

Subject Description Form

Subject Code	COMP6701
Subject Title	Advanced Topics in Computer Algorithms
Credit Value	3
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil.
Objectives	To introduce students various advanced computer algorithm design techniques.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) know a variety algorithm design and analytical techniques (b) apply the learnt techniques to solve various computational problems
Subject Synopsis/ Indicative Syllabus	<ol style="list-style-type: none">1. Techniques for Exact Algorithms<ul style="list-style-type: none">○ branch and bound○ dynamic programming2. NP-Completeness and Approximation Algorithms<ul style="list-style-type: none">○ introduction of complexity classes○ polynomial-time reduction○ proving for approximation ratio○ hardness of approximation3. Heuristics Approaches<ul style="list-style-type: none">○ local search, tabu search, genetic algorithm○ swarm algorithms4. Randomized Algorithms<ul style="list-style-type: none">○ expected time complexity, error probability○ techniques for designing randomized algorithms○ analysis of randomized algorithms5. Online Algorithms<ul style="list-style-type: none">○ competitive ratio○ techniques for designing online algorithms○ analysis of online algorithms
Teaching/Learning Methodology	The concepts will be disseminated through lectures. Tutorials will be used to do exercise. Exercises, assignments, and the final exam will contain various computational problems and students will need to apply their knowledge to solve them.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
			a	b			
	1. Assignments	60	✓	✓			
	2. Final Exam	40	✓	✓			
	Total	100 %					
	<ul style="list-style-type: none"> • Assignments: assessment of the theoretic studies with respect to the understanding of the relevant subject matters including new concepts, algorithms and techniques by proving answers to the assignment questions • Exam assessment of the overall performance by written report and oral presentation. 						
Student Study Effort Expected	Class contact:						
	▪ Lecture/Tutorial		39 Hrs.				
	Other student study effort:						
	▪ Self-study		83 Hrs.				
	Total student study effort		122 Hrs.				
Reading List and References	<ol style="list-style-type: none"> 1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. "Introduction to Algorithms", 3rd Ed, MIT Press, 2009. 2. Vijay V. Vazirani, "Approximation algorithms", 1st Ed, Springer, 2001. 3. Stefan Edelkamp and Stefan Schrod, "Heuristic search theory and applications", 1st Ed, Elsevier/Morgan Kaufmann, 2011. 4. Nadia Nedjah, Luiza de Macedo Mourelle, "Swarm Intelligent Systems, Studies in Computational Intelligence", Volume 26, 2006. 5. Rajeev Motwani and Prabhakar Raghavan. "Randomized algorithms, 1st Ed, Cambridge University Press", 1995. 6. Amos Fiat, Gerhard J. Woeginger, "Online algorithms: the state of the art", 1st Ed, Springer, 1998. 						