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Rethinking Physics for Biologists: A Design-Based Research Approach

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As physicists we'd like to think of our physics classes as communicating the beauty of the world around us from a physics perspective. However, the students most likely to take our introductory physics classes are those who do not appreciate physics for its own right nor see the course as connected to things they do appreciate. Biology programs typically require students to take courses in introductory biology, chemistry, and physics - but they often see these courses as disconnected. To combat this problem, Introductory Physics for the Life Science (IPLS)courses are gaining momentum in the physics education community, with the creation of multiple curricula for a variety of implementation strategies. At Michigan State University, we have designed an integrated lab-lecture (studio style) introductory physics course that meets the needs of life science students. Our design of this course focused on (1) connecting the disciplines of physics, biology, and chemistry through designing authentic tasks for students in collaboration with biophysicists, (2) incorporating computational simulations that model complex biological phenomenon, and (3) building positive relationships for life science students with physics. Our key goal in the design of this course was to help students see the relevance and utility of physics to things they care about. In this presentation I will detail our process of collecting systematic data, listening to and valuing students' reasoning, and bridging diverse perspectives. I will demonstrate how this process led to improved curricular design, refined assessment objectives, and new design heuristics.