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) critically evaluate the literature of advanced algorithms (b) demonstrate a comprehensive understanding of advanced algorithm design and analysis techniques (c) design advanced algorithms for problems in one's research area
Subject Synopsis/ Indicative Syllabus	1. Techniques for Exact Algorithms o branch and bound o dynamic programming 2. NP-Completeness and Approximation Algorithms o introduction of complexity classes o polynomial-time reduction o proving for approximation ratio o hardness of approximation 3. Heuristics Approaches o local search, tabu search, genetic algorithm o swarm algorithms 4. Randomized Algorithms o expected time complexity, error probability o techniques for designing randomized algorithms o analysis of randomized algorithms 5. Online Algorithms o competitive ratio o techniques for designing online algorithms o 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.

<table>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="3">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1. Assignments</td><td>60</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Final Exam</td><td>40</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="3"></td></tr>
</table>

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.

</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture/Tutorial</td><td>39 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Self-study</td><td>83 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>122 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>

Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. “Introduction to Algorithms”, 3rd Ed, MIT Press, 2009.
Vijay V. Vazirani, “Approximation algorithms”, 1st Ed, Springer, 2001.
Stefan Edelkamp and Stefan Schrodl, “Heuristic search theory and applications”, 1st Ed, Elsevier/Morgan Kaufmann, 2011.
Nadia Nedjah, Luiza de Macedo Mourelle, “Swarm Intelligent Systems, Studies in Computational Intelligence”, Volume 26, 2006.
Rajeev Motwani and Prabhakar Raghavan. “Randomized algorithms, 1st Ed, Cambridge University Press”, 1995.
Amos Fiat, Gerhard J. Woeginger, “Online algorithms: the state of the art”, 1st Ed, Springer, 1998.

</td></tr>
</table>