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Integrated Concentration in Science (iCons): Undergraduate Education Through Interdisciplinary, Team-Based, Real-World Problem Solving¹
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Attitude, Skills, Knowledge (ASK) – In this order, these are fundamental characteristics of scientific innovators. Through first-hand practice in using science to unpack and solve complex real-world problems, students can become self-motivated scientific leaders. This presentation describes the pedagogy of a recently developed interdisciplinary undergraduate science education program at the University of Massachusetts Amherst focused on addressing global challenges with scientific solutions. Integrated Concentration in Science (iCons) is an overarching concentration program that supplements the curricula provided within each student's chosen major. iCons is a platform for students to perform student-led research in interdisciplinary collaborative teams. With a schedule of one course per year over four years, the cohort of students move through case studies, analysis of real-world problems, development of potential solutions, integrative communication, laboratory practice, and capstone research projects. In this presentation, a track emphasizing renewable energy science is used to illustrate the iCons pedagogical methods. This includes discussion of a third-year laboratory course in renewable energy that is educationally scaffolded: beginning with a boot camp in laboratory techniques and culminating with student-designed research projects. Among other objectives, this course emphasizes the practice of using reflection and redesign, as a means of generating better solutions and embedding learning for the long term.

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