

**Programme:** M. Sc. (Biochemistry)

**Course Code:** BCO 403

**Title of the Course:** Cell Biology

**Number of Credits:** 3

**Effective from AY:** 2021-22

<b><u>Prerequisites for the course:</u></b>	Should have basic knowledge on animal and plant cells studied at B.Sc levels.	
<b><u>Course Objective</u></b>	1. The objective is to offer detailed knowledge about cell biology, various cellular organelles and the cell communication pathways associated with the cellular processes of the cells. The course aims to provide insights of basic cell culture techniques.	
<b><u>Course Outcomes</u></b>	<ol style="list-style-type: none"><li>1. Students will learn about cell structure, cell division and cell cycle mechanisms, various cellular organelles and their functions.</li><li>2. Students will acquire insight into the processes of transport across cell membranes,</li><li>3. Students will gain knowledge about the concepts of various cellular communication pathway and their importance.</li><li>4. This course will give them understanding of basic Cell culture techniques needed to work in a Biological research laboratory.</li><li>5. This course will provide the students with the base for various courses in life science including Cancer biology, Neurochemistry, etc.</li></ol>	
<b><u>Content</u></b>	<ol style="list-style-type: none"><li>1. <b>Structural organizations, structure and functions of cellular and sub-cellular organelles:</b> prokaryotic and eukaryotic cells, Animal and plant cells</li><li>2. <b>Biological membrane structure and function:</b> Structure and functions of membrane, Transport across cell membrane- Passive and active transport of molecules across biological molecules, membrane pumps.</li><li>3. <b>Cell division and cell cycle:</b> Mitosis and Meiosis, their regulation</li><li>4. <b>Cellular communication and Cell signalling:</b> Signal transduction pathway, Signaling molecules and their receptor- G-</li></ol>	<b>6h</b> <b>4h</b> <b>4h</b> <b>10h</b>

	<p>Protein Coupled Receptors, Receptor Tyrosine Kinases, MAP kinase pathway, JAK-STAT pathway; light signaling in plants, bacterial chemotaxis and quorum sensing</p> <p>Programmed cell death: Apoptosis</p> <p><b>5. Plant tissue culture: techniques and applications-</b> Introduction to plant tissue culture and various requirements, preparation steps for tissue culture, surface sterilization of plant tissue material, basic procedure for aseptic tissue transfer, tissue culture methodologies- Callus Culture, Cell Suspension Culture, Protoplast culture and hybridization, Organogenesis, plant micro propagation, Somatic Embryogenesis; incubation and maintenance of culture; Applications of PTC.</p> <p><b>6. Animal tissue culture: techniques and applications-</b> Introduction to animal tissue culture and various requirements, Stem cells, typical cell lines, Growing mammalian cells and general maintenance of cells; Application of ATC.</p> <p><b>7. Microbial culture techniques:</b> <i>In vitro</i> culture techniques, nutrient requirements.</p>	<p>4h</p> <p>4h</p> <p>4h</p>
<b>Pedagogy:</b>	Lectures (online or physical)/ tutorials/ laboratory work/ viva/ seminars/ term papers/assignments/ presentations	
<b>Text Books/ References / Readings:</b>	<ol style="list-style-type: none"> <li>1. Gerald Karp. Cell and Molecular Biology: Concepts and experiments. John Wiley and sons, Inc. 8<sup>th</sup> edition (2015).</li> <li>2. Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Angelika Amon, Kelsey C. Martin. Molecular cell biology. W.H. Freeman and company, New York. 8<sup>th</sup> edition (2016).</li> <li>3. DeRobertis and Saunders. Cell and Molecular Biology. 8<sup>th</sup> edition (2017).</li> <li>4. Michael Pelczar, Jr, R.D. Reid, E.C.S. Chan. Microbiology. MacGraw-Hill. 5<sup>th</sup> edition (2001).</li> </ol>	

	<p>5. R. Ian Freshney. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications. Wiley-Blackwell, 7th Edition (2016).</p> <p>6. Roberta H. Smith. Plant tissue culture: technique and experiments. Academic Press. 3<sup>rd</sup> edition (2012).</p>	
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