

Algorithms (22C:031)
(Required: Computer Engineering Track)

Catalog Description:

Algorithm design techniques (divide and conquer, dynamic programming, greedy) and analysis techniques (big O notation, recurrence); sorting (merge sort, heapsort, and quicksort), searching (B-trees, AVL trees or red black trees, hashing); basic graph algorithms (depth-first and breadth-first search, minimum spanning trees, shortest paths); NP-completeness.

Pre(co)requisites:

22C:021 [P] and 22M:025 [P] or 22M:031 [P]

Textbook:

J. Kleinberg and E. Tardos, Algorithm Design. Addison Wesley. 2006

References:

None

Topics (Class Hours):

- | | |
|----------------------------|--|
| 1. Algorithm analysis (6) | 5. NP and computational intractibility (6) |
| 2. Greedy algorithms (6) | 6. Local search (6) |
| 3. Divide and conquer (6) | 7. Randomized algorithms (6) |
| 4. Dynamic programming (6) | 8. In class exams (3) |

Laboratory Projects:

None

Class/Laboratory Schedule:

Three 50-minute lectures per week

Writing Assignments and Oral Presentations:

None

Design Component:

Students do homework problems requiring the design of algorithms to solve various computational problems

Contribution to the Requirements of Criterion 5:

Engineering topics: 3 s.h.

Course Goals: Basis for Assessment and Mapping onto Outcomes

Course Goal	Basis For Goal Assessment	Supports ABET Outcomes
1. The students will learn techniques for analyzing the time and space efficiency of algorithms and programs.	Homework, exam problems	a(●), c(●), k(●)
2. The students will learn several important algorithm design strategies – greedy, divide-and-conquer, dynamic programming, randomization, and so forth.	Homework, exam problems	a(●), e(●), k(●)
3. The students will gain practical experience through design, analysis, implementation, and empirical evaluation of algorithms and programs for several problems.	Homework, exam problems	a(●), c(●), e(●), k(●)

◦ denote moderate contribution to the outcome; ● denote substantial contribution to the outcome

Performance Criteria:

Instructor completes a Course Outcome Rating (COR) that quantitatively evaluates student performance for each course goal-related outcome using a standard scale (4.0 = outstanding ability; 3.0 = good ability; 2.0 = adequate ability; 1.0 = poor ability; 0.0 = no ability). Instructor chooses appropriate graded course artifacts (homework questions, exam questions, etc) for each outcome rating. COR scores below 2.5 are indicative of problems with meeting course goals/outcomes and COR scores below 2.0 indicate failure to adequately meet course goals/outcomes.

Prepared By:

Jim Cremer (January, 2008)