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Physics Innovation and Entrepreneurship (PIE) in the First-year Physics Course[1] RANDALL JONES, BAHRAM ROUGHANI, Loyola University Maryland — The J-TUPP, Phys21 report reminds us that most physics bachelor graduates are employed outside academia and that important skills for these students include a creative ability to apply physics knowledge to real-world settings. We are introducing students to the ideas of innovation and entrepreneurship, to encourage them to think about applying their physics knowledge throughout their 4-year physics program. In this presentation we report on how we introduce these ideas into a typical first-year course without sacrificing a large proportion of course time. We have used the Hyperloop, a high-speed transport system proposed by a joint team from Tesla and SpaceX, to have students investigate technical feasibility and human desirability questions that can be addressed throughout their first semester course. With each new physics topic, we are able to present a design question related to the Hyperloop that requires students to apply their just-acquired knowledge to the question and then to brainstorm implications and possible solutions guided by design thinking principles. As a first example, we ask what maximum acceleration would be acceptable to passengers on a train and investigate how much time is added to a trip from Boston to Washington, DC if the Hyperloop is to make several stops along the way. Since the Hyperloop is expected to reach a maximum speed of 760 mph, a significant amount of time must be spent speeding up and slowing down. This leads students to discuss novel ideas for getting passengers on and off the train without requiring it to slow down.

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