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Mathematics for Sustainability: A General Education Mathematics Course.

Mathematics for Sustainability is a general education math course offered at Penn State that engages students in a quantitative approach to sustainability questions. Students are introduced to interesting mathematical ideas in a context requiring minimal mathematical background, build their skills in quantitative reasoning, and are empowered in using quantitative arguments in effectively advocating for issues they care about.

We view quantitative reasoning as part of a broader set of essential skills for citizens who are prepared to be engaged in sustainability questions and we develop mathematical topics in the course with this purpose in mind. These include: basic computations using units; estimation and precision; communicating quantitative information in relevant terms; logical fallacies and the misleading use of quantitative information; computations involving energy and power; dynamic equilibria and the energy balance of the Earth; feedbacks and tipping points in ecosystem models; models of exponential and logistic growth; risk and uncertainty; bayesian inference; game theory; and potential mechanisms for resolving the tragedy of the commons. (Received September 24, 2018)