

Introduction to Systems Biology

www.coursera.org/learn/systems-biology

About this course: This course will introduce the student to contemporary Systems Biology focused on mammalian cells, their constituents and their functions. Biology is moving from molecular to modular. As our knowledge of our genome and gene expression deepens and we develop lists of molecules (proteins, lipids, ions) involved in cellular processes, we need to understand how these molecules interact with each other to form modules that act as discrete functional systems. These systems underlie core subcellular processes such as signal transduction, transcription, motility and electrical excitability. In turn these processes come together to exhibit cellular behaviors such as secretion, proliferation and action potentials. What are the properties of such subcellular and cellular systems? What are the mechanisms by which emergent behaviors of systems arise? What types of experiments inform systems-level thinking? Why do we need computation and simulations to understand these systems? The course will develop multiple lines of reasoning to answer the questions listed above. Two major reasoning threads are: the design, execution and interpretation of multivariable experiments that produce large data sets; quantitative reasoning, models and simulations. Examples will be discussed to demonstrate “how” cell- level functions arise and “why” mechanistic knowledge allows us to predict cellular behaviors leading to disease states and drug responses.

Created by: Icahn School of Medicine at Mount Sinai

Basic Info	Course 1 of 6 in the Systems Biology and Biotechnology Specialization .
Commitment	6-8 hours/week
Language	English, Subtitles: Chinese (Simplified)
How To Pass	Pass all graded assignments to complete the course.
User Ratings	4.3 stars Average User Rating 4.3 See what learners said



Syllabus

WEEK 1

Systems Level Reasoning | Molecules to Pathways

Module description goes here.

5 videos, 3 readings

Graded: Systems Level Reasoning | Molecules to Pathways

WEEK 2

Pathways to Networks | Physical Forces and Electrical Activity in Cell Biology

Module description goes here.

4 videos, 3 readings

Graded: Pathways to Networks | Physical Forces and Electrical Activity in Cell Biology

WEEK 3

Mathematical Representations of Cell Biological Systems | Simulations of Cell Biological Systems

Module description goes here.

4 videos, 3 readings

Graded: Mathematical Representations of Cell Biological Systems | Simulations of Cell Biological Systems

WEEK 4

Experimental Technologies | Network Building and Analysis

Module description goes here.

4 videos, 4 readings

Graded: Experimental Technologies | Network Building and Analysis

WEEK 5

Midterm

Module description goes here.

Graded: Midterm Exam

WEEK 6

Analysis of Networks | Topology to Function

Module description goes here.

4 videos, 3 readings

Graded: Analysis of Networks | Topology to Function

WEEK 7

Strengths and Limitations of Different Types of Models | Identifying Emergent Properties

Module description goes here.

4 videos, 4 readings

Graded: Strengths and Limitations of Different Types of Models | Identifying Emergent Properties

WEEK 8

Emergent Properties: Ultrasensitivity and Robustness | Case Studies

Module description goes here.

4 videos, 4 readings

Graded: Emergent Properties: Ultrasensitivity and Robustness | Case Studies

WEEK 9

Case Studies | Systems Biomedicine | Systems Pharmacology and Therapeutics | Perspective

Module description goes here.

5 videos, 4 readings

Graded: Case Studies | Systems Biomedicine | Systems Pharmacology and Therapeutics | Perspective

WEEK 10

Final

Module description goes here.

Graded: Final Exam

FAQs

How It Works



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