***Algorithms and Data Structures***

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| *SMS Code* | IN711001 | *Directed Learning hours* | 60 |
| *Level* | 7 | *Workplace or Practical Learning hours* | 0 |
| *Credits* | 15 | *Self-Directed Learning hours* | 90 |
| Prerequisites | IN610001 or IN628001 | *Total Learning Hours* | 150 |
| *This course partially replaces IT324001*  *Name of other Programme: Bachelor of Information Technology (version 2)* | | | |

***Aims***

To acquaint students with the wide variety of algorithms and data structures required for complex software development, to develop their programming technique to an advanced level, and to train them to analyse the efficiency and correctness of a computational solution.

***Learning Outcomes***

At the successful completion of this course, students will be able to:

1. Generate correct and formally efficient algorithms for complex programming problems.
2. Evaluate and choose appropriate data structures for complex programming problems.
3. Design and implement significant programs under the principles defined above.

***Indicative Content***

* General role and range of computational problem solving
* Algorithmic approaches (e.g. greedy, brute force, stochastic)
* Basic algorithmic efficiency (Big-Oh) analysis
* Recursion
* Classes of abstract data types, with implementation and sample applications including
  + Linear (stacks, queues)
  + Hierarchical (trees)
  + Connected (graphs)
* Assorted algorithmic techniques including
  + Varieties of search, sort and other data manipulation incl. hashing
  + Encryption, cryptography and other symbol manipulation
  + Stochastic computation
  + Modelling and simulation

***Assessment***

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| **Assessment Activity** | **Weighting** | **Learning Outcomes** |
| Practical Tasks | 20% | 1,2,3 |
| Software Projects | 70% | 1,2,3 |
| Theory exam | 10% | 1,2 |

***Resources***

* Appropriate IDE
* System documentation
* Appropriate texts

**Required:**

No required text, students will be directed to online materials.