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P. P. Yu*, 501 Westminster Ave., Fulton, MO 65251. *What happens when a physicist teaches Ordinary Differential Equations?* Preliminary report.

As a mathematical relativist with formal training in physics and engineering, I will discuss in this talk some pedagogical approaches I have implemented in several distinct undergraduate courses on Ordinary Differential Equations (ODEs). Specific topics include (1) Use planar systems as a vehicle to teach ODEs simultaneously with linear algebra inherently embedded therein. I will lay out a pathway through the text by Hirsch, Smale, and Devaney I experimented when teaching ODEs without linear algebra as a prerequisite. In particular, I will underscore how concrete examples from classical and quantum mechanics as well as feedback control design can be naturally incorporated in a reverse-engineering strategy to help reduce the barrier of the eigenvalue problem. (2) Emphasize the role symmetry plays in ODEs through a geometric (re)interpretation of systems of ODEs using low-dimensional Lie algebras of vector fields. The cost of having to deal with partial derivatives proved to be minimal; however, the real challenge seemed to consist in establishing a tangible feel in students about flows and brackets. I will share my efforts of introducing the most quintessential components of the Lie theory in a first course on ODEs to math majors with knowledge of Calculus III and Linear Algebra. (Received September 25, 2017)