

Abstract Submitted
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Learning physical biology via modeling and simulation: A new course and textbook for science and engineering undergraduates¹ PHILIP NELSON, Univ Pennsylvania — To a large extent, undergraduate physical-science curricula remain firmly rooted in pencil-and-paper calculation, despite the fact that most research is done with computers. To a large extent, undergraduate *life*-science curricula remain firmly rooted in descriptive approaches, despite the fact that much current research involves quantitative modeling. Not only does our pedagogy not reflect current reality; it also creates a spurious barrier between the fields, reinforcing the narrow silos that prevent students from connecting them. I'll describe an intermediate-level course on “Physical Models of Living Systems.” The prerequisite is first-year university physics and calculus. The course is a response to rapidly growing interest among undergraduates in a broad range of science and engineering majors.

Students acquire several research skills that are often not addressed in traditional undergraduate courses: •Basic modeling skills; •Probabilistic modeling skills; •Data analysis methods; •Computer programming using a general-purpose platform like MATLAB or Python; •Pulling datasets from the Web for analysis; •Data visualization; •Dynamical systems, particularly feedback control.

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