### Subject Description Form

<table>
<thead>
<tr>
<th><strong>Subject Code</strong></th>
<th>COMP6701</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subject Title</strong></td>
<td>Advanced Topics in Computer Algorithms</td>
</tr>
<tr>
<td><strong>Credit Value</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Level</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Pre-requisite / Co-requisite/ Exclusion</strong></td>
<td>Nil.</td>
</tr>
</tbody>
</table>

**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**

1. Techniques for Exact Algorithms
   - branch and bound
   - dynamic programming
2. NP-Completeness and Approximation Algorithms
   - introduction of complexity classes
   - polynomial-time reduction
   - proving for approximation ratio
   - hardness of approximation
3. Heuristics Approaches
   - local search, tabu search, genetic algorithm
   - swarm algorithms
4. Randomized Algorithms
   - expected time complexity, error probability
   - techniques for designing randomized algorithms
   - analysis of randomized algorithms
5. Online Algorithms
   - 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.
<table>
<thead>
<tr>
<th>Assessment Methods in Alignment with Intended Learning Outcomes</th>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>a</td>
</tr>
<tr>
<td>1. Assignments</td>
<td>60</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. Final Exam</td>
<td>40</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
<td></td>
<td></td>
</tr>
</tbody>
</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.

### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
<th>39 Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture/Tutorial</td>
<td></td>
</tr>
</tbody>
</table>

Other student study effort:

<table>
<thead>
<tr>
<th>Self-study</th>
<th>83 Hrs.</th>
</tr>
</thead>
</table>

Total student study effort: 122 Hrs.

### Reading List and References