Systems Biology

Semester No 6/8	Code BI-438	Credit Hours 3-0

Course description:

The purpose of the course is to introduce the students to the field of systems biology and to provide an understanding of the cell at systems level.

Textbooks:

Recommended Books

Latest editions of following books

1. Klipp, E., Wolfram L., Christoph W., Axel K., Hans L., and Ralf H., "Systems biology", Wiley.
2. Ullah, M., and Olaf W., "Stochastic approaches in systems biology", Springer.
3. Newman M., "Networks: An Introduction", Oxford University Press, USA.

Prerequisite:

Probability & Statistics, Linear Algebra & Differential Equations, Genomics

Course Learning Outcomes:

To the field of systems biology and to provide an understanding of the cell at systems level

Quizzes	10-15%
Assignments	5-10%
MSE	30-40%
ESE	40-50%

ASSESSMENT SYSTEM:

Week wise Lecture Plan:

Week	Lecture Topic		
1	Introduction to systems biology	1	

No.	Topic		
2	Modeling of biochemical systems		
3	Kinetic modeling of enzymatic reactions		
4	Law of mass action		1
5	Michaelis-Menten Kinetics, rate equation		
6	Model systems: lac operon, phages, plasmids and chemotaxis;		
7	Analysis of high throughput data		
8	Gene expression models	2	
9	**MIDTERMS**		
10	Stochastic modeling of biological systems		2
11	Chemical master equation		
12	Stochastic simulation	3	
13	Fluctuations in gene expression		3
14	Biological networks	4	
15	Network structure		4
16	Network dynamics and function		
17	Network motifs, network modularity		
18	**END SEMESTER EXAMINATION**		