Coriolis & Centrifugal Forces

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The idea of a "fictitious force" is introduced early in our physics education but is rationalized much later. Correctly interpreting this "fictitious force" is critical to understanding any physical system in a non-inertial frame. In uniformly rotating frames, two "fictitious forces" arise: the Coriolis and centrifugal forces. In this presentation, I will introduce these forces from a philosophical and historical perspective, derive the forces by applying Newton's second law to a uniformly rotating frame, discuss Mach's principle, and solve two interesting problems involving objects in non-inertial frames. This will be an enriching topic for undergraduate and graduate students alike, especially considering that it is one that is not discussed in many undergraduate- and graduate-level classical mechanics courses.