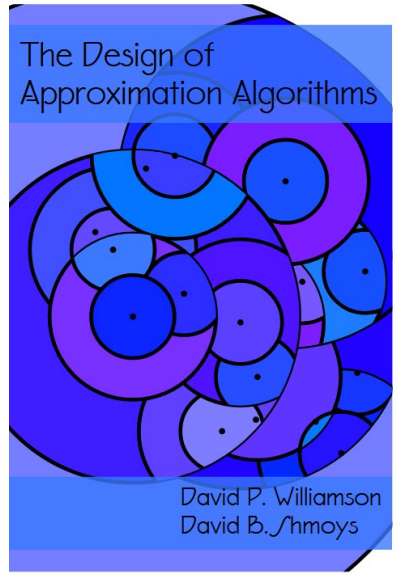
Advanced Algorithms

March 24, 2026

Logistics

- Approximation Algorithms!
- Reference = “the two Davids book”
  - Copies in Edmunds library
- Assignment 2 due in one week

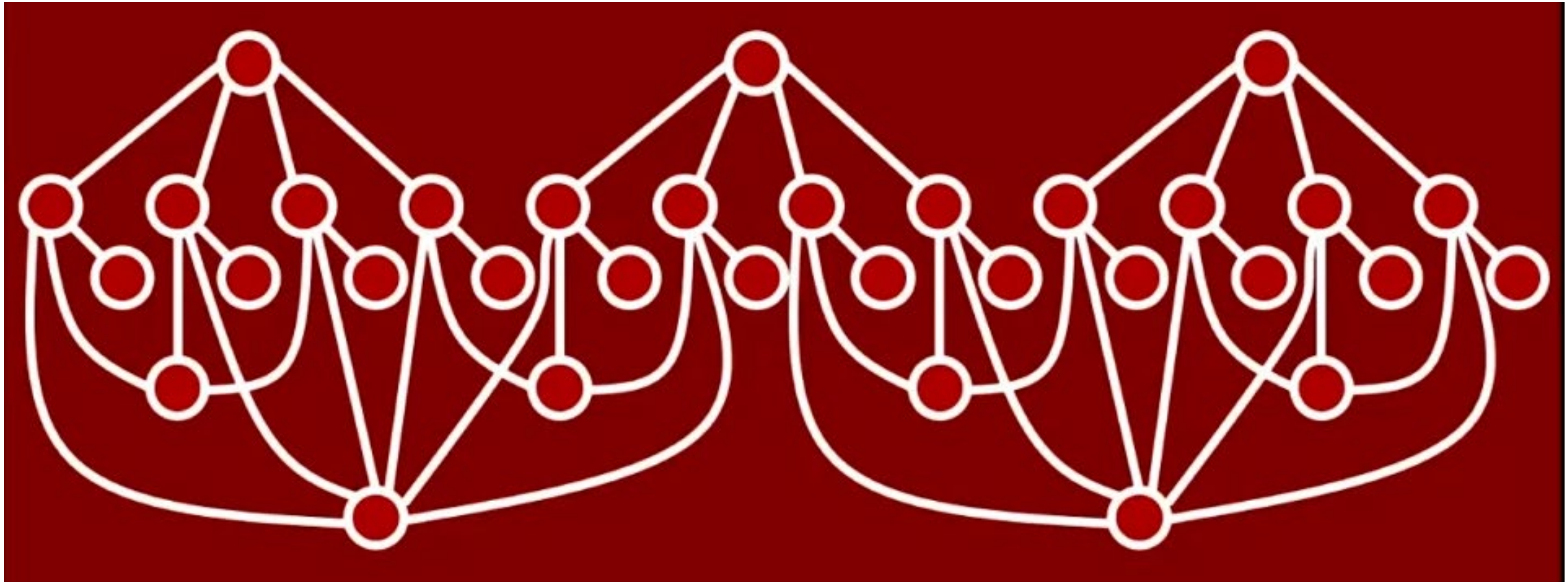


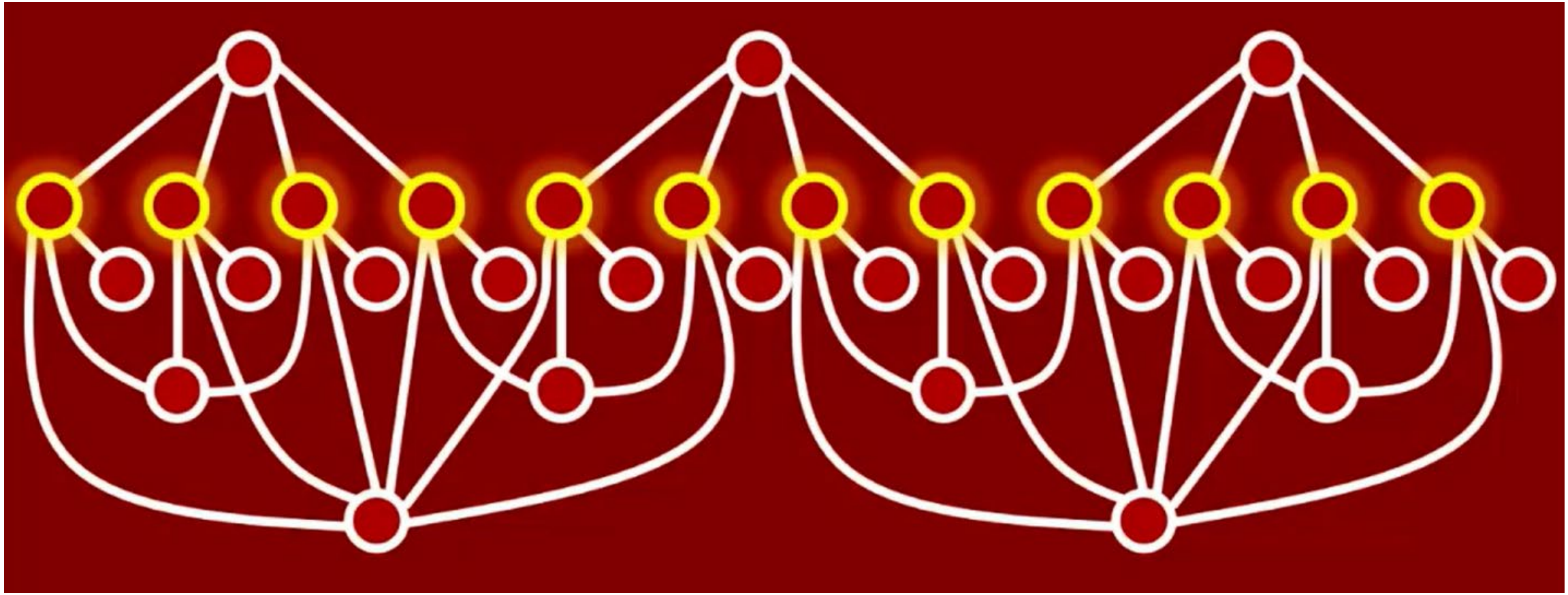
Greedy Vertex Cover

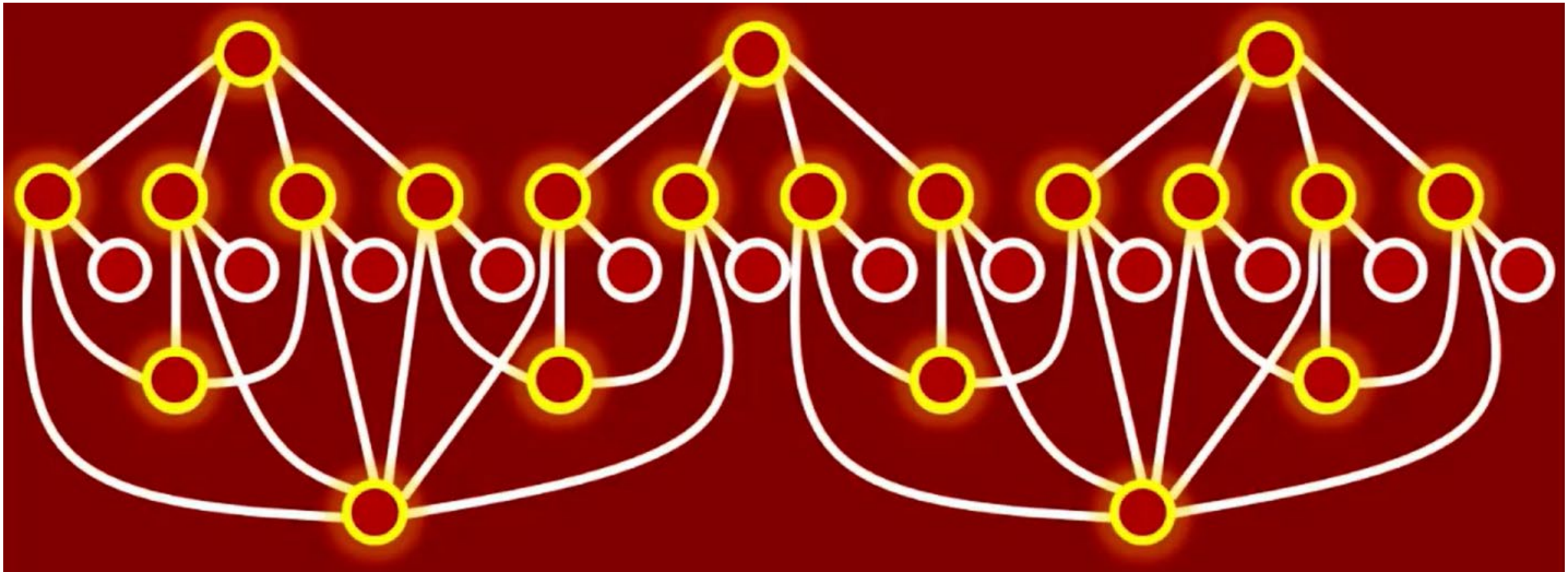
- Initialize $S = \emptyset$
- **While** not all edges covered by S:
  - Let v be the vertex covering the **most number** of uncovered edges
  - Update $S = S \cup v$.
- Return S

This is not a C-approximation for any constant C

But it is an O(log n)-approximation, we will see this later when we study Set Cover







Gavril's algorithm

- Initialize $S = \emptyset$
- **While** not all edges covered by S:
  - Let $\{u, v\}$ be some uncovered edge
  - Update $S = S \cup \{u\} \cup \{v\}$. **?**
- Return S

Gavril's algorithm

- Initialize $S = \emptyset$
- **While** not all edges covered by S:
  - Let $\{u, v\}$ be some uncovered edge
  - Update $S = S \cup \{u\} \cup \{v\}$. !
- Return S

This is a 2-approximation for Vertex Cover