

<b>Semester:</b>	05		
<b>Course Code:</b>	ZOOL 41752		
<b>Course Name:</b>	Molecular Cell Biology		
<b>Credit Value:</b>	02		
<b>Status:</b>	Compulsory		
<b>Pre-requisite:</b>	ZOOL 21722		
<b>Co-requisites:</b>	None		
<b>Hourly Breakdown:</b>	Theory	Practical	Independent Learning
	24	18	58

**Intended Learning Outcomes:**

After completion of this course unit, the student will be able to:

1. explain the key molecular processes involved in the regulation of cellular physiology,
2. discuss the role of molecular regulatory processes of cells in growth, development and physiology of animals,
3. describe the molecular basis of human diseases, cancer and drug target selection,
4. appreciate the importance of molecular cell biology, stem cells and cell culture in contemporary sciences, human health and well-being,
5. critically evaluate molecular and cellular interactions of curated cell signaling pathways of humans and,
6. demonstrate competencies in *in vitro* cell culture and fundamental simulation studies in cell signaling.

**Course Content:**

Regulation of cellular processes: overview to cell architecture, cellular signals, receptors, second messengers, signal transduction pathways, restriction of cellular signals in space and time, Mechanisms of cell physiology: cell proliferation, cell cycle, survival, apoptosis, cellular senescence, cell motility, cell adhesion, protein trafficking, secretions, establishment and maintenance of cell polarity, Molecular biology of stem cells, Renewal of selected cell types, Stem-cell engineering, Key molecular processes regulating cell differentiation, organogenesis, patterning of appendages, shaping the vertebrate body, neural development and aging, Cancer cell biology: carcinogenesis, molecular basis of cancer cell behavior, metastasis, Cellular pathways of selected human infections, diseases and the role of cellular molecules as therapeutic modalities, Applications, prospects, challenges, socio-economic aspects of molecular cell biology research.

Practical sessions on animal cell culture techniques: *in-vitro* animal cell lines, culture environment, biosafety, contaminations, culture maintenance of cell lines for expression analysis, analysis of selected curated and peer-reviewed signaling pathways, and fundamental simulation studies on selected signal transduction pathways of humans.

**Teaching /Learning Methods:**

A combination of lectures, laboratory practical sessions, computer simulations and online resources.

**Assessment Strategy:**

Continuous assessment and end of semester examination. Percentage given for each sub-component indicates the percent contribution to the final marks.

Continuous Assessment 40 %	Final Assessment 60 %		
<b>Details:</b> Assignments            20 % Laboratory reports    20 %	<b>Theory</b> 60 %	<b>Practical</b> -	<b>Other</b> -
<b>Recommended Readings:</b> <ol style="list-style-type: none"> <li>1. Lodish, H., A. Berk, C. A. Kaiser, M. Krieger, A. Bretscher, H. Ploegh, K.C. Martin, M. Yaffe &amp; A. Amon (2021) <i>Molecular Cell Biology</i>, 9<sup>th</sup> Edition. W. H. Freeman.</li> <li>2. Alberts, B., A. D. Johnson, J. Lewis, D. Morgan, M. Raff, K. Roberts &amp; P. Walter (2004). <i>Molecular Biology of the Cell</i>, 6<sup>th</sup> Edition, Garland Science.</li> <li>3. Freshny, R. I. (2016) <i>Culture of Animal Cells: A Manual of Basic Techniques and Specilaized Applications</i>, 7<sup>th</sup> Edition, John Wiley &amp; Sons, Inc.</li> <li>4. Selected scholarly review and research articles on molecular cell biology.</li> </ol>			