

# Spectral Questions and Expander Graphs

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## Project Description:

Expander graphs, roughly defined as  $k$ -regular unoriented graphs with the property that “any ‘small’ subset of vertices has a relatively ‘large’ neighborhood” (Chung p. 88), have known constructions for particular values of  $k$ . Practical applications of expanders call for a more general construction. During the summer of 2001, I will be working at Mt. Holyoke College with Dr. Giuliana Davidoff in an effort to find a more general construction satisfying certain desirable properties.

My thesis will be an extension of this summer research. I expect that throughout the summer, many questions linked closely to expander properties and spectral graph theory will present themselves. During the 2001 fall semester, Professor Orrison and I plan to read through Fan Chung’s book *Spectral Graph Theory* to expand my knowledge in this field. Hopefully, I’ll be able to formulate one of these summer questions or an associated idea from the spectral graph theory text into an appropriate independent research project.

## References:

Chung, Fan R. K., *Spectral Graph Theory*, American Mathematical Society, Providence, 1997.

Davidoff, Giuliana, pre-print of book describing the construction of expanders based on the value the second largest eigenvalue of an associated adjacency matrix.