



SACRED HEART COLLEGE (AUTONOMOUS)

Tirupattur – 635 601, Tamil Nadu, S.India

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Ready for
Everv Good Work

A Don Bosco Institution of Higher Education, Founded in 1951 * Affiliated to Thiruvalluvar University, Vellore * Autonomous since 1987

Accredited by NAAC (4th Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

Sacred Heart College (Autonomous), Tirupattur District

1.2.1 List of New Courses

B.Sc. Microbiology

Sem	Part	Subject Code	Subject Title	Hrs	Credit (s)	E - Hrs	CA	SE	Total
I	I	LT 112	Tamil – I	5	3	3	30	70	100
	II	LE 114T	English – I	5	3	3	30	70	100
	III	ABC 101	Allied Biochemistry – I	4	3	3	30	70	100
	III	PABC 101	Allied Practical – I	2	1	6	40	60	100
	III	MB 101	Fundamentals of Microbiology	4	4	3	30	70	100
	III	MB 102	Microbial Diversity and Classification	3	3	3	30	70	100
	III	PMB 101	Main Practical - I	3	3	6	40	60	100
	IV	SK 103	Personal Skills	2	1	-	-	-	-
	IV	VE104A/B	Christian Religion – I/Value Education - I	2	1	3	30	70	100
	IV	CE 102	Communicative English – I	-	1*	-	-	-	-
	Total				30	22 + 1*	-	-	-
II	I	LT 212	Tamil – II	5	3	3	30	70	100
	II	LE 214AT	English – II	5	3	3	30	70	100
	III	ABC 201	Allied Biochemistry – II	4	3	3	30	70	100

	III	PABC 201	Allied Practical – II	2	1	6	40	60	100
	III	MB 201	Microbial Physiology and Metabolism	4	4	3	30	70	100
	III	MB 202	Bioinstrumentation	3	3	3	30	70	100
	III	PMB 201	Main Practical - II	3	3	6	40	60	100
	IV	SK 203	Social Skills	2	1	-	-	-	-
	IV	VE204A/B	Christian Religion – II/Value Education - II	2	1	3	30	70	100
	IV	CE 202	Communicative English – II	-	1*	-	-	-	-
	Total			30	22 + 1*	-	-	-	-
p	I	LT 311	Tamil – III	5	3	3	30	70	100
	II	LE 308T	English – III	5	3	3	30	70	100
	III	AM 309C	Allied Biostatistics – I	6	4	3	30	70	100
	III	MB 301	Immunology	4	4	3	30	70	100
	III	MB 302	Mushroom Technology	3	3	3	30	70	100
	III	PMB 301	Main Practical - III	3	3	6	40	60	100
	IV	SK 303	Employment Skills – I	2	1	-	-	-	-
	IV	VE 305	Environmental Science	2	1	3	30	70	100
	Total			30	22	-	-	-	-
IV	I	LT 410	Tamil – IV	5	3	3	30	70	100
	II	LE 408T	English – IV	5	3	3	30	70	100
	III	AM 408C	Allied Biostatistics – II	6	4	3	30	70	100
	III	MB 401	Bioinoculant Technology	4	4	3	30	70	100
	III	MB 402	Microbial Genetics	3	3	3	30	70	100
	III	PMB 401	Main Practical - IV	3	3	6	40	60	100
	IV	SK 403	Employment Skills – II	2	1	-	-	-	-
	IV	VE 405	Human Rights	2	1	3	30	70	100
	V		DEEDS	-	2	-	-	-	-

	V		SHELTERS	-	2	-	-	-	-
	V		Summer Lab/Industrial Training	-	2*	-	-	-	-
	Total			30	26 + 2*	-	-	-	-
Sem	Part	Subject Code	Subject Title	Hrs.	Credit (s)	E – Hrs	CA	SE	Total
V	III	MB 501	Molecular Biology and Genetic Engineering	4	4	3	30	70	100
	III	MB 502	Medical Bacteriology	5	5	3	30	70	100
	III	MB 503	Virology	5	5	3	30	70	100
	III	MB 504	Medical Mycology and Parasitology	5	4	3	30	70	100
	III	PMB 501	Main Practical – V	5	4	6	40	60	100
	III		Major Elective – I	4	3	3	30	70	100
		MB 505A	a) Health Care & Hygienic Practices						
		MB 505B	b) Computational Biology						
		MB 505C	c) Pharmaceutical Microbiology						
			(One out of three)						
	III	NMB 501	Non – Major Elective – I	2	1	3	30	70	100
	III		SSP – 1: Nutrition and Dietics	-	1*	-	-	-	-
	Total			30	26 + 1*	-	-	-	-
VI	III	MB 601	Microbial Biotechnology	4	4	3	30	70	100
	III	MB 602	Environmental Microbiology	5	5	3	30	70	100
	III	MB 603	Vermitechnology	4	4	3	30	70	100
	III	MB 604	Food Microbiology	5	5	3	30	70	100
	III	MB 605	Industrial Microbiology	5	5	3	30	70	100
	III	PMB 601	Main Practical – VI	5	4	6	40	60	100
	III	NMB 601	Non – Major Elective – II	2	1	3	30	70	100

	III		SSP – 2: Dairy Technology	-	1*	-	-	-	-
	Total			30	28 + 1*	-	-	-	-

TOTAL HOURS = 180 Hrs

TOTAL CREDITS = 148 + 2 *(SSP) + 2 *(Lab/Industrial training) + 2* from other department Certificate course.

Sacred Heart College (Autonomous), Tirupattur District

1.2.1 List of New Courses

Department: B. Sc Microbiology

S.No	Course Code	Course Name
1.	MB 301	Immunology
2.	MB 302	Mushroom Technology
3.	PMB 301	Main Practical - III
4.	MB 401	Bioinoculant Technology
5.	MB 402	Microbial Genetics
6.	PMB 401	Main Practical – IV

Semester – III
4 Hours
4 Credits

MB 301: IMMUNOLOGY

Objectives

- To make the students to understand the Immune system.
- To strengthen the knowledge of students through a detailed study on Antigens, Antibodies and Immunoassays.

Course Outcomes

Introducing the Immunology to study various types of Cells and Organs in Immune systems and Mechanism of immune activation.

Unit – I

History of Immunology – Contributions of Louis Pasteur, Edward Jenner, Elie Metchnikoff and Karl Landsteiner; Normal microbial flora of human body; Microbial Infection – Types, Source, Transmission and Factors predisposing to Microbial Pathogenicity; Immunity – Innate and Acquired immunity; Vaccines and Vaccination; Toxoids and Antitoxins.

Unit – II

Cells of the immune system: Lymphoid cells – B - Lymphocytes, T - Lymphocytes and NK cells; Mononuclear Phagocytes – Monocytes and Macrophages; Granulocytic cells – Neutrophils, Eosinophils, Basophils and Mast cells; Antigen presenting cells - Dendritic

cells; Platelets; Erythrocytes; Lymphoid System – Primary and Secondary lymphoid organs.

Unit – III

Antigens – Antigenicity, Determinants of Antigenicity, Epitopes, Haptens and Adjuvants; Immunoglobulins – Structure and types (IgG, IgA, IgM, IgD & IgE); Monoclonal antibodies and its production; Complement system – Properties, Components and Functions.

Unit – IV

Immunoassays – Precipitation test (Mancini Radial Immunodiffusion, Ouchterlony Double Immunodiffusion, Immunoelectrophoresis and Rocket electrophoresis), Agglutination test (Hemagglutination, Bacterial Agglutination, Passive Agglutination & Agglutination Inhibition), Complement fixation test, Immunofluorescence test, ELISA and RIA; Immunohematology - Blood groups, Blood transfusion and Rh incompatibilities.

Unit – V

Immundeficiency diseases; Hypersensitivity reactions – IgE Mediated Hypersensitivity (Type – I), Antibody Mediated Cytotoxic Hypersensitivity (Type – II), Immune Complex Mediated Hypersensitivity (Type – III) and Delayed Type Hypersensitivity (Type – IV); Autoimmune diseases; Major Histocompatibility Complex (MHC) – Structure and functions of Class – I and II MHC molecules.

Text Books

- 1) Judith A. Owen, Jenni Punt, Sharon A. Stanford and Patricia P. Jones. 2009. Kuby's Immunology, 4th Edition, W. H. Freeman and Company, New York.
- 2) Jeffrey K. Actor. 2012. Elsevier's Integrated Review – Immunology and Microbiology, 2nd Edition, Sabre Foundation, China.

References

- 1) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 2) Chakraborty, P. 2013. A Text book of Microbiology, Published by New Central Book Agency (P) Ltd., Kolkata, India.
- 3) Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- 4) Roitt, I. M. 2011. Roitt's Essential Immunology, 12th Edition, Wiley - Blackwell Scientific publishers, London, United Kingdom.

Semester – III

3 Hours

3 Credits

MB 302: MUSHROOM TECHNOLOGY

Objectives

- To encode the importance of the Mushrooms.
- To obtain a good understanding of Mushroom cultivation and its disease control.
- To obtain knowledge in nutritional and medicinal values of Mushrooms.

Course Outcomes

The paper Mushroom Technology provides the information about the Cultivation, Disease control, Nutritional value and Medicinal value of Mushrooms.

Unit - I

Mushroom – Historical development, Morphology and Life cycle; Commonly cultivated mushrooms in the world; Nutritional value of mushroom; Edible and Non - edible mushroom.

Unit - II

Mushroom farms – Farm layout and Farm hygiene; Substrates used for Mushroom cultivation; Spawn production for Mushroom cultivation – Starter culture, Sterilization process, Clean environmental condition, Cultures, Preparation of media & slants, Spawn containers, Mother spawn and Preparation of final spawn.

Unit - III

Cultivation of Button mushroom (*Agaricus bisporus*), Oyster mushroom (*Pleurotus sajor – caju*), Milky mushroom (*Calocybe indica*), Reizhi mushroom (*Ganoderma lucidum*) and Paddy mushroom (*Volvariella volvacea*); Insect pests and its management during Mushroom cultivation.

Unit - IV

Diseases of Mushrooms – Bacterial disease (Bacterial blotch, Mummy disease & Drippy gill), Viral disease (Die back disease) and Fungal disease (Green mould, Brown plaster mould, White plaster mould, Inky caps, Yellow mould, False truffle, Dry & Wet bubble disease, Cobweb disease, Mildew caused by *Cladobotrym* sp. and *Aphanocladium* disease).

Unit - V

Post harvest marketing of Mushroom – Fresh market and Drying; Environmental impact of Mushroom cultivation; Mushroom food recipes; Medicinal values of Mushroom; Antimicrobial compounds from Mushroom; Mushroom Research Centers in India.

Text Books

- 1) Kannaiyan. 2001. Handbook of Edible Mushrooms, TNAU Publication, Coimbatore, India.
- 2) Alice, D., K. Muthusamy and M. Yesuraja. 1999. Mushroom Culture, Agricultural College, Research Institute Publications, Madurai, Tamil Nadu, India.

References

- 1) Marimuthu, T. 1991. Oster Mushroom, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
- 2) Nita Bhal. 2000. Handbook on Mushrooms, 2nd Edition, Volume - I and II, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.
- 3) Tripathi, D. P. 2005. Mushroom Cultivation, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, India.

Semester – III

3 Hours

3 Credits

PMB 301: MAIN PRACTICAL – III

- 1) Blood Grouping and Rh Typing.
- 2) Blood collection and Plasma/Serum separation.
- 3) Precipitation reaction – Mancini Radial Immunodiffusion, Ouchterlony Double Immunodiffusion, Immunoelectrophoresis and Rocket electrophoresis.
- 4) Agglutination reaction – WIDAL Test, RPR Card Test, TPHA Test, ASO Test, RA Test, CRP Test and Pregnancy Test.
- 5) ELISA Test (Demonstration) only

Semester – IV

4 Hours

4 Credits

MB 401: BIOINOCULANT TECHNOLOGY

Objectives

- To study about the Production, Formulation, Method of application and Quality control of Bioinoculants.
- To understand the role of Nitrogen fixers, Phosphate solubilizers, AM fungi and Algal biofertilizers.
- To learn the ability of Biofertilizers and Biocontrol agents.

Course Outcomes

The course Bioinoculant Technology has been designed to provide the knowledge to the students about Natural organic farming. This paper also provides the details of Production, Formulation, Method of application and Quality control of Bioinoculants.

Unit – I

Bioinoculants – Definition, Types and Importance; Advantages of Biofertilizers over Chemical fertilizers; Formulations of Bioinoculants; Methods and application of Bioinoculants in different crops; Quality control of different Bioinoculants; Organic farming – Compost making and Vermicomposting.

Unit – II

PGPR and its role in agriculture; Nitrogen fixation by bacteria; Isolation, Characterization, Mass multiplication and Field application of Nitrogen fixing bacteria (*Rhizobium* sp., *Frankia* sp., *Azotobacter* sp., *Azospirillum* sp. and *Gluconacetobacter* sp.).

Unit – III

Phosphate solubilization – Mechanism of Phosphate solubilization and Screening of Phosphate solubilizing efficiency; Phosphate solubilizing bacteria (PSB); Algal Biofertilizers – Mass production of Blue Green Algae, *Azolla – Anabaena* symbiosis, Importance of Heterocyst in N₂ fixation.

Unit – IV

Mycorrhizal Bioinoculants – Significance and Types; Arbuscular Mycorrhiza (AM) fungi - Isolation, Assessment of AM colonization in roots, Mass inoculum production, Field applications; Role of AM fungi in agriculture.

Unit – V

Biopesticides – Entomopathogenic bacteria (*Bacillus thuringiensis*); Entomopathogenic fungi (*Beauveria bassiana*, *Isaria fumosorosea*, *Lecanicillium* sp. & *Metarhizium*

anisopliae); Entomopathogenic virus (Cydia pomonella granulosis virus - CpGv); Plant disease control agents (*Bacillus subtilis*, *Pseudomonas fluorescens* & *Trichoderma viride*).

Text Books

- 1) Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
- 2) Subba Rao N.S. 1999. Soil Microbiology, 4th Edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.

References

- 1) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 2) Atlas, R.M and R. Bartha. 1998. Microbial Ecology. Fundamentals and Applications, 4th Edition, Red Wood City. C.A. Benjamin.
- 3) Bagyaraj, D. J and G. Rangasamy. 2002. Agricultural Microbiology, 2nd Edition, Prentice Hall, India.
- 4) Mahendra K. Rai. 2005. Hand book of Microbial Biofertilizers, The Haworth Press, Inc. New York.

Semester – IV

3 Hours

3 Credits

MB 402: MICROBIAL GENETICS

Objectives

- To make the students to understand the Genetics of microorganisms.
- To focus on the basic principles of Cloning vectors and Gene transfer mechanism.
- To study the recent advances in microbial genetic principles for strong foundation in Microbiology.

Course Outcomes

The application of Microbial Genetics has completely transformed the Microbiology field with new possibilities ranging from the treatment of human diseases to the development of new forms of crops. It also looks set to be the most promising and exciting science of the next few decades.

Unit – I

Genetics – History and Scope; DNA – Structure and forms; DNA & RNA as a genetic material; Organization of Gene; Chromosomes – Structure, Types and Functions; Chromosome theory of inheritance; Chromosomal aberrations.

Unit – II

Transposons - IS elements, Composite transposons, Simple transposition, Replicative transposition, Conjugative transposons; Bacteriophages – Structure, Lytic and Lysogenic cycle.

Unit – III

Plasmids – Structure, Characteristics, Types, Replication, Plasmid copy number, Partitioning and Segregative stability of Plasmids, Incompatibility of Plasmids, Isolation of Plasmids, Purification of Plasmid DNA and Desirable properties of Plasmid vector.

Unit – IV

Genetic recombination in Bacteria – Conjugation, Transformation and Transduction; Mapping the Genome – *Escherichia coli* and Bacteriophages.

Unit – V

Genetic code; Mutation - Mutagens and Mutagenesis; Spontaneous Mutation; Induced Mutation and Point Mutation – Silent Mutation, Missense Mutation, Non-sense Mutation and Frameshift Mutation; Mutant detection, Mutant selection and Carcinogenicity testing.

Text Books

- 1) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 2) Freifelder, D. 2008. Molecular Biology, 2nd Edition, Narose Book Distributors Pvt. Ltd., New Delhi, India.
- 3) Maloy, S. R., J. E. Cronan and D. Freifelder. 2001. Microbial Genetics, 2nd Edition, Narose Book Distributors Pvt. Ltd., New Delhi, India.

References

- 1) Gardner, E. J., M. J. Simmons and D. P. Snustad. 2005. Principles of Genetics, 8th Edition, John Wiley and Sons, New York.
- 2) Klug, W. S and M. R. Cummings. 2001. Essentials of Genetics, 4th Edition, Prentice Hall, New Jersey.
- 3) Chatterjee, N and Rana Shinde. 2012. Textbook of Medical Biochemistry, 8th Edition, Jaypee publication, New Delhi, India.
- 4) Weaver, R. F. 2008. Molecular Biology, 5th Edition, McGraw Hill, New York.

Semester – IV
3 Hours
3 Credits

PMB 401: MAIN PRACTICAL – IV

- 1) Isolation and purification of Nitrogen fixing bacteria – *Rhizobium* sp., *Azotobacter* sp. and *Azospirillum* sp.
- 2) Mass production of Biocontrol agents – *Bacillus subtilis* and *Pseudomonas fluorescens*, *Trichoderma viride* and *Beauveria bassiana*.
- 3) Assessment of AM colonization in roots.
- 4) Different formulations of Bioinoculants.
- 5) Method of application and Quality control.