

Semester	AUG 2023
Open to semester	3
Course code	BI2123
Course title	Introduction to Biological Systems (Elective)
Credits	3 /
Course Coordinator & participating faculty (if any)	Aurnab Ghose*, Collins Assisi
Nature of Course	Lectures
Pre-requisites	None
Objectives (goals, type of students for whom useful, outcome etc)	<p>Biological systems are elaborate machines with parts that interact in surprising ways. This course can be envisaged as the antithesis of reductionism. Rather than take the biological machine apart, we will try to put it together and demonstrate the properties that emerge are often more than the sum of its parts. Using thematic examples from sub-cellular to organismal scales, we will try to derive organisational principles that mediate interactions between components. The course will introduce quantitative methods necessary to develop a systems perspective.</p>
Course contents (details of topics /sections with no. of lectures for each)	<p>Introduction to complexity in Biology : Introduction to complex systems Emergent properties and evolution of biological complexity</p> <p>Integration and organisation in cells : Signal transduction – representing the outside and communication Gene regulation and gene regulatory networks</p> <p>Integration and organization in organisms : Early development and pattern formation Differentiation and hierarchical gene expression Regeneration and Stem cells Cell death</p> <p>Integration and organisation in physiology : The immune system and inflammation</p>
Evaluation /assessment	End-Sem Examination-50%

	Mid-Sem Examination-50% Others-%
Suggested readings (with full list of authors, publisher, year, edn etc.)	<p>i] Alberts, Johnson, Lewis, Raff, Roberts & Walter. Molecular Biology of the Cell. Garland Science, 4th Edition, 2002</p> <p>ii] Wolpert, Smith, Jessell, Lawrence, Robertson & Meyerowitz. Principles of Development. Oxford University Press. 3rd Edition, 2006.</p> <p>iii] Alon. An Introduction to Systems Biology: Design Principles of Biological Circuits Chapman & Hall/CRC. 1st Edition, 2006.</p> <p>iv] Murray. Mathematical Biology Vol. I. Springer. 3rd Edition, 2007.</p>