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Coordinating an IPLS class with a biology curriculum: NEXUS/Physics[1]

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A multi-disciplinary team of scientists has been reinventing the Introductory Physics for Life Scientists (IPLS) course at the University of Maryland. We focus on physics that connects elements common to the curriculum for all life scientists – molecular and cellular biology –with building general scientific competencies, such as mathematical modeling, reasoning from core principles, and multi-representation translation. The prerequisites for the class include calculus, chemistry, and biology. In addition to building the basic ideas of the Newtonian framework, electric currents, and optics, our prerequisites allow us to include topics such as atomic interactions and chemical bonding, random motion and diffusion, thermodynamics (including entropy and free energy), and spectroscopy. Our chemical bonding unit helps students link the view of energy developed in traditional macroscopic physics with the idea of chemical bonding as a source of energy presented in their chemistry and biology classes. Education research has played a central role in our design, as has a strong collaboration between our Discipline-Based Education and the Biophysics Research groups. These elements permit us to combine modern pedagogy with cutting-edge insights into the physics of living systems.

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