

CSE 6140/ CX 4140:

Computational Science and Engineering

ALGORITHMS

Instructor: Anne Benoit

Visiting Associate Professor, CSE

Based on slides by Bistra Dilkina

- **Computational Science & Engineering (CSE) Algorithms**
- Designing algorithms for computational science & engineering applications:
 - Algorithm design
 - Proofs of correctness
 - Complexity analysis
 - Experimentation
 - Optimization
- Background/Prerequisites:
 - Data structures and elementary algorithms such as Breadth First Search
 - Familiarity with writing formal proofs: discrete math
 - Programming in one of C/Java/Python

Wide range of applications of Algorithms

- Data analysis
 - Clustering
- Databases
 - Queries
- Social Network Analysis
 - Centrality measures, recommendation, information diffusion
- Circuit Design
 - Every electronic device you use
- Computer Networks
- Scheduling & Resource Allocation
 - Timetabling (your classes and exams)
- Transportation
 - Routing, network design
- Computational biology
 - Genome sequencing, protein folding
- Computational physics & chemistry
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- Greedy
- Divide-and-conquer
- Dynamic programming
- Network flow
- Intractability: no known polynomial time algorithm
- Coping with intractability: intelligent search, approximation & heuristics
- Develop critical thinking, problem-solving & rigorous analysis skills, as well as skills in implementation and empirical analysis of algorithms

- This course includes four sections
 - CX 4140 (Undergraduates)
 - CSE 6140A (Graduate Students)
 - CSE 6140Q (Distance Learning)
 - CSE 6140Q3 (Distance Learning Lorraine campus)

- Waitlists
 - Oversubscribed
 - Please remove yourself from the waitlist if class not needed
 - Email Nirvana Edwards <cse-advisor@cc.gatech.edu> ONLY IF you are
 - PhD student in CSE
 - MS student that needs this course to graduate THIS FALL
 - Give your GTid and reason

Course Staff

- Instructor: Prof. Anne Benoit (abenoit6)
- Office: Klaus 1341
- Office hour: Tue 1:20-2:20pm in Klaus 1335
- TA: Amrita (agupta375)
 - T 10, R 10
- TA: Patrick (plavin3)
 - M 2, W 1
- TA: Eisha (enathan3)
 - T 4, R 4
- TA: Caleb (dcrobins)
 - M 8.30, F 8.30
- TA: Harsh (harshs27)
 - W 11, F 2
- TA: Ruomeng (ruomengxu)
 - M 12, F 12

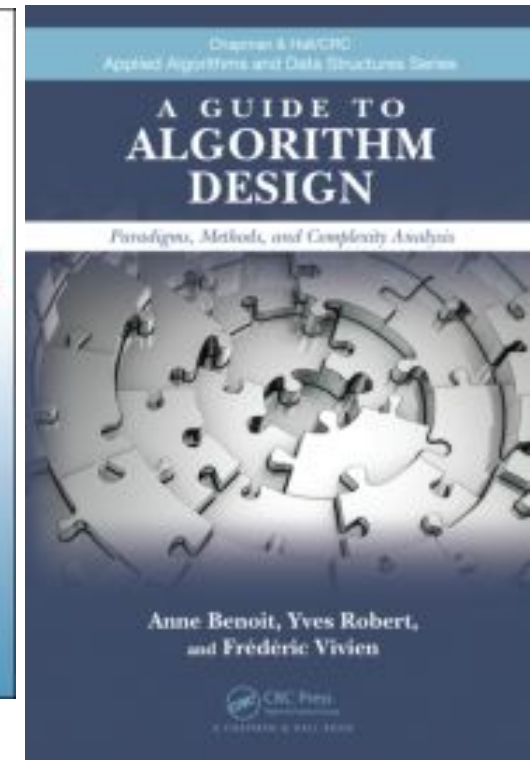
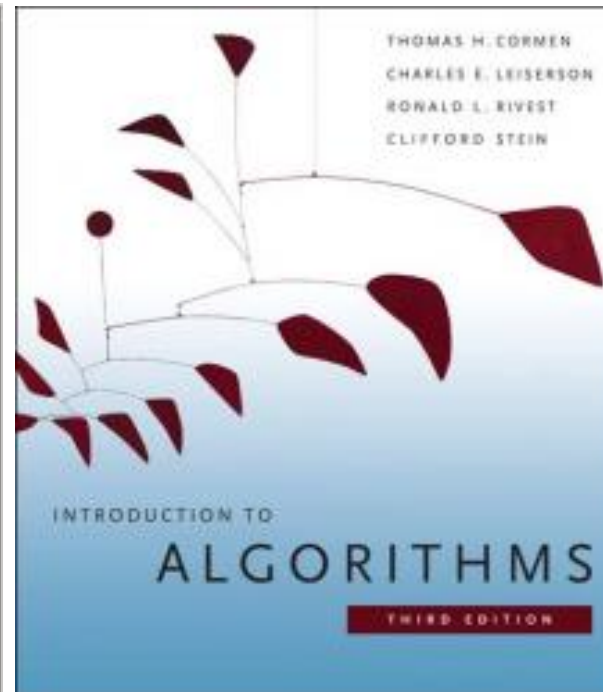
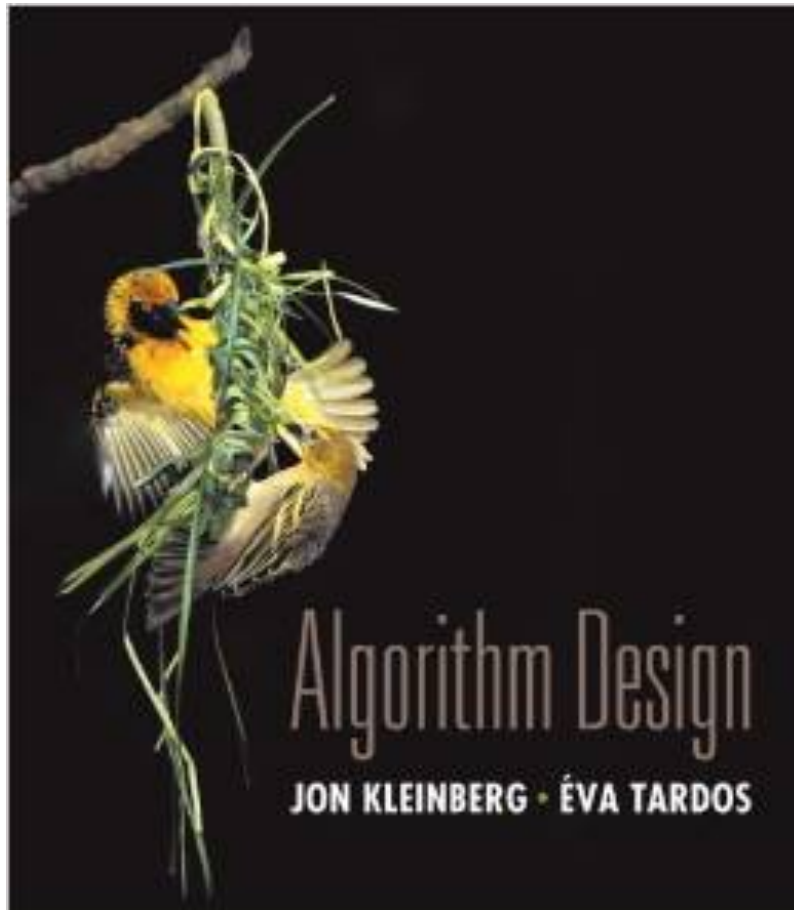


Emails: @gatech.edu

Course Details

- Web page:
 - <http://graal.ens-lyon.fr/~abenoit/CSEAlgo17>
- T-square:
 - Syllabus
 - Slides
 - Assignments
 - Emails
 - Grades

Textbooks in bookstore, library, eBook:



Course Grading

- 5% Participation
 - Attendance is expected
 - No use of cellphones!
 - Laptops strongly discouraged, allowed only for taking notes
- 20% Homeworks (5)
 - Proofs & implementation
- 25% Midterm (Oct 5)
- 25% Project (Dec 5)
- 25% Final (Dec 8)

Collaboration on homework

- Can form study group of up to 3 students
 - Study group must work on each problem jointly
 - Each student must write up solutions individually
 - Must acknowledge all collaborators
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- Course materials are always permitted
 - No external resources, e.g., Google
 - You are encouraged to attend office hours as needed
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- Late homeworks will not be accepted without a legitimate excuse and approval from the instructor. Due by 6PM on the given due date.

Where to get help

- Textbooks
 - “Algorithm Design” by Kleinberg and Tardos
 - Should be in bookstore
 - Other recommended books
- Piazza
 - Link provided next week
 - By students for students
 - Mindful of **not revealing homework answers** on piazza
- Office hours
 - Every day of the week

Background Evaluation Quiz