

# Mizoram University

## UG/Bachelor's Degree Programme with Multiple Entry and Exit Options

### Under the New Education Policy 2020

in

### Biotechnology

### First Semester

Semester	Course Code	Course Name	Components with Credits		Total credits
			Theory	Practical	
I	BIOT/MJ/100	Cell Biology	3	1	4
	BIOT/MJ/101	Environmental Biotechnology	4	-	4
	BIOT/MN/102	<i>[To be chosen from an MJ course offered by other disciplines]</i>	4	-	4
		Introductory Course (Interdisciplinary)	3	-	3
	AEC/103	MIL/English I	3	-	3
	VAC/104	Understanding India	2	-	2
					<b>20</b>

# Cell Biology

BIOT/MJ/100

Credits: 3 (Theory) + 1 (Practical)

## Theory

- Unit 1 Cell theory; structure of prokaryotic & eukaryotic cells; structure and function of motile cells (amoeboid, ciliary, flagellar), Cytoskeletons: microfilaments, intermediate filaments, and microtubules.
- Unit 2 Structure and function of cell organelles – nucleus, ribosomes, Golgi apparatus, endoplasmic reticulum, mitochondria, chloroplast, peroxisomes, lysosomes.
- Unit 3 Cell membrane – fluid mosaic model; extracellular matrix; membrane transport mechanisms; cell-cell interactions; general overview of cell signaling.
- Unit 4 Cell cycle and regulation of cell cycle through cyclin-CDK complexes, stages of mitosis and meiosis; senescence and necrosis, apoptosis.

## Practical

1. Study of cell organelles from slides/models.
2. Study of structure of any prokaryotic and eukaryotic cell.
3. Methods of cell counting – Haemocytometer.
4. Study of stages of mitosis from permanent slides
5. Study of stages of meiosis from permanent slides.

### Mark distribution of practical for end semester examination

1. Experiment 1	5
2. Experiment 2	5
3. Minor experiment	3
4. Laboratory record	3
5. Viva voce	4
TOTAL	20

### Suggested readings

1. Cell Biology & Molecular Biology – De Robertis EDP & De Robertis EMF; Lippincott Williams and Wilkins; 8th Edition (2006).
2. Cell and Molecular biology concepts and experiments – Karp G; John Wiley & Sons; 5th Edition (2007).
3. Molecular cell biology – Lodish H, Berk A & Matsudaira P; WH Freeman & Co.; 5th Edition (2003).
4. Cell biology Organelle Structure and function – Sadava DE; Panima Publishing Corporation; (2004).
5. Molecular Biology of the Cell – Alberts B, Lewis A, Lewis J, Raff M, Roberts K & Walter P; Garland Publications; 4th Edition (2002).

# Environmental Biotechnology

BIOT/MJ/101

Credits: 4

- Unit 1 Environmental contaminants (land, air, water) and effect on globe. Concept of biodiversity and effect of climate change on biodiversity; germplasm conservation, cryopreservation.
- Unit 2 Biomagnification; bioremediation and phytoremediation - role of microbes, plants and other organisms in toxicants (heavy metal and xenobiotics) biotechnological exploitation.
- Unit 3 Agriculture contaminants; biofertilizers (nitrogen fixers, Mycorrhiza, PSBs, VAM); biopesticides, biocontrol agents. Restoration of degraded lands, organic farming.
- Unit 4 Energy resource- renewable and non-renewable; biofuels; bioenergy (green energy and carbon credits); biogas from wastes; biotechniques for air pollution control.

## Suggested readings

1. Environmental Biotechnology – Fulekar MH; Oxford & IBH Publishing; 1st Edition (2008).
2. Environmental Biotechnology – Jogdand SN; Himalaya Publishing House, Mumbai; 3rd Edition (2006).
3. Environmental Biotechnology: Theory and Application – Evans GM & Furlong JC; John Wiley & Sons; 2nd Edition (2010).
4. Environmental Biotechnology – Hiremath MB, Baligar P & Prashanth MS; Prateeksha Publications; (2011).
5. Fundamentals of Ecology – Odum E, Barrick M & Barrett GW; Cengage Learning; 5th Edition (2005).
6. Ecology and Environment – Tripathi AK; Aph Publishing Corporation (2012).