SRM University
School of Bioengineering
Department of Biotechnology

B. Tech. Biotechnology
II Year/IV Semester
BT1062 – Environmental Microbiology
Total hours: 45

Lesson plan

Unit	Hours	Lecture Topics	Page Nos.	Reference	Learning Outcomes
I	1 -3	Introduction to microbial biodiversity – distribution, abundance, ecological niche. Types- Bacterial, Archael and Eucaryal.	73-78 20-27 128-164	1 2 2	Basic understanding about the nature and habitat of microbes in different environment and evaluates their applications in different fields will explained.
	4-6	Characteristics and classification of Archaebacteria.Thermophiles: Classification, hyperthermophilic habitats and ecological aspects.	82-90 190-199 489-490	3	
	7-8	Extremely Thermophilic Archaebacteria, Thermophily, commercial aspects of thermophiles. Applications of thermozymes.	199-240	2	
	9-10	Methanogens: Habitats, applications.	271-290	2	
II	11	Classification: Alkalophiles and acidophiles	5-11 186-190	2	Learn about the classification and characterization of alkalophiles and acidophiles from different environments.
	12-14	Characterization of acidophiles	24-35 43-49	2	
	15-16	Alkaline environment, soda lakes and deserts, calcium alkalophily	28-34 186-200	1	
	17-18	Applications of Acidophiles and their products	24-35 76-81	2	

			186-200		
	19	Low pH environment	159-170	2	
	20	Acidotolerence microbes	29-33 440-448	2	
III	21	Classification: Dead Sea, discovery basin	188-200 317-336	2 1	Study about dead sea microbes and their cell wall organization will be studied. Applications of halophiles and their extremozymes will delivered.
	22-23	Cell walls and membranes – Purple membrane, compatible solutes. Osmoadaptation / halotolerence.	42-49 296-300	3 2	
	24-25	Applications of halophiles and their extremozymes.	296-300 151-157	2 1	
	26-28	Barophiles: high-pressure habitats, life under pressure, barophily, death under pressure.	187-193 200-210	1 2	
IV	29-31	Introduction to Nitrogen Fixation –biological fixation	259-267 167-170	1 3	A basic study about nitrogen fixation and their genes in bacteria will taught along with regulation of nitrogen fixation.
	32	Nitrogenase enzyme and its activity & physiology	167-175 344-352	3 2	
	33-34	Nod genes – nif genes – I; Nod genes – nif genes – II	313-351	2	
	35-36	Regulation of nitrogen fixation genes; Process of nodulation- Bacteriods;	313-351 559-566	2 1	
	37-38	Transfer of nif genes to microorganisms National interests and Economic considerations	142-150 687-692	2 1	
V	38	Space research: Life detection methods a] Evidence of metabolism (Gulliver) b] Evidence of photosynthesis (autotrophic and heterotrophic) c] ATP production d] Phosphate uptake e] Sulphur uptake.	149-162	3	A basic knowledge about atmosphere microorganisms found in Space will be studied in addition with the viable characteristic feature discussed.
	39	Martian environment: atmosphere, climate and other details.	166-170	3	

	40-41	*Antartica as* a model for Mars. Search for life on Mars, Viking mission, Viking landers, and Biology box experiment. Gas exchange, Label release and pyrolytic release experiments.	243-248 691-704	2	
	42-45	Monitoring of astronauts microbial flora: Alterations in the load of medically important microorganisms, changes in mycological autoflora, and changes in bacterial autoflora.	176-180	2	

Text Book:

1. Michael J. Pelczar, "Microbiology," Tata McGraw-Hill,1993.
2. Maier, R.M. Pepper, I.L and Gerba, "*Environmental Microbiology*," C.P. Academic press, 2000.
3. Joanne M Willey, Joanne Willey, "*Prescott's Microbiology*," 8th edition, 2009.

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