

# MATH 8460 Integer Programming

MW 7:00-8:15pm | Dr. Fabio Vitor

**Prerequisite:** MATH/CSCI 4300/8306 or permission of instructor

Integer programming is one of the most useful classes of mathematical optimization models. Integer programs are used **daily** to model and **optimize** systems from several industries including:

- Logistics, transportation, and supply chain
- Financial systems
- Manufacturing
- Health care, medicine, and public health
- Oil, chemical, and mining industries
- Food and energy systems
- Agriculture
- Military and defense

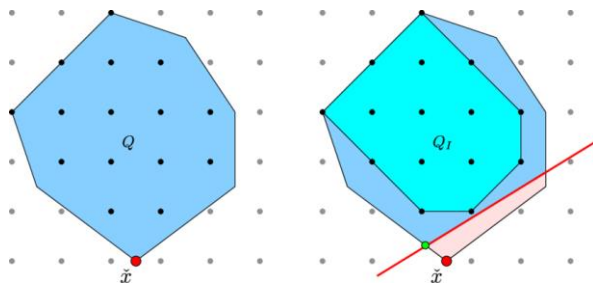


**This course will study modeling and advanced solution techniques to solve integer, mixed integer, and combinatorial optimization problems. SIGN UP FOR THIS COURSE TO LEARN MORE!**

## Modeling

Use integer programming to model complex systems using **real-world** data, and solve them using some optimization software

- Traveling salesperson and vehicle routing problems
- Knapsack and multiple knapsack problems
- Assignment and matching problems
- Covering, node packing, and bin packing problems
- Facility location, fixed charge, and network problems

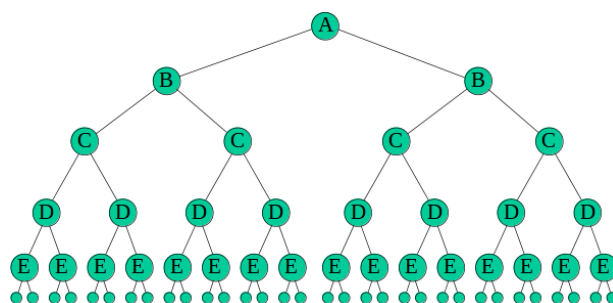


## Integer Programming Theory

- Why are integer programs *NP*-complete?
- Polyhedral theory, valid inequalities, and facet defining inequalities
- Cutting planes for integer programming
  - Disjunctive, Chvatal Gomory, and mixed integer rounding cuts
  - Cover, superadditive and modular arithmetic cuts

## Advanced Algorithms

- Branch and bound/cut algorithm
- Search strategies and variable selection techniques
- Hyperplane and polyhedra branching
- Column generation and decomposition methods
- Dynamic programming and heuristic algorithms



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**For More Information:**

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