	translational proof-reading, translational inhibitors.	
G.	Protein folding, post-translational modifications of proteins, leader sequences, protein localization and secretion.	
Pedagogy:	Lectures/tutorials/assignments	
References/ Readings	Alberts, B., Johnson, A., Lewis, J., Morgan, D., Raff, M., Roberts, K. and Walter, P., Molecular Biology of the Cell, Garland Science.	
(Latest editions)	Darnell, J. E., Lodish, H. F. and Baltimore, D., Molecular Cell Biology, Scientific American Books, Spektrum Akademischer Verlag.	
	Davis, L. G., Dibner, M. D. and Battey, J. F., Basic Methods in Molecular Biology, Elsevier.	
	Gardner, E. J., Simmons, M. J. and Snustad, D. P. Principles of Genetics, John Wiley & Sons.	
	Gerhardt, P., Methods for General and Molecular Bacteriology, Elsevier.	
	Green, M. R. and Sambrook, J., Molecular Cloning: A Laboratory Manual, Cold Spring Harbor Laboratory, New York.	
	Krebs J. E., Lewin, B., Goldstein, E. S. and Kilpatrick S.T., LEWIS Genes XI., Jones and Bartlett Publishers.	
	Malacinski, G.M., Freifelder's Essentials of Molecular Biology, Narosa Book Distributors Private Limited.	
	Tamarin, R. H., Principles of Genetics, McGraw-Hill Higher Education.	
	Twyman, R. M. and Wisden, W., Advanced Molecular Biology: A Concise Reference, BIOS Scientific Publishers.	
	Watson, J. D., Molecular Biology of the Gene, Pearson/Benjamin Cummings.	
Learning Outcomes	Understanding of gene structure, expression and regulation of gene expression in both prokaryotes and eukaryotes for application in molecular research.	

Programme: M.Sc. (Microbiology)
Course Code: MIPC-407
Title of the Course: MOLECULAR BIOLOGY [P]
Number of Credits: 1, Practical
Contact hours: 30
Effective from Academic Year: 2022-23

Prerequisites	It is assumed that the students have a basic knowledge of DNA (structure and replication), transcription and protein synthesis	
Objective:	This course develops concepts in molecular biology: DNA packaging, DNA damage and repair, gene structure, expression and regulation in both prokaryotes and eukaryotes	
Content:		**(30)**
1.	Isolation of genomic DNA of eukaryotic microorganisms, estimation of quantity and purity of DNA by spectrophotometry, and agarose gel electrophoresis.	
2.	Recovery of genomic DNA from agarose gel.	
3.	Extraction of mRNA / total RNA.	

4.	cDNA synthesis from mRNA.	
5.	PCR amplification of a specific gene using genomic DNA as a template and agarose gel analysis of PCR product to determine amplicon size.	
Pedagogy:	Hands-on experiments in the laboratory, video, online data	
References/ Readings	As given under Theory Course MITC-407	
Learning Outcomes	Able to handle molecular biology tools for gene expression studies.	

Programme: M.Sc. (Microbiology)
Course Code: MITC-408
Title of the Course: ARCHAEA - ECOLOGY, PHYSIOLOGY, BIOCHEMISTRY AND GENETICS [T]
Number of Credits: 3, Theory
Contact hours: 45
Effective from Academic Year: 2022-23

Prerequisites	Basic knowledge of the three domains of life.	
Objective:	This course gives the understanding of the ecology, diversity, cell structure, physiology and genetics of Archaea.	
Content:		
1.	**Ecology, Taxonomy and Significance of the Domain Archaea**	**(15)**
1.1	**Evolution of the Domain Archaea:** Three domains of life – Archaea, Eubacteria and Eukarya. a) Carl Woese classification of archaea based on 16S rRNA analysis. b) Similarities and dissimilarities - archaea, eubacteria and eukaryotes. c) Uniqueness of archaea versus other extremophilic microorganisms.	
1.2	**Ecology and Diversity of Archaea**	
	a) Ecology and Global econiches: Deep Sea, Hydrothermal vent, Dead Sea, solar salterns, geothermal vents, solfataras, Antarctica, soda lake, alkaline hot springs, marshy land. b) Strategies to cultivate, preserve and maintain Thermophilic and Halophilic Archaea. c) Studies of unculturable archaea by metagenomics.	
1.3	**Archaeal Taxonomy**	
	Nutrition, growth Characteristics and physiological versatility, Stress response of Major Archaeal Physiological Groups a) Phyla Euryarchaeota : (i) Methanogens (*Methanobacterium thermoautotrophicum*), (ii) Haloarchaea (*Halobacterium halobium*) and (iii) Thermophiles (*Thermoplasma acidophilum*); (iv) Psychrophilic archaea (*Methanogenium frigidum*) b) Phyla Crenarchaeota : (i) *Sulfolobus and* (ii) *Thermoproteus* c) Phyla Thaumarchaeota : Archaeal ammonia oxidizers	