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Proposal to PSA

Executive Short Course on
Design and Analysis of Algorithms

Course Objectives

- To provide a basic understanding of algorithms design and analysis to 15-25 PSA non-CS grads (grads are assumed to be from a related discipline such as Math, Engineering or IT).
- By the end of the course, participants are expected:
 - to know the fundamental computational problems underlying many practical planning and operational problems faced by PSA today
 - to learn the major algorithmic paradigms, and to design algorithms in pseudo-code according to those paradigms
 - to be familiar with techniques involved in analyzing algorithms
 - to have an appreciation of the inherent computational complexity of practical problems, and to know how to cope with them from the Computer Science perspective

Course Schedule

A four-day course is proposed as follows:

S/N	Date	Topic	Remarks
1	5 Jun (AM)	Introduction Classical Algorithms (i.e. sorting and searching)	2 hour teaching 1 hour practice session
2	5 Jun (PM)	Divide and Conquer	2 hour teaching 1 hour practice session
3	12 Jun (AM)	Dynamic Programming	2 hour teaching 1 hour practice session
4	12 Jun (PM)	Greedy Algorithms	2 hour teaching 1 hour practice session
5	19 Jun (AM)	Graph Algorithms (i.e. graph searching, shortest paths, MST, TSP)	2 hour teaching 1 hour Case study: Berth Allocation
6	19 Jun (PM)	Introduction to Computational Complexity and the theory of NP-Completeness	2 hour teaching 1 hour practice session

		Exact Methods (branch and bound)	
7	26 Jun (AM)	Heuristic Methods (i.e. construction heuristic, local search)	2 hour teaching 1 hour Case study: Route Optimization
8	26 Jun (PM)	Recent advances in Algorithmic research (meta-heuristics, constraint programming, approximation algorithms, etc) Conclusion	2 hour teaching 1 hour practice session

Proposed Programme:

S/N	Time	Activity
1	9:00-10:30	Interactive Teaching
2	10:30-11:00	Tea Break
3	11:00-11:30	Interactive Teaching
4	11:30-12:30	Practice Session
5	12:30-14:00	Lunch Break / Informal Discussion
6	14:00-15:30	Interactive Teaching
7	15:30-16:00	Tea Break
8	16:00-16:30	Interactive Teaching
9	16:30-17:30	Practice Session

Equipment Required

- 1 LCD Projector
- 1 OHP Projector
- 1 Whiteboard and 1 set of 4-color markers
- Seminar materials for the participants (to be prepared by PSA)
- 5 boxes handwriting transparencies and sufficient sets of OHP markers (for participants)
- Sufficient sets of notepads (for participants)
- Room setup: clusters of 4-5 participants