

<b>Programme</b>	BS Biochemistry	<b>Course Code</b>	BC. 405	<b>Credit Hours</b>	3-0
<b>Course Title</b>	<b>Bio membranes and Cell Signaling</b>				
<b>Course Introduction</b>					
The course will reintroduce the importance of cellular membranes and their role in cell signaling, elaborating the components, principles and mechanisms of the cellular signaling. The course will also explore the role of cellular signaling molecules in diagnosis of diseases and therapeutics.					
<b>Learning Outcomes</b>					
By the end of this course, students will be able to: <ul style="list-style-type: none"> <li>• Understand the basic principles of signal transduction mechanisms</li> <li>• Describe the mechanisms by which different receptors may be activated by their respective ligands</li> <li>• Comprehend the importance of cellular signaling mechanisms in metabolic diseases</li> </ul>					
<b>Course Content</b>					
<ul style="list-style-type: none"> <li>• Introduction of structural and functional properties of natural and synthetic biomembranes</li> <li>• Fluid mosaic model</li> <li>• Types of transport across biomembranes</li> <li>• Intracellular membrane traffic</li> <li>• Membranes of erythrocytes, intestinal mucosa, retinal cells and nerve cells</li> <li>• Introduction to concepts of cellular signaling, receptors, transducers, primary and second messengers; signal amplification</li> <li>• The plasma membrane as transducer and amplifier</li> <li>• G-protein coupled receptors and hormones</li> <li>• Cellular signaling via protein phosphorylation and kinases</li> <li>• TGF beta; Cytokine receptors; JAK/STAT pathways</li> <li>• Pathways with signal induced protein cleavage: Notch/Delta</li> <li>• Signaling pathways controlled by Ubiquitination: Wnt, Hedgehog and NF- <math>\kappa</math>B</li> <li>• Signaling pathways involved in cancers</li> <li>• Signaling during metabolic dysfunctions leading to obesity, diabetes, etc.</li> <li>• Down regulation of signaling</li> <li>• Integration and controlling signals</li> </ul>					
<b>Textbooks and Reading Material</b>					
<b>Textbooks.</b> <ul style="list-style-type: none"> <li>• Molecular Cell Biology. (2013) 7th Ed. by Lodish et al. Published by W H Freeman and Company.</li> <li>• Molecular Biology of the Cell. (2008). by Alberts et al. Garland Sciences, Taylor &amp; Francis Group.</li> <li>• Cell and Molecular Biology. (2013) 7th Ed. by Gerald Karp. Wiley.</li> </ul>					
<b>Teaching Learning Strategies</b>					
<ul style="list-style-type: none"> <li>• Class lecture</li> </ul>					

- Class Discussions
- Class Tutorials

**Assignments: Types and Number with Calendar**

- 1<sup>st</sup> Quiz in 4<sup>th</sup> Week of 5 marks
- 2<sup>nd</sup> Quiz in 12<sup>th</sup> Week of 5 marks
- 1<sup>st</sup> Assignment in 8<sup>th</sup> Week of 15 marks

**Assessment**

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.