

## B.Sc Biochemistry Curriculum Design

### FIRST YEAR: SEMESTER II

Part	Course Category	Course	Credit Distribution				Overall Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
Part -1		Language – Tamil –II	2	1	0	0	3	6	25	75	100
Part -2		English –II	2	1	0	0	3	4	25	75	100
Part -3	Core Course – CC III	Cell Biology	3	1	0	0	4	4	25	75	100
	Elective II Generic/ Discipline Specific	Chemistry- II	2	1	0	0	3	4	25	75	100
	Core Course – CC IV <b>Practical</b>	Core Practical II -Cell Biology	0	0	3	0	3	3	25	75	100
	Elective II Generic/ Discipline Specific <b>Practical</b>	Chemistry Practical –II	0	0	2	0	2	3	25	75	100
Part -4	Skill Enhancement Course SEC-2	<b>Medicinal Diet</b>	1	1	0	0	2	2	25	75	100
	Skill Enhancement Course -SEC-3	Discipline/ Subject specific) <b>First Aid</b>	1	1	0	0	2	2	25	75	100
<b>Total</b>							<b>24</b>	<b>30</b>			

\*Skill Enhancement Course (NME/Discipline/Sub specific) –(Basket of Courses)

**FIRST YEAR: SEMESTER II  
CELL BIOLOGY**

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	<b>Core paper 3: Cell Biology</b>	Core	2	1	-	-	3	4	25	75	100

**Learning Objectives**

The main objectives of this course are to

- Provide basic understanding of architecture of cells and its organelles.
- Understand the organization of prokaryotic and eukaryotic genome.
- Educate on the structural organization of bio membrane and transport mechanism
- Impart knowledge on cell cycle, cell division and basics of cells
- Familiarize the concept of mechanism of cell-cell interactions.

**Module I:** Architecture of cells- Structural organization of prokaryotic and eukaryotic cells microbial, plant and animal cells. The ultrastructure of nucleus, mitochondria, RER, SER, Golgi apparatus, lysosome, peroxisome and their functions **12Hrs.**

**Module II:** Cytoskeleton- microfilament, microtubules and intermediary filament- structure, composition and functions. Organization of Genome -prokaryotic, and eukaryotic genome. Organization of chromatin – histones, nucleosome concept, formation of chromatin structure. **12 Hrs.**

**Module III:** Biomembranes- Structural organization of bilipid layer model and basic functions- transport across cell membranes- Uniport, Symport and Antiport. Passive and active transport. **12Hrs**

**Module IV:** Cell cycle- Definition and Phases of Cell cycle- Cell division- Mitosis and Meiosis and its significance, Cancer cells- definition, types and characteristics of cancer cells. **12 Hrs**

**Module V:** Extracellular matrix – Collagen, Laminin, Fibronectin and Proteoglycans- structure and biological role. Structure and role of cadherin, selectins, Integrin, Cell -cell interactions- Types- gap junctions, tight junctions and Desmosomes **12 Hrs**

## Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Explain the structure and functions of basic components of Prokaryotic and Eukaryotic cells, especially the organelles.	PO1
CO2	Familiarize the Cytoskeleton and Chromatin	PO1,PO2
CO3	Illustrate the structure, composition and functions of cell membrane related to membrane transport	PO1,PO2
CO4	Elaborate the phases of Cell cycle and Cell division- Mitosis and Meiosis and characteristics of cancer cells.	PO1, PO2
CO5	Relate the structure and biological role of extracellular matrix in cellular interactions	PO1,PO2

## Text books

1. Arumugam. N, Cell biology. Sara's publication(10ed, paperback), 2019
2. Devasena.T. Cell Biology. Oxford University Press India-ISBN: 9780198075516, 0198075510, 2012
3. Bruce Albert's and Dennis Bray. 2013, Essential Cell Biology. (4<sup>th</sup>Ed). Garland Science.

## Reference books

1. S.C, R. Cell Biology. New age Publishers -ISBN-10: 8122416888/ISBN-13: 978-8122416886, 2008
2. Cooper,G.A.TheCell:AMolecularApproach.SinauerAssociates,Inc -ISBN10: 0878931066 / ISBN 13: 9780878931064, 2013
3. E.M.F., D.R,CellandMolecularBiology.LippincottWilliams&WilkinsPhiladelphia - ISBN: 0781734932 9780781734936, 2006
4. Lodish H.A, Berk C.A, Kaiser M, Krieger M.P, Scott A, Bretscher H, Ploegh and Matsudaira. 2007. Molecular Cell Biology, 6th Edition, WH. Freeman Publishers, New York, USA.

## Web resources

- 1.<https://nicholls.edu/biol-ds/bio1155/Lectures/Cell%20Biology.pdf>
- 2.<https://www.medicalnewstoday.com/article/320878.php>
- 3.<https://biologydictionary.net/cell>

**Mapping with Program Outcome**

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>
<b>CO 1</b>	3						3			3
<b>CO 2</b>	3	3					3			3
<b>CO 3</b>	3	3					3			3
<b>CO 4</b>	3	3					3	3		3
<b>CO5</b>	3	3					3			3

**S-Strong (3) M-Medium (2) L-Low (1)**

**FIRST YEAR: SEMESTER II**  
**PRACTICAL II CELL BIOLOGY**

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	<b>Core paper 4 practical II: Cell Biology</b>	Core practical	-	-	3	-	3	3	25	75	100

**Learning Objectives**

The main objectives of this course are to

- Learn the parts of Microscope
- Investigate the Cells under microscope.
- Image the Cells using different stains
- Identify the Cells, Organelles and stages of cell division
- Identify the spotters

**IMICROSCOPYANDSTAININGTECHNIQUES**

1. Study the parts of Light and Compound microscope
2. Preparation of Slides and Micrometry
3. Examination of prokaryotic and eukaryotic cell
4. Visualization of animal and plant cell by methylene blue
5. Visualization of Nuclear fraction by acetocarmine stain
6. Staining and visualization of Mitochondria by Janus Greenstein

**II GROUP EXPERIMENT**

7. Identification of different stages of Mitosis in onion root tip
8. Identification of different stages of Meiosis in onion bulb

**III SPOTTERS**

9. a) **Cells:** Nerve, Plant and Animal cell
- b) **Organelles:** Mitochondria, Chloroplast, Endoplasmic reticulum,
- c) **Mitosis stages**–Prophase, Anaphase, Metaphase, Telophase

## Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Identify the parts of Microscope.	PO1,PO2
CO2	Preparation of Slides	PO1,PO2
CO3	Identify the stages of Mitosis & Meiosis	PO1,PO2
CO4	Visualize Nucleus and Mitochondria by staining methods	PO1,PO2
CO5	Identify the spotters of cells, organelles and stages of Cell division	PO1,PO2

## Textbooks

1. Rick wood. D and J.R.Harris Cell Biology: Essential Techniques John Wiley 1996.
2. Davis J.M. Basic Cell culture: A practical approach IRL 1994.
3. Ganesh M.K. and Shivashankara A.R. 2012. Laboratory Manual for Practical Biochemistry Jaypee publications 2nd Edn.

## Web resources

1. <https://www.microscopemaster.com/organelles.html>
2. <https://www.pdfdrive.com/biochemistry-books.htm>
3. [http://medcell.med.yale.edu/histology/cell\\_lab.php#:~:text=](http://medcell.med.yale.edu/histology/cell_lab.php#:~:text=)
4. [The%20electron%20microscope%20is%20necessary,and%20small](#)
5. [%20granules%20and%20vesicles.](#)
6. <http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1>
7. <https://www.khanacademy.org/science/ap-biology/heredity/>
8. [meiosis-and-genetic-diversity/a/phases-of-meiosis](#)

9. <https://www.microscopemaster.com/organelles.html>

10. <https://www.pdfdrive.com/biochemistry-books.html>

**Mapping with Program Outcomes:**

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>
<b>CO 1</b>	2	3					3	3	3	3
<b>CO 2</b>	2	3					3	3	3	3
<b>CO 3</b>	2	3					3	3	3	3
<b>CO 4</b>	2	3					3	3	3	3

**S-Strong (3) M-Medium (2) L-Low (1)**