

Mathematically Optimizing Doctoral Consortium Group Assignment

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General template, feel free to change things around (categories, size of boxes, location of certain sections)

Introduction

Doctoral Consortium feedback sessions are a common format in academic conferences where PhD students present their work to small groups of peers and faculty mentors across multiple rounds.

More **students** + more **rounds** = impossible to track by hand. Someone always ends up seeing the same faces.

Our Task

Schedule students into **rotating** small groups — **no repeat peers**, **no same-advisor** or **same-school pairings**.



Some images

Graphic to assign students/faculty to groups
(maybe we can run the model a bunch of times with changing variables and record time taken)

Hard constraints (must satisfy.)

- One student → one group per session
- 2–5 students, 1–2 faculty per group
- No advisor-advisee in same group

Soft constraints (minimize).

- Repeat peer pairings across rounds
- Same-institution student pairings



Model

Minimize $Z = (\text{weight for peer repeats}) \times (\text{total repeat pairings across all students}) + (\text{weight for institution conflicts}) \times (\text{total same-institution pairings across all sessions and groups})$

Result

3 sessions $\times$ 4 groups, 14 students and 4 faculty successfully assigned with no constraint violations.

- correct group sizes (2–5 students, 1–2 faculty)
- no advisor-advisee pairings
- each student in exactly one group per session.

Future work

- Core problem: runtime blows up as constraints grow → need approximation methods
- Proposed fix: two-phase solve — lock in hard constraints first, then layer on diversity optimization

