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Ralph L Wojtowicz* (rwojtowi@shepherd.edu), 301 North King Street, Shepherdstown, WV 25443. *Categorical Logic as a Foundation for Reasoning Under Uncertainty.*

A zoo of uncertainty models has emerged in past decades to address perceived deficiencies in the capacity of probability theory to represent vagueness, ignorance, and related concepts. A small sample of these newer models includes fuzzy set theory, Dempster-Shafer theory, the theory of hints, rough sets, vague sets, higher-order probabilities, likelihood logic, and imprecise probabilities. Such models are employed in real engineering systems. Moreover, examples arise in which different models are implemented in a single system or in systems that must work together. Category theory provides a natural framework for relating distinct uncertainty models and for supporting interoperability. Although category theory has been applied to probability since the 1960s, and has been used to formulate fuzzy set theories, little work has been done with many other uncertainty models. In this talk we discuss (1) a categorical formulation of Dempster-Shafer belief functions (2) mappings between categories of belief functions and probabilities, and (3) a general category-theoretic program for relating uncertainty models. This work grew out of research conducted under Small Business Innovative Research contracts in recent years. (Received April 06, 2017)