterial photosynthesis. Transport of nutrients in microorganisms. Biosynthesis of macromolecules in microorganisms: Amphibolic pathways, biosynthesis of proteins and lipids, Calvin cycle. Biodegradation of macromolecules.

Method of Teaching and Learning: A combination of lectures, tutorials, computer assisted learning and assignments.

Assessment: Continuous assessment and end of the course unit examination.

Recommended Reading:

1. Freifelder, D (1998). *Molecular Biology*. Jones & Bartlett Publishers, Inc.
2. Singer, M. and Berg, P. (1991). *Genes and Genome*. University Science Books, U.S.A.
3. Turner, P.C ; McLennan, A.G; Bates, A.D and White, M.R.S (1997). *Instant Notes in Molecular Biology*. Springer-Verlag New York.
4. Gottschalk, G (1986). *Bacterial Metabolism*. Springer-Verlag, New York.
5. Mandelstam, J.;McQuillen, K. and. Dawes, I. (1983). *Biochemistry of Bacterial Growth*. Blackwell Scientific Publications.
6. Mohan, S.; Dow, C. and Cole, J.A. (1992). *Prokaryotic Structure and function: a new perspective*. Cambridge University Press
7. Synder, L. and Champness, W. (1997) *Molecular Genetics of Bacteria*. American Society for Microbiology

Course Code : **MIBI 21022**
Title : Microbial genetics and Microbial physiology and Biochemistry Laboratory
Pre-Requisite : MIBI 12014 & MIBI 12022
Co-Requisite : MIBI 21014

Learning Outcomes :

At the end of the course unit student will be able to,

- carryout the detection & differentiation of microorganisms using DNA based techniques,
- analyze the biologically important components in the laboratory,
- demonstrate some physiological activities of microorganisms,
- demonstrate the potential usage of some microbial metabolic activities/processes in industries.

Course Content:

Laboratory exercises to illustrate the contents and special features emphasized in lecture course MIBI 21014. Preparation of bacterial Genomic DNA, Preparation of bacterial plasmid DNA, Digestion of DNA and analysis of the digestions by Gel electrophoresis: Restricted Fragment Length Polymorphism (RFLP) analysis, Bacterial transformation and cloning of DNA, Polymerase Chain Reaction (PCR) for the detection of important Bacterial species and some viruses.

Determination of bacterial enzymes, chromatography techniques

Method of Teaching and Learning: Laboratory practical, demonstration classes and computer assisted learning.

Assessment: Continuous assessment and end of the course unit examination.

Recommended Reading:

1. Anderson, P and Ganetzky, B. (1997). *An electronic companion to genetics workbook*. Cogito Learning Media, Inc., New York
2. Creighton, T.E. (1990). *Protein Structure a Practical Approach*. IRL Press, New York,
3. John G. Holt (1994) *Bergy's Manual of Determinative Bacteriology*. Williams & Wilkins, Baltimore
4. Sambrook, J., Fritsch, E.F and Maniatis, T. (1989). *Molecular Cloning- A Laboratory Manual*. Vol. 1, 2, and 3. Cold Spring Harbor.

Course Code : **MIBI 22034**
Title : Environmental and Agricultural Microbiology
Pre-Requisite : MIBI 21014 & MIBI 21022
Co-Requisite : MIBI 22042

Learning outcomes: At the end of the course unit, the student will be able to,

- discuss the causes and effects of oligotrophication and eutrophication in lakes and ponds,
- discuss water purification techniques and indicator microorganisms used for microbiological quality of water,
- demonstrate knowledge in solid and liquid waste management,
- explain the principles of use of GIS in environmental microbiology,
- describe the microbial communities in the environment and their interactions with plants causing diseases,
- explain the application of pesticide to control microbial diseases in plants,
- apply principles of Post harvest microbiology of fruits & vegetables to minimize losses.

Course Content:

Environmental Microbiology

Microbial ecology and ecosystems, place and the significance of microorganisms in the ecosystem. Microbial interactions with plants, animals and microorganisms. Aquatic environment as a microbial habitat. Microbiology of air. Microbial contribution to pollution, pathogens, persistence of non-biodegradable Xenobiotic molecules. Environmental biotechnology: Microbiology of domestic water and sewage, water pollution, purification, sanitary quality, sewage treatment.(industrial and domestic). Bioremediation and Bioaugmentation.

Introduction to Geographical Information Systems (GIS): Fundamental of GIS as a planning tool in environmental microbiology such as waste disposal, pollution control.

Agricultural Microbiology

Microbial disease of crops, symptoms of plant disease and mechanisms of microbial pathogenicity, Transmission of plant pathogens, viral diseases, viroid diseases, bacterial diseases, fungal diseases.

Agricultural biotechnology: control of crop diseases. pesticide microbiology. biological control of plant diseases. post-harvest microbiology of fruits and vegetables.

Soil microbiology: Diversity of microbial habitats, Physical, chemical and biological aspects of soil structure. Methods of studying soil microorganisms. The significance of microbial biomass in soil. Biogeochemical cycles.

Method of Teaching and Learning: A combination of lectures, tutorials, and computer assisted learning and assignments.

Assessment: Continuous assessment and end of the course examination.

Recommended Reading:

1. Agrios, G.N. (1997). *Plant Pathology*, Academic Press
2. Dikinson and Lucas (1998). *Plant Pathology and Plant Pathogens*. Blackwell Science, Inc. Oxford, UK.
3. Hurst, C. J., Knudson, G. R. (1997). *Manual of Environmental Microbiology* Washington, ASM Press
4. Ronald M. Atlas (1996). *Microbiology Fundamentals and applications*. Wm. C. Brown Publishers

Course Code : **MIBI 22042**
Title : Environmental and Agricultural Microbiology Laboratory
Pre-Requisite : MIBI 21014 & 21022
Co-Requisite : MIBI 22034

Learning Outcomes :

At the end of the course unit, the student will be able to,

- use the different physiological techniques to assay microorganisms in the environment,
- apply techniques to evaluate the ability of bacteria to bio-degrade xenobiotic compounds,
- apply the standard procedures for the detection and quantification of coliforms,
- assess the standard techniques and usage of assessing BOD, COD, Suspended solids and some other selected parameters in wastewater,
- apply GIS to monitor solid and liquid waste,
- apply laboratory procedures used to diagnose plant diseases and to identify pathogens.

Course Content:

Environmental Microbiology

Laboratory exercises to illustrate the contents and special features emphasized in lecture course MIBI 22034. Enrichment & Isolation of bacteria capable of degrading synthetic organic compounds. Diversity of microbial habitats, Microbial Quality of water: Coliform Test, Membrane filter techniques, MPN counts Physico-Chemical characteristics of polluted water.

Application of GIS in environmental microbiology: Determination of pollution levels and environmental quality in relation to microbiology using GIS. Case studies on environmental microbiology based on GIS.

Agricultural Microbiology

Plant disease diagnosis (Fungal, Bacterial, Virus diseases), Isolation of plant pathogenic Microorganisms. (Fungi & Bacteria), Identification of plant pathogens using Cultural, Biochemical and Molecular biological techniques. Confirmation of pathogenicity. Qualitative and quantitative analysis of soil microorganisms.

Method of Teaching and Learning: Laboratory practical, demonstration classes, assignments and computer assisted learning.

Assessment: Continuous assessment and end of the course examination.

Recommended Reading:

1. Agrios, G. N. (1997). *Plant Pathology*, Academic Press
2. Board, R.G., Jones, D. and Skinner, F.A. (1992) *Identification methods in Applied and Environmental Microbiology*. Blackwell Science, Inc. Oxford, UK.
3. Coomaraswamy, U. (1979) *A hand book to the fungi parasitic on the plants of Sri Lanka*. Published by the National Science Council of Sri Lanka.
4. Howard, J., Whitcombe, D. M. (1995) *Diagnostic Bacteriology- Protocols*. Humana Press.
5. Matthews, R. E. F (1992). *Plant Virology*. San Diego, Academic Press.
6. Pepper, I.L. and Gerba, C.P. (1995) *Environmental Microbiology: A Laboratory Manual*. Harcourt Brace & Company.
7. *Standard methods for the examination of water and wastewater (1992)*. American Public Health Association.

Course Code : *MIBI 22054
Title : Environmental Microbiology
Pre-Requisite : ENMC 21032
Co-Requisite : MIBI 22062

Learning Outcomes:

At the end of the course unit, the student will be able to,

- demonstrate the knowledge and understanding of the role of microorganisms in the biosphere
- state the factors affecting the microbial growth and growth kinetics as the basis of application of microbiology,
- describe basic characteristics of some selected groups of bacteria with reference to their role in the environment.
- describe the basic component processes involved in the typical treatment of drinking water and indicator microorganisms used for microbiological quality of water,
- demonstrate the knowledge and understanding of the role of microbial processes in solid and liquid waste management,

Course Content:

The scope of Microbiology and its importance to environment. The nature of microbial world. Microbial diversity based on their nutritional requirements. Factors affecting microbial growth, Microbial growth kinetics, Basic Microbiological methods: Pure culture techniques, Principles of microbial nutrition. Enumeration of microorganisms. The basic characteristics of some selected groups of bacteria with reference to their role in the environment.

Characteristics of fungi: Nutrition and reproduction, Brief study of major divisions of fungi, slime molds. Structure of viruses, and their importance in the environment

Microbial ecology and the significance of microorganisms in the ecosystem. Microbial interactions with plants, animals and microorganisms. Aquatic environment as a microbial habitat. Microbial interactions and physico-chemical diversity in lake and river environments. Indicator organisms in relation to microbial quality of water. Bio-films in drinking water distribution systems. Water borne diseases. Microbiology of domestic water and sewage, water pollution, purification, sanitary quality, sewage treatment. Bioremediation and Bioaugmentation. Microbiology of air.

Method of Teaching and Learning: A combination of lectures, tutorials assignments and discussions

Assessment: Continuous assessments through evaluation of assignments and end of course written examination.

Recommended Reading:

1. Atlas, R.M. (1996). *Microbiology Fundamentals and applications*. Wm. C. Brown Publishers
2. Tortora, G.J., Funke, B.R., Case, C.L (1998) *Microbiology*. Benjamin Cummings Publishers, Addison Wesley Longman, Inc
3. Atlas, R.M. and Bartha, R. (2000) *Microbial ecology Fundamentals and applications* Benjamin Cummings Publishers, Addison Wesley Longman, Inc

* Compulsory only for the students follow the B.Sc. Degree programme in Environmental Conservation and Managemem

Course Code : *MIBI 22062
Title : Environmental Microbiology Laboratory
Pre-Requisite : ENMC 21032
Co-Requisite : MIBI 22054

Learning Outcomes :

At the end of the course unit, the student will be able to,

- demonstrate the understanding of the basic laboratory methods used in the study of microorganisms,
- use the different physiological and biochemical methods to assay microorganisms in the environment,
- apply the standard microbiological procedures for the detection and quantification of coliforms,
- use the standard techniques employed for assessing BOD, and some other selected parameters in wastewater,

Course Content:

Laboratory exercises to illustrate the contents and special features emphasized in lecture course MIBI 22054. Microscopic observations of microorganisms. Simple and differential staining techniques in microbiology. Basic microbiological techniques. Enumeration of bacteria. Diversity of microbial habitats, Enrichment & Isolation of bacteria capable of degrading synthetic organic compounds. Microbial Quality of water: Coliform Test, Membrane filter techniques, MPN counts Physico-Chemical characteristics of polluted water.

Method of Teaching and Learning: Laboratory practical, demonstration classes and assignments

Assessment: Continuous assessment and end of the course examination.

Recommended Reading:

1. Board, R.G., Jones, D. and Skinner, F.A. (1992) *Identification methods in Applied and Environmental Microbiology*. Blackwell Science, Inc. Oxford, UK.
2. Pepper, I.L. and Gerba, C.P. (1995) *Environmental Microbiology: A Laboratory Manual*. Harcourt Brace & Company.
3. *Standard methods for the examination of water and wastewater (1992)*. American Public Health Association.

* Compulsory only for the students follow the B.Sc. Degree programme in Environmental Conservation and Manageme

Level – 3

Course Code	:	MIBI 31014
Title	:	Food Microbiology, Food Hygiene and Food Technology
Pre-Requisite	:	MIBI 21014 & MIBI 21022
Co-Requisite	:	MIBI 31022

Learning Outcomes:

At the end of the course unit, the student should be able to,

- explain microbial spoilage of food,
- describe food borne microbial illness and prevention,
- distinguish between indicators of microbial quality and safety of food,
- propose effective microbiological quality assurance schemes in the food industry,
- explain the production technologies of various food products,
- determine the faults related to processing lines in various food industries,

Course Content :

Food Microbiology

Microbial flora of fresh foods. Intrinsic and extrinsic factors affecting microbial growth in foods. General aspects of food spoilage, spoilage of specific types of food. Physical and chemical changes taking place as a result of microbial spoilage. Microbiological examination of foods. Preservation of foods and legislation. Indices of sanitary quality and microbiological standards, food poisoning. Fermented foods, microorganisms as food -SCP. Dairy Microbiology: Microorganisms in milk, Microbiological examination of milk. Pasteurization and sterilization of milk. Grades of milk and dairy products manufactured with the aid of microorganisms. Quality assurance in food industry, Hazard Analysis Critical Control Point system.

Food Hygiene:

Indices of food sanitary quality; Coliforms, Enterococci and total bacterial counts as indicators of food sanitary quality, Microbiological standards of food. Food borne Pathogens, Reservoirs of infection and modes of spread, Epidemiology and investigation of food poisoning out breaks. Detection of food borne Pathogens. Food Hygiene in the prevention of food borne disease; production and processing of foods, Personal hygiene of food handlers, storage and transport of food, food plant and equipment sanitation. Keeping quality of foods; methods used in the prevention of spoilage of foods. Quality of water and Ice used in food Industry. Microbiological guidelines in food Catering Industry.

Food Technology:

Scope of food science & technology. Principals of food processing technology: preliminary operational techniques, conversion & preservation operational techniques and ancillary techniques. Processing technology of cereals, meats, fish, and poultry & eggs and dairy products. Processing of fats, oils & related products and sugar syrup & soft drinks. Fruit and Vegetable Technology. Principals of food packaging & food transport. ISO guidelines.

Method of Teaching and Learning: A combination of lectures, tutorials and computer assisted learning.

Assessment: Continuous assessment and end of the course examination.

Recommended Reading:

1. Banwart, G (1989) *Basic Food Microbiology*. Chapman & Hall
2. Forsyth, S.J (1995) *Food Hygiene, Microbiology and HACCP*. Culinary and Hospitality Industry Publications Services
3. James, M.J.(1995) *Modern microbiology*. Plenum Press, NY
4. Poter, N.N.H (1999) *Food Science*. Chapman and Hall.
5. Rahman, M.S. (1999) *Handbook of food preservation*.

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Course Code : MIBI 31022
Title : Food Microbiology, Food Hygiene and Food Technology Laboratory
Pre-Requisite : MIBI 21014 & MIBI 21022
Co-Requisite : MIBI 31014

Learning Outcomes:

At the end of the course unit, the student should be able to,

- assess the microbiological quality of food,
- interpret data relevant to results obtained after microbiological examination of food,
- analyze the basic constituents in food,
- assess adulteration of food,
- design a small scale food processing industry to have a good quality final product.

Course Content:

Laboratory exercises to illustrate the contents and special features emphasized in lecture course MIBI 31014. Determination of different types of bacteria present in various condiments. Bacterial counts in milk, Microbial examination of milk and milk products. The Microbiological examination of specific foods, determination of commercial sterility canned foods, detection of *Salmonella* in foods. Determination of properties of cereals Identification in coloring matter in food and industrial visits.

Method of Teaching and Learning: Laboratory practical, demonstration classes, industry visits and assignments.

Assessment: Continuous assessment and end of the course examination..

Recommended Reading:

1. Harrigan, W.F (1998) *Laboratory methods in food and dairy microbiology*. Culinary and Hospitality Industry Publications Services.
2. Ronald S. Kirk and Ronald Sawyer (1997) *Pearson's Composition and Analysis of Foods*.

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Course Code : MIBI 33034
Title : Medical, & Veterinary Microbiology and Microbial Technology
Pre-Requisite : MIBI 21014 & MIBI 21022
Co-Requisite : MIBI 32041

Learning Outcomes:

At the end of the course unit, the student will be able to,

- describe the functioning of the immune system,
- describe the common microbial disease agents, methods of transmission and control,
- apply principles of disease diagnostic methods,
- describe the principles of microbial process development,
- apply basic formulas in growth kinetics and bio-engineering parameters of fermentation technology,
- apply principles of microbial process development in production of industrial chemicals, food-flavors, health care products.

Course Content:

Microbial Technology:

The nature of biotechnology, historical evolution of biotechnology, Growth application and strategic planning in biotechnology. Safety in Microbiology laboratory.

Basic principles of biochemical engineering and its role in the development of fermentation technology; Unit operations, unit processes, process design. Microbial growth kinetics, batch preservation and improvement of industrial microorganisms. Primary metabolites and Secondary metabolites. Fermentation technology Bio-reactors, media design, measurement techniques, Solid Substrate Fermentation (SSF). Application of microbial technology, microbial production of ethanol, wine, beer, lactic acid, vinegar, amino acids, antibiotics, enzymes soy sauce, bio-gas generation. Basic principles in cosmetic microbiology.

Medical Microbiology:

Host-microbe Interactions; Host defenses in vertebrates; non-specific and specific defense mechanisms. Cellular and Humoral immune responses; structure, formation and classes of immunoglobulins, Diagnostic Immunology, Disorders associated with the Immune system. Microorganisms and human diseases; microbial diseases of skin, respiratory, gastrointestinal, genitourinary and nervous.

Veterinary Microbiology:

Aetiology, transmission, pathogenesis and diagnosis of common microbial diseases of poultry in Sri Lanka.

Method of Teaching and Learning: A combination of lectures, tutorials and computer assisted learning.

Assessment: Continuous assessment and end of the course examination.

Recommended Reading:

1. Cruger, W. and Cruger, A. (1990) *Biotechnology A text book of industrial microbiology*. Science Tech. Inc. Madison.
2. Greenwood, D., Slack, R. C. B., Peutherer, J. F. (1997) *Medical microbiology*(15th Ed): Churchill Livingstone, UK.
3. Prave, P., Faust, U., Sttigg, W. and Sukatsch, D. A. (1982) *Biotechnology – A student's guide*. VCH Verlagsgesellschaft, Germany.

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Course Code : **MIBI 32041**
Title : Medical & Veterinary Microbiology laboratory
Pre-Requisite : MIBI 21014 & MIBI 21022
Co-Requisite : MIBI 32034

Learning Outcomes:

At the end of the course unit the student will be able to,

- analyze specimens for common pathogens and interpret results.

Course Content :

Laboratory exercises to illustrate the contents and special features emphasized in lecture course in Medical & Veterinary microbiology. Bacteria of the skin, Bacteria of the mouth, Bacteria of the respiratory tract, Chemical methods of control: Disinfectants and Antiseptics, Action of Antibiotics and dyes. Immunological techniques used in disease diagnosis- Blood Test, Agglutination Reaction, Tube Agglutination, Complement fixation, ELISA.

Method of Teaching and Learning: Laboratory practical, demonstration classes, computer assisted learning and assignments.

Assessment: Continuous assessment and end of the course examination.

Recommended Reading:

1. Turgeon, M.L (1995) *Immunology and serology in laboratory*. 2nd ed. Plenum Press, New York.

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Course Code : MIBI 32056*
Title : Internship in microbiology
Pre-Requisite : All the level 3 course units offered by the department

Learning Outcomes:

At the end of the course unit internship student will be able to,

- apply laboratory skills in microbiology related industries,
- develop generic skills needed to work in the real world of work,
- to understand the social structure and organization of the industry and work accordingly.

Course Content:

Major aspects to be covered are how to apply the knowledge of microbiology to different industries based on food, dairy, pharmaceuticals, cosmetics etc. agriculture to develop laboratory and generic skills needed to work in the real world of work. The required resource materials will be provided.

Method of Teaching and Learning: Training under the supervision and guidance of academic staff and relevant industry for 480 hours.

Assessment: Oral presentation, evaluation of the student's technical report and the progress report submitted by the trainer.

Recommended Reading:

Materials recommended by the relevant industry and the Dept. of Microbiology.
(*This course unit is not permitted to follow the students follow PRPL 31012)

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Course code : MIBI 33062
Title : Industrial Microbiology laboratory
Pre-Requisites : MIBI 31014, MIBI 31022 and MIBI 33034

Learning Outcomes:

At the end of the course unit, the student will be able to

- design a small project based on industrial microbiology, apply some microbiological techniques,
- interpret analyze data relevant to the given project, interpret and present the findings in the form of a report.

Course Content:

Laboratory exercise to illustrate some special features emphasized in course unit MIBI 33034. Quantitative estimation of microbial growth. Estimate growth kinetic parameters and project on industrial microbiology. A detail project report should be submitted before the end of the academic year.

Method of Teaching and Learning:

The course will be delivered through combination of practical and group based project work.

Assessment: Oral presentation, evaluation of the student's technical report.

Recommended reading: Reading and reference materials recommended by the relevant industry.

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