Name of the Programme : **M.Sc. Part-II (Biochemistry)**
Course Code : **CHB-622**
Title of the Course : **Clinical Microbiology and Food Biochemistry**
Number of Credits : **4**
Effective from AY : **2022-23**

Pre-requisites for the Course:	Students should have studied life sciences at M.Sc Part I Level	
Course Objectives:	1. To develop an understanding of the diseases caused by microorganisms and their biochemistry. 2. To develop a basic understanding on significance of commensal and normal microflora for human health. 3. Introduction of the fundamental concepts of food spoilage and food preservation. 4. To provide insights on quality control and good practices in the food industry.	
Content:		**No of hours**
	Clinical Microbiology **1. Introduction to Microbiology** a. Introduction to bacteriology, mycology, virology and parasitology. b. Sterilization and Disinfection: Introduction and its types, principle, procedure and its application, biosafety in microbiology lab, biowaste management.	**3**
	2. Normal microbial flora and pathogenic microorganisms a. **Introduction**: Distribution of the normal microbiota; Commensals; relationship between normal microbiota and host; collection and transport of specimens, processing of clinical specimens for microbiological examination. b. **Human microbiota in health: functions, microbe-host interaction, health benefits:** Skin microbiota, Gut microbiota, Normal microbiota of oral cavity, Normal microbiota of genitourinary tract. c. **Human microbiota in disease** i. **Human microbiota and infectious disease:** Opportunistic infections; Nosocomial infections; bacterial Infections: Gastroenteric (*Clostridium difficile*; *Helicobacter pylori*; *E. coli*); Skin *(Staphylococcal)*; Respiratory (*Streptococcal*, *Pneumococcal, tuberculosis*); Urogenital tract (UTIs, Bacterial vaginosis); Oral cavity (Dental caries, Periodontitis). ii. **Human microbiota and metabolic disorders:** Irritable bowel disease; Obesity; Type 2 diabetes mellitus; Allergic diseases; Liver diseases. iii. **Secondary infections:** Infections associated with HIV; Influenza.	**12**

	3. Fungal and parasitic infections a. **Fungal infections/mycoses:** Cutaneous, Sub-cutaneous, systemic and opportunistic mycoses b. **Parasitic infectious:** i. Protozoan infections: Malaria, Amoebiasis ii. Helminthic infections: Ascariasis	**5**
	4. Viral infections: HIV, Influenza, Poliomyelitis, Dengue fever, Chikungunya, Hepatitis, Rabies, Coronavirus disease (COVID-19)	**4**
	5. Antimicrobial agents and drug resistance: a. Classification, mechanism of action of antibacterial agents; antifungal agents; antiviral agents and their resistance b. Antibiotic sensitivity tests and its medical importance	**6**
	Food Biochemistry	
	6. Food Spoilage and Food Preservation a. Forms of food spoilage: physical, chemical, microbiological parameters. b. Factors affecting the growth and survival of microorganisms in foods: Intrinsic and extrinsic factors c. Predictive food spoilage microbiology of milk, meat, poultry, vegetables and fruits, grains and legumes. d. Food preservation technologies: Traditional methods of food preservation, Heat processing, low temperature storage, control of water activity, irradiation, high pressure processing, modified atmospheres, preservatives (chemicals, natural organic molecules (nisin) and enzymes).	**12**
	7. Vitamins and minerals in health a. Fat soluble vitamins: physiological role, deficiency disorders, toxicity. b. Water soluble vitamins: physiological role, deficiency disorders, toxicity. c. Mineral metabolism, physiologic role and deficiency disorders: calcium, iron, magnesium, sodium, zinc, manganese, potassium, phosphorus, sulphur and chlorine.	**10**
	8. Quality control and Quality Assurance in Food industries a. Microbiological examination of food, air and water in industries. b. Plant sanitation c. Hazard analysis and critical control point concept d. Good lab practices (GLP) Good Manufacturing Practice (GMP) and Quality Systems in the food industry**.**	**8**
Pedagogy:	Mainly lectures and tutorials. Seminars / term papers /assignments / presentations / self-study or a combination of some of these can also be used. ICT mode should be preferred. Sessions should be interactive in nature to enable peer group learning.	
References/ Readings:	1. Tortora, G. J., Funke, B. R., Case, C. L., Microbiology: An Introduction., Pearson Benjamin Cummings publishers; 2010, 10th Edition.	

	2. Willey, J., Sandman, K., Wood, D.; Prescott's Microbiology., Mc Graw Hill., 2020, 11th Edition. 3. Harvey, R. A., Cornelissen, C. N., Fisher, B. D., Lippincott's Illustrated review: Microbiology., Lippincott's William and Wilkins; 2007, 3rd Edition. 4. Chauhan, N. S. Introductory Chapter: Human and Microbes in Health and Diseases. In *Role of Microbes in Human Health and Diseases*. IntechOpen., 2019. 5. Feng, Q., Chen, W. D., & Wang, Y. D. (2018). Gut microbiota: an integral moderator in health and disease. *Frontiers in microbiology*, *9*, 151. 6. Frazier, W. C &Westhoff, C.W. Food Microbiology. Graw-Hill Companies, Inc., New York (2017), 5th edition. 7. Hayes, P. R. Food Microbiology and Hygiene. Springer, 1995, 2nd edition. 8. Kniel, K. E., Montville, T. J., Matthews, K. R, Food Microbiology., ASM Press, NW Washington, USA., 2017, 4th edition 9. Jay, J. M., Loessner, M.J., Golden, D.A., Modern Food Microbiology. Springer Science, New York, 2005, 7th edition 10. Adams, M. R. & Moss, M. O. Food Microbiology. Royal Society of Chemistry, 2015, 4th edition 11. Mudambi, R. Sumathi, Rajagpal M.V, Fundamentals of Food, Nutrition and diet therapy, New age International Publishers, 1983, 6th edition.
Course Outcomes:	1. Students will be able to explain the significance of normal microbiota and the biochemistry of infectious diseases in the human body. 2. Students will be able to explain the importance of antimicrobial agents in antibiotic therapy. 3. They will be able to apply the concepts of food spoilage and food preservation in maintaining food safety. 4. The student will be able to implement the Good Laboratory Practices and Good Manufacturing Practices used in industries to maintain food hygiene.

(Back to Index)