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Motivating example

- **Context**: You are a senior in college, and need to register in 4 courses for the Spring semester
- **Possibilities**: Many courses offered in Math, CSE, EE, CBA, etc.
- **Constraints**: restrict the choices you can make
  - *Unary*: Courses have prerequisites you have/don't have, there a courses/instructors you like (or not), etc.
  - *Binary*: Courses are scheduled at the same time
  - *n-ary*: In CE: 4 courses from 5 tracks such as at least 3 tracks are covered
- **Problem:** You have choices, are restricted by constraints, and

  You need to make the right decisions!!

Research issues

- Modeling the constraints
  - Hard/soft, binary/non-binary, finite/interval
- Solving the problem
  - Algorithms for constraint propagation
  - Search: backtrack & iterative repair
- Identifying islands of tractability based on
  - Topological properties of the constraint graph
  - Semantic properties of the constraints

Sample Projects

1. Graduate TA Assignment Project (GTAAP)
   - Modeling, search, GUI
2. Temporal Reasoning
   - Constraint propagation, search, graph theory
3. Symmetry detection
   - Search, databases (computational), graph theory
4. Structural decompositions
   - Databases (theory), tractability results

Courses

- Relevant CSE courses:
  - Introduction to AI (876)
  - Foundations of Constraint Processing (821)
  - Advanced AI (976)
  - Recent Advances in Constraint Processing (990)

- To conduct research, you also need:
  - CSE:
    - Solid knowledge of 235, 310
    - Useful courses: 423, 424, 914, 923
  - Also: Math852, Math832, Stat801, Stat802