
ECE6095: CAD Algorithms

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University of Connecticut



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Course Details

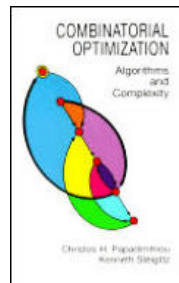
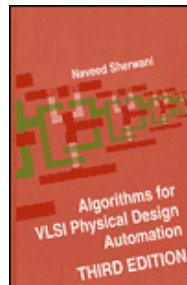
- Instructor:
 - Mohammad Tehranipoor
- Office: ITE 441
- Email: tehrani@engr.uconn.edu
- URL: <http://www.engr.uconn.edu/~tehrani>
- Phone: 860-486-3471
- Office hours: W 3-4pm or by appointment

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Text Books

- Sherwani. N., Algorithms for VLSI Physical Design Automation, Kluwer Academic Publishers, 1999.
- C. H. Papadimitriou and K. Steiglitz, Combinatorial Optimization: Algorithms and Complexity, Dover Publications, Inc., 1998.



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References

- Sadiq M. Sait and Habib Youssef, *VLSI Physical Design Automation: Theory and Practice*, IEEE Press, 1995.
- Sadiq M. Sait and H. Youssef, *VLSI Physical Design Automation: Theory and Practice*, World Scientific, 1999.
- M. Sarrafzadeh and C. K. Wong, *An Introduction to VLSI Physical Design*, McGraw Hill Publications, 1996.
- Technical papers.

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Course Website

- <http://www.engr.uconn.edu/~tehrani/teaching/cad/index.html>
- **Frequently check the course webpage for announcements and postings.**

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What is CAD Algorithms Course about?

- Aimed for those who want broad exposure to the physical design automation, optimization techniques and data structures inside modern VLSI design tools.
- Many of the leading edge CAD algorithms are built upon optimization techniques which will be introduced in this course.
- The applications of these techniques will be described through realistic VLSI CAD problems, especially VLSI physical design automation algorithms.

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Cont.

- Physical design automation related issues for the current state of the art will familiarize students with existing techniques in VLSI design.
- Students will understand the relationships between optimization techniques and various constraints posed by VLSI fabrication and design technology.
- The key goals of this course are to prepare students for design and development of CAD tools and for research in physical design automation of VLSI systems.

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What is CAD Alg. Course **NOT** about?

- It's not a circuits class--although we will mention circuits a few times.
- It's not a digital design class or VLSI design class, in the sense that we design a system or a chip.
- Instead, we design software for CAD tools.
 - But it's not a course on algorithms only either.

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Topics To Be Covered

■ Introduction to Optimization Techniques

- Linear and Nonlinear Programming
- Branch and Bound
- Divide and Conquer Algorithms
- Greedy and Heuristic Algorithms
- Simulated Annealing
- Genetic Algorithm
- Spanning and Steiner Trees

Cont.

■ Introduction to Physical Design Automation

- Design and Fabrication of VLSI Devices
- Fabrication Process and its Impact on VLSI Design
- Logic and Circuit Partitioning
- Floorplanning and Pin Assignment
- Placement
- Routing
- Compaction
- Physical Design Automation of FPGAs

Assignments

- Assignments will be individual responsibility.
- Sharing thoughts and discussions on assignments are encouraged.
- Sharing answers, programs or part of program is considered cheating.
- Cheating will be an automatically FAIL (no exceptions, no withdrawals).
- Assignments:
 - ~ 5 homeworks
 - Final project

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Grading

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| ■ Class Participation, In-class Exercise | 5% |
| ■ Homework Assignments/Project | 55% |
| ■ Midterm Examination | 40% |

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Examination

- Comprehensive
- Exam will be closed book and closed note.
- The exam will be held almost at the end of the semester
- The exact date and time will be posted soon.