DEPARTMENT OF MICROBIOLOGY				*CLASS: I B.Sc. Microbiology*				
Semester	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
II	Major Core	20U2RMC4	Cell And Molecular Biology	3	3	25	75	100

Course Objectives:

1. To understand the basic structure and functions of various cell organelles
2. To comprehend the central dogma of life
3. Appreciate the various cellular mechanisms involved in the control of transcription
4. Gain insights into the various processes involved in the replication of DNA.
5. To explore mechanism of translation.

Unit-I: Cell and Cell Organelles

Overview of prokaryotic and eukaryotic cell. Structure and Functions- Nucleoid, Nucleus, Endoplasmic Reticulum, Golgi apparatus, Lysosomes, Ribosomes, Peroxisome, Mitochondria and Chloroplast. Structure and forms of DNA, Types of RNA.

Unit-II: Cell cycle and Cell division

Cell cycle - cell division types-mitosis and meiosis and their significance. Molecular and biochemical characteristics of cancer cells. Cell ageing, Cell death and its regulation Apoptosis and Necrosis.

Unit-III: DNA Replication

Types of DNA replication – conservative, dispersive, semi conservative mode, Messelson - Stahl experiment. Mechanism of replication- rolling circle and theta mode. Enzymes involved in DNA replication-DNA polymerase, topoisomerase, helicase, primase and gyrase.

Unit-IV: Transcription

Transcription in Prokaryotes and eukaryotes- Initiation - promoters, sigma and transcription factors. Elongation - RNA polymerase, sub units. Termination - Rho dependent and Rho independent.
Post-transcriptional modifications in eukaryotes.

Unit-V: Translation

Genetic code: Deciphering genetic code, Characteristics of genetic code. Translation in prokaryotes – Initiation, Elongation and Termination. Translation in eukaryotes. Post-translational modifications.

Books for Study

1. Powar, C.B. (2009). Cell Biology. Himalayan Publishing House, New Delhi.
2. Paul, A. (2009). Cell and Molecular Biology. Books and Allied (P) ltd, India.
3. Harvey Lodish, Arnold Berk, S Lawrence Zipursky, Paul Matsudaira, David Baltimore, and James Darnell. (2008). Molecular Cell Biology. 6th Ed., W.H. Freeman & Co., New York.

Books for Reference

1. Alberts, B. Bray, D, Lewis, J, Raff, M, Roberts, K and Watson JD. (1994). Molecular Biology of the Cell (3rd edition). Garland Publishing, Inc., New York
2. Cooper, GM and Hawman RE. (2013). Cell - A Molecular Approach (6th Edition). Sinauer Associates Inc. US.
3. De Roberties E.D.P and E.M.F.DeRoberties. (2011). Cell and Molecular Biology. 8th edition. B.I. PublicatonsPvt. Ltd., India
4. Karp G. (2013). Cell and Molecular Biology - Concepts and Experiments. John Wiley & Sons Inc. New Jersey.
5. Stephen R. B, Jeremy S. H, *et.al*., Cell Biology - A short course, 2nd Edition, John wiley& Sons Inc. New Jersey.

Web Resources

1. https://www.omicsonline.org/scholarly/microbial-genetics.
2. https://www.lamission.edu/lifesciences/Steven/Micro20
3. https://www.indiabix.com Microbiology
4. https://www Microbial Genetics youtube.com

Pedagogy

Chalk and talk, PPT, Group discussion, Seminar, Screening of educational videos and quiz

Course Learning Outcomes (CLO):

On the completion of the course the student will be able to

	Course Learning Outcome	Knowledge Level
CLO1	Explain the structure and functions of cell, cell organelles, biological membranes and intercellular communication	Up to K3
CLO2	Appraise the concepts of cells in terms of growth, division and gather an extempore knowledge on different phases of cell cycle	Up to K3
CLO3	Analyse the molecular basis of DNA replication and modes	Up to K4
CLO4	Interpret the transcription process of prokaryotic genomes	Up to K2
CLO5	Elaborate the process of translation in prokaryotes and eukaryotes.	Up to K2

K1 –Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 – Examining, analyzing, presentation and make interferences with evidences

Mapping of Course Learning Outcome with Programme Specific Outcome:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	1	2	2	1	3	1	2
CLO2	1	1	1	2	2	1	1
CLO3	2	1	1	3	1	1	1
CLO4	2	2	1	1	2	3	1
CLO5	1	1	2	3	2	2	1

Advance application–3; Intermediate level –2; Basic level –1

Mapping of course outcome with Programme outcome:

	PO1	PO2	PO3	PO4	PO5
CLO1	2	2	3	1	2
CLO2	1	3	1	1	2
CLO3	1	2	3	2	2
CLO4	2	3	1	1	2
CLO5	1	2	3	3	2

Advance application–3; Intermediate level –2; Basic level –1

Lesson Plan:

Units	Topics	Staff	Hours	Mode
I Cell and Cell organelles	a) Overview of Prokaryotic and Eukaryotic Cell.		1	Chalk & Talk
	b) Structure and Functions –Nucleoid, Nucleus, Endoplasmic Reticulum.		3	PPT
	c) Golgiappartus, lysosomes, Ribosome, Peroxisome		2	PPT
	d) Mitochondria, and Chloroplast. Structure and forms of DNA and types of RNA.		3	PPT
II Cell and Cell division	a) Cell Cycle – Introduction		1	Chalk & Talk
	b) Cell division types-mitosis and meiosis and their significance.		2	Chalk & Talk
	c) Molecular and biochemical characteristics of cancer cells.		3	Chalk & Talk
	d) Cell ageing,cell death and its regulations.		2	PPT
	e) Apoptosis and Necrosis.		1	PPT
III DNA Replication	a) Types of DNA Replication.		1	OHP
	b) DNA Replication- Semi conservative mode, Messelson – Stahl Experiment.		2	OHP
	c) Mechanism of replication.		1	PPT
	d) Modes of replication-rolling circle and theta mode.		2	PPT
	e) Enzymes involved in DNA replication-DNA Polymerase, topoisomerase, helicase, primase, and gyrase.		3	Chalk & Talk
IV Transcription	a) Transcription in Prokaryotes and eukaryotes-Initiation - promoters		2	Chalk & Talk
	b) Sigma and Transcription factors.		3	PPT
	c) Elongation-RNA Polymerase, Subunits		2	OHP
	d) Termination-Rho dependent and Rho independent.		1	PPT
	e) Post-transcriptional modifications in eukaryotes		1	PPT
V Translation	a) Genetic code: Deciphering genetic code.		2	Chalk & Talk
	b) Characteristics of genetic code		2	Chalk & Talk
	c) Translation in prokaryotes – Initiation, Elongation and Termination		3	PPT
	d) Post-translational modifications		2	Chalk & Talk, OHP
Total			**45 Hours**	

Learning Outcome Based Education & Assessment (LOBE)

Blue Print

Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

S. No.	CLOs	K-Level	Section A		Section B		Section C (Either / or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level		
1.	CLO 1	Up to K 3	2	K1 & K2	1	K1	2 (K1&K1)	1(K2)
2.	CLO 2	Up to K 3	2	K1 & K2	1	K1	2 (K2&K2)	1(K3)
3.	CLO 3	Up to K 4	2	K1 & K2	1	K2	2 (K4&K4)	1(K4)
4.	CLO 4	Up to K 2	2	K1 & K2	1	K2	2 (K2&K2)	1(K2)
5.	CLO 5	Up to K 2	2	K1 & K2	1	K2	2 (K2&K2)	1(K2)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each Question			1		2		5	10
Total Marks for each Section			10		10		25	30

K1 –Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 – Examining, analyzing, presentation and make interferences with evidences

Distribution of Section-wise Marks with K Levels

K Levels	Section A (No Choice)	Section B (No Choice)	Section C (Either/or)	Section D (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	5	4	10	-	**19**	15.83	**75%**
K2	5	6	30	30	**71**	59.16	
K3	-	-	-	10	**10**	8.33	**8%**
K4	-	-	10	10	**20**	16.67	**17%**
Total Marks	10	10	50	50	**120**	100.00	**100%**

Course designers:

1. **Mrs. N. Sumathy**