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Audrey Margaret Hubbard* (audrey.hubbard@avemaria.edu) and **Christian Matthew Woods** (cmw55@pitt.edu). *The Energy of Graphs*.

Let M be a matrix associated with a graph G on n vertices. Let $\sigma(M) = \{\mu_1, \mu_2, \dots, \mu_n\}$ be the set of eigenvalues of M , and let $\bar{\mu} = \text{Tr}(M)/n$ be their average. The M -energy of graph G is defined as

$$E_M G = \sum_{i=1}^n |\mu_i - \bar{\mu}|$$

The energies of several matrices associated with a graph have been studied, in particular, the adjacency energy, Laplacian energy, distance energy, and, more recently, the normalized Laplacian energy. In this talk, we explain the relationship between the normalized Laplacian matrix and the Randić matrix of a graph. We also present some relations we have found concerning several types of energy. In particular, we will derive formulas and bounds for the effects of various graph operations on adjacency and normalized Laplacian energy. Among these are binary operations such as the join, Cartesian product, tensor product, strong product, lexicographic product, and corona of two regular graphs, as well as an operation we call the “shadow” of a graph. (Received July 28, 2010)