

# Mathematical Foundations of Spectral Graph Theory.

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# What is a graph?

This is an unofficial template for Florida State Mathematics poster presentation prepared by Rafiq Islam[Islam(2025b)]. Here is how you use plain text. Here is how you can use a block to write some important information [Islam(2025a)]

## Graph Theory

Spectral graph theory studies properties of a graph in relationship to the eigenvalues and eigenvectors of matrices associated with the graph, such as the adjacency matrix  $A$ , degree matrix  $D$ , and Laplacian  $L = D - A$ .

- ▶ This is how you can start itemize
- ▶ Instead of this right-pointed arrow, if you want bullets, then see the instruction in line 6

# Why do we need this?

This is an unofficial template for the Florida State Mathematics poster presentation prepared by Rafiq Islam<sup>1</sup>. Here is how you use plain text. Spectral graph theory studies properties of a graph in relationship to the eigenvalues and eigenvectors of matrices associated with the graph, such as the adjacency matrix  $A$ , degree matrix  $D$ , and Laplacian  $L = D - A$ .

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<sup>1</sup>An example of footnote

# Mathematical Background

This section has three slides. So in the top right, we see 3 dots. Highlighted one indicates the current slide.

Let  $G = (V, E)$  be an undirected graph. The Laplacian matrix is given by

$$L_{ij} = \begin{cases} \deg(v_i) & \text{if } i = j, \\ -1 & \text{if } i \neq j \text{ and } (i, j) \in E, \\ 0 & \text{otherwise.} \end{cases}$$

1. The eigenvalues of  $L$  reveal key structural properties such as connectivity.

# A Tikz Picture Example

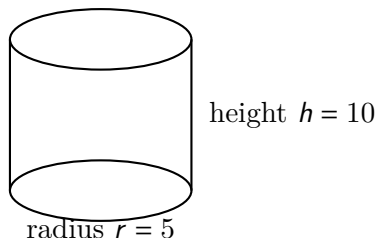


Figure 1: Spherical Cylinder with radius  $r = 5\text{m}$  and height  $h = 10\text{ m}$

# Other Plots



Figure 2: Florida State Seminole (Photo credit: Wikipedia)

# Bibliography



Rafiq Islam.

Florida state university beamer presentation design  
(unofficial).

Department of Mathematics, 2025a.



Rafiq Islam.

Fsu mathematics general poster design.

Technical report, Florida State University, 2025b.