Instructor: Dr. Xuerong Yong, Email: xryong@math.uprm.edu, Tel: 787-832-4040 ext. 5871. Office: M407G. Office Hours: Mondays: 4:30 - 6:30 pm in Room 407G.

- **Main Reference Books:**

- **Objectives:** Introduction to the general issues of algebraic graph theory, the spectral techniques; enumerations of the structures such as the independent sets, matchings, spanning trees, Hamiltonian cycles, etc..

- **Credit Number:** 3

- **Prerequisites:** Linear Algebra, Elements of Graph Theory

- **Expected Work:** Four Written Homework (= 1/3); Midterm+Final (= 2/3).

- **Covering Topics:**
  1. **Fundamental Concepts:** independent sets, matchings, spanning trees, Hamiltonian cycles, Eulerian orientations, cycle covers, etc..
  2. **Operations on Graphs and the Resulting Spectra:** the polynomial of a graph, eigenvalues and eigenvectors, line graphs and total graphs, etc..
  3. **The Divisor of Graphs:** The divisor and cover, symmetry properties, some generalizations
  4. **Spectral Characterizations:** Eigenvalues of L-, Q-, and adjacency matrix, co-spectral graphs, graphs characterized by their spectra;
  5. **Spectral Techniques in Graph Theory and Combinatorics:** Computing the structures such as, independent sets, matchings, spanning trees, Hamiltonian cycles, Eulerian orientations, etc..
  6. **Additional Topics:** Random Graphs, Ramsey Theory, Extremal Problems

- **Other References:**