1.	Name of Course/Module	Discrete Structures
2.	Course Code	TDS1191
3.	Status of Subject	Core for B.IT Security Technology
4.	MQF Level/Stage	Bachelor Degree – MQF Level 6
5.	Version (state the date of the last Senate approval)	June 2012
6.	Requirement for Registration	None
7.	Name(s) of academic/teaching staff	Ong Lee Yeng Chin Yong Jian Goh Pey Yun
8.	Semester and Year offered	Trimester 1 (Beta Level)

9. Objective of the course/module in the programme :

The primary goal of this course is to provide an introduction to discrete structures for information technology. Discrete structures is the study of the logical and algebraic relationships between discrete objects. The focus will be on Set theory, Logic, Functions, Induction and recursion, Elementary algorithm analysis, Counting techniques Counting techniques, Relations, Graphs, Trees, Algebraic structures and finite automata.

10. Learning Outcomes :

At the completion of the subject, students should be able to:

LO1: Relate computing theory with applications. (Cognitive, Level 4)
LO2: Apply the knowledge of abstraction required in computing. (Cognitive, Level 3)
LO3: Analyse and distinguish constructs of Graph Theory. (Cognitive, Level 4)
LO4: Generalise the concepts of Boolean Algebra in various computing areas. (Cognitive, Level 2)
LO5: Explain and design Finite State Machines. (Cognitive, Level 5)

11. Synopsis:

The major areas of study include: Set theory, Logic, Functions, Induction and recursion, Elementary algorithm analysis, Counting techniques, Relations, Graphs, Trees, Algebraic structures and finite automata.

Bidang pengajian utama merangkumi set teori**,** kalkulus perusulan, kalkulus predikat, induksi dan rekursi, graf, set dan hubungan, fungsi.

12. Mapping of Subject to Programme Outcomes :

Programme Outcomes	**% of Contribution**
PO1: Apply soft skills in work and career related activities	50.00
PO2: Demonstrate knowledge and understanding of fundamental concepts, principles and best practices	50.00

13. Assessment Methods and Types :

	Method and Type	Description/Details	Percentage
	Test 1 & 2		30.00%
	Weekly Assessment	Quizzes/ Homework/ Assignments	20.00%
	Final Examination		50.00%

14. Details of Subject

Topics	Mode of Delivery	
	Lecture	Tutorial
1. Logic and Proofs Proposition; Truth tables; Implication and equivalence; Tautology; Consistency and Contradiction; First order logic; Quantifiers; Resolution; Proof techniques.	5	2
2. Sets, Relations and Functions Review of set theory; Binary relations; Composition of relations; Equivalence Relations and partitions; Partially ordered sets and lattices, Hasse diagrams; Functions, Injection, surjection and bijection; Composition of functions.	5	2
3. Induction and Recursion Principle of mathematical induction; Recursive definitions; Introduction to primitive Recursive functions.	4	2
4. Introduction to Algorithms Characteristics of an algorithm; Euclidean algorithm and its analysis; Recursive Algorithm; Introduction to complexity of an algorithm.	4	1
5. Combinatorics Basic counting techniques; Permutations and combinations; elementary probability; Inclusion-exclusion principle; Binomial methods; Ordered and unordered partitions; Pigeonhole principle.	4	1
6. Graph Theory Directed and undirected graphs and their matrix representations; Eulerian paths and Cycles; Hamiltonian paths and cycles; Trees; Binary tress , Binary search trees and tree traversals; Proving properties of graphs using mathematical induction.	6	2
7. Algebraic Structures Introduction to algebraic structures, Semigroups; Groups and subgroups; Elementary Theory of coding; Homomorphism and Isomorphism of groups; Lagrange'theorem; Rings, integral domain and fields.	4	1
8. Boolean Algebra Basic circuits and theorems; Boolean expressions; Logic gates and realization of Boolean functions.	4	1
9. Introduction to Finite Automata Sequential circuits; regular expression and finite-state machines; Deterministic and non-deteministic finite automata, and their relationship.	6	2

<table>
<tr><td></td><td colspan="2">Total</td><td>42</td><td>14</td></tr>
<tr><td>15.</td><td colspan="4">Tutorials
• Implementation of lecture materials through exercises</td></tr>
<tr><td rowspan="8">16.</td><td>Total Student Learning Time (SLT)</td><td>Face to Face (Hour)</td><td colspan="2">Total Guided and Independent Learning</td></tr>
<tr><td>Lecture</td><td>42</td><td colspan="2">42</td></tr>
<tr><td>Tutorials</td><td>14</td><td colspan="2">14</td></tr>
<tr><td>Test 1 & Test 2</td><td>3</td><td colspan="2">15</td></tr>
<tr><td>Final Exam</td><td>2</td><td colspan="2">20</td></tr>
<tr><td>Weekly Assessment</td><td>10 times</td><td colspan="2">10</td></tr>
<tr><td>Sub Total</td><td>61</td><td colspan="2">101</td></tr>
<tr><td>Total SLT</td><td colspan="3">162/40 = 4.05 => 4</td></tr>
<tr><td>17.</td><td colspan="2">Credit Value</td><td colspan="2">4</td></tr>
<tr><td rowspan="2">18.</td><td colspan="4">Reading Materials :</td></tr>
<tr><td colspan="2">Textbook</td><td colspan="2">Reference Materials</td></tr>
<tr><td colspan="2">1. W.K.Grassmann and J.P.Tremblay, “Logic and Discrete Mathematics- A Computer Science Perspective”, Prentice-Hall, 1998.</td><td colspan="2">1. R. Richard Johnsonbaugh, “Discrete Mathematics”, Prentice-Hall, Inc., 2009.
2. Kenneth Rosen, “Discrete Mathematics and Its Applications”, 6th edition, McGraw-Hill, 2007.
3. Kenneth H. Rosen, “Discrete Mathematics and Its Applications with Student Solutions Guide”, sixth Edition, McGraw-Hill 2007.
4. John K. Truss, “Discrete Mathematics For Computer Scientists”, Addison Wesley, 1991.
5. K.A.Ross and C.R.B.Wright, “Discrete Mathematics, 5/E”, Prentice-Hall, 2003.
6. Robert J. McEliece et. al.: “Introduction to Discrete Mathematics”, McGraw-Hill, 1989.
7. John A. Dossey, “Discrete Mathematics, 5/E”, Harper Collins, 2005.
8. B. Kolman and R.C. Busby, “Discrete Structures for Computer Science, 3rd Edition”, PHI, 1996.
9. James L.Hein, “Discrete Structures, Logic, and Computability”, Jones and Bartlett Publishers, USA, 2009.
10. Susanna S. Epp, “Discrete Mathematics with Applications, Second Edition”, Brooks/Cole Publishing, 2003.</td></tr>
<tr><td>19.</td><td colspan="4">Appendix (to be compiled when submitting the complete syllabus for the programme) :
1. Mission and Vision of the University and Faculty
2. Mapping of Programme Objectives to Vision and Mission of Faculty and University
3. Mapping of Programme Outcome to Programme Objectives
4. Programme Objective and Outcomes (Measurement and Descriptions)</td></tr>
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