

Abstract Submitted
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Teaching Emergence and Collective Behavior in Physics and Biology to Non-majors¹ MICHAEL MANHART, Rutgers University — Emergence and collective behavior form one of the most fertile intersections of physics and biology in current research. Unfortunately, modern and interdisciplinary concepts such as these are often neglected in physics courses for non-majors. A team of four graduate students and a faculty advisor recently redesigned our department's course for non-majors (Concepts of Physics for Humanities and Social Science Students) to focus on emergence and collective behavior along with three other major themes in modern physics. In the course we developed basic concepts of statistical physics and thermodynamics to understand a variety of emergent phenomena in physics and biology, including bird flocking, superconductivity, and protein folding. We discussed the notion of life itself as an inherently emergent phenomenon arising from the collective behavior of molecules. The students also wrote their own blog posts on emergent phenomena and interactively explored emergence through workshops on Foldit (the protein folding game) and Conway's Game of Life. We believe our course demonstrates some possibilities and challenges for teaching non-majors at the intersection of physics and biology.

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