

M.Sc. Biochemistry revised syllabus with effect from A.Y. 2021-2022

Core Papers			
Sl. No.	Subject code	Paper title	Credits
1.	BCC 101	Fundamentals of Biomolecules [T]	3
2.	BCC 103	Analytical Biochemistry-I [T]	3
3.	BCC 106	Bioenergetics and metabolism [T]	3
4.	BCC 107	Molecular Biology [T]	3
5.	BCC 108	Laboratory course in Biochemistry-I	4
		a. Fundamentals of Biomolecules [P]	
		b. Analytical Biochemistry-1 [P]	
		c. Molecular Biology [P]	
		d. Field trip/study tour [P]	
Optional Papers			
1.	BCO 110	Immunology and Immunotechniques [T]	3
2.	BCO 111	Biochemistry of Environmental Pollution and Remediation [T]	3
3.	BCO 124	Cell biology [T]	3
4.	BCO 125	Analytical Biochemistry-II	3
5.	BCO 126	Laboratory techniques and Applications of Biochemistry	4
		a. Cell biology [P]	
		b. Immunology and Immunotechniques [P]	
		c. Analytical Biochemistry-II [P]	
		d. Biochemistry of Environmental Pollution and Remediation [P]	

	6. Khopkar S. M., Environmental Pollution Analysis. New Age International Pvt. Ltd.; 2005, 1 st edition. 7. Mitchell R., Cu J. D.; Environmental Microbiology; Wiley-Blackwell Publication; 2009. 8. Moore J. W., Moore, E. A.; Environmental Chemistry; Academic Press; 1976, 1 st edition 9. Maier R., Pepper I., Gerba, C., Gentry T.; Environmental Microbiology; Academic Press; 2008, 2 nd edition	
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Programme: M. Sc. (Biochemistry)

Course Code: BCO 124

Title of the Course: Cell Biology [T]

Number of Credits: 3

Effective from AY: 2021-22

<u>Prerequisites for the course:</u>	Should have basic knowledge on Prokaryotic and eukaryotic cells.	
<u>Course Objectives</u>	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.	
<u>Course Outcomes</u>	1. Students will learn about cell structure, cell division and cell cycle mechanisms, various cellular organelles and their functions. 2. Students will acquire insight into the processes of transport across cell membranes, 3. Students will gain knowledge about the concepts of various cellular communication pathway and their importance. 4. This course will give them understanding of basic Cell culture techniques needed to work in a Biological research laboratory. 5. This course will provide the students with the base for various courses in life science including Cancer biology, Neurochemistry, etc.	

<u>Content</u>	1. Structural organizations, structure and functions of cellular and sub-cellular organelles: prokaryotic and eukaryotic cells, Animal and plant cells 6h 2. Biological membrane structure and function: Structure and functions of membrane, Transport across cell membrane- Passive and active transport of molecules across biological molecules, membrane pumps. 4h 3. Cell division and cell cycle: Mitosis and Meiosis, their regulation 4h 4. Cellular communication and Cell signalling: Signal transduction pathway, Signalling molecules and their receptor- G-Protein Coupled Receptors, Receptor Tyrosine Kinases, MAP kinase pathway, JAK-STAT pathway; light signaling in plants, bacterial chemotaxis and quorum sensing Programmed cell death: Apoptosis 10h 5. Plant tissue culture: techniques and applications- 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; incubation and maintenance of culture; Applications of PTC. 4h 6. Animal tissue culture: techniques and applications- Introduction to animal tissue culture and various requirements, Stem cells, typical cell lines, Growing mammalian cells and general maintenance of cells; Application of ATC. 4h 7. Microbial culture techniques: <i>In vitro</i> culture techniques, nutrient requirements. 4h	
Pedagogy:	Lectures (online or physical)/ tutorials/ laboratory work/ viva/ seminars/ term papers/assignments/ presentations/ self-study.	
Text Books/ References / Readings:	1. Gerald Karp. Cell and Molecular Biology: Concepts and experiments. John Wiley and sons, Inc. 2015, 8th edition. 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. 2016, 8th edition. 3. DeRobertis and Saunders. Cell and Molecular Biology. Saunders College Publishers. 2017, 8th edition. 4. Pranav Kumar and Usha Mina. Pathfinder Academy CSIR-JRF-NET Life Sciences. Pathfinder publications. 2016, 7th edition. 5. Michael Pelczar, Jr, R.D. Reid, E.C.S. Chan. Microbiology. MacGraw-Hill. 2001, 5th edition. 6. R. Ian Freshney. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications. Wiley-Blackwell. 2016, 7th Edition. 7. Roberta H. Smith. Plant tissue culture: technique and experiments. Academic Press. 2012, 3rd edition.	
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Programme: M. Sc. (Biochemistry)

Course Code: BCO 125

Title of the Course: Analytical Biochemistry-II

Number of Credits: 3

Effective from AY: 2021-22

<u>Prerequisites for the course:</u>	Students should have studied the theory/ instrumentation and application of some of the basic bio-analytical techniques. It is assumed that students have a basic knowledge of fundamentals in biochemistry and certain basic techniques in routine laboratory analysis.	
<u>Course Objectives:</u>	1. Introduction of various bioanalytical techniques for analysis. 2. Evaluate the utility of various analytical techniques as a qualitative and quantitative tool. 3. Develop concepts in techniques and instruments required for macromolecule structure determination and other techniques such as tracers for metabolic pathways.	
<u>Course Outcomes:</u>	1. Students should be able to differentiate between various analytical techniques based on their theory and sensitivity achieved.	