AMITY UNIVERSITY
UTTAR PRADESH

FORMAT FOR COURSE CURRICULUM

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
2	0	0	0	2

Course Title: Computational Systems Biology

Course Code: BIOF411 **Units: 02**

Course Objectives:

Theory: This course will introduce students into a biology world as seen by engineers, physicists, mathematicians and computer scientists.

Pre-requisites: Basics of Molecular Biology and Biochemistry.

Student Learning Outcomes:

- By the end of the semester, students will be able to understand systems based approaches in biological sciences.
- The students will be able to proficiently select Systems Biology web-resources and tools that will help them in re-constructing and re-defining complex biological processes.
- The students will be able to choose an appropriate modeling technique to be used to a complex biological system

Course Contents/Syllabus- Theory:

	Weightage (%)
Module I	**20**
Descriptors/Topics: Introducing Systems Biology Basic concepts of Systems Biology, Enabling information and integration for Systems Biology, Databases for Systems Biology, SBML format and other XML formats.	
Module II	**30**
Descriptors/Topics: Foundations of biochemical network analysis and modeling Introduction to computational models of biochemical reaction networks, Biological foundations of Signal transduction and the Systems Biology perspective, Reconstruction of metabolic network from genome information and its structural and functional analysis, Metabolic Flux Analysis.	

Module III	**30**
Descriptors/Topics: Computer simulation of dynamic networks Discrete approach to network modeling, Gene networks: Estimation, modeling and simulation, Computational models of metabolism: Deterministic Versus Stochastic approaches.	
Module IV	**20**
Descriptors/Topics: Multiscale representation of cells and emerging phenotypes Spatio-temporal Systems Biology, Cytomics - From cell states to predictive medicine, The IUPS Physiome project, E-Cell Concept, Recent developments and trends of Systems Biology.	

Pedagogy for Course Delivery:

Lectures: 25
Tutorial:
Presentation/ Seminar: 4
Class Test: 1
Total: 30

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
100%	**NA**	**100%**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment						End Term Examination
Components (Drop down)	**Class Test 1**	**Viva**	**Home Assignment**		**Attendance**	
Weightage (%)	15	5	5		5	70

Text:

- Introduction to Systems Biology. By Sangdun Choi. Published by Humana Press, 2007, ISBN 9781588297068
- Computational Systems Biology. By Andres Kriete, Roland Eils. Published by Academic Press, 2005, ISBN 012088786X

References:

- Systems Biology: Applications and Perspectives. By Peter Bringmann. Published by Springer, 2007, ISBN 3540313389
- Systems Biology: Principles, Methods and Concepts. By Andrzej K, Konopka. Published by CRC Press, 2007, ISBN 0824725204.

Any other Study Material:

- Systems Biology: Definitions and Perspectives. By Lilia Alberghina, Hans V. Westerhoff. Published by Birkhauser, 2005, ISBN 354022968X.