

SUMMARY OF INFORMATION ON EACH COURSE

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|-----|--|--|-------|-----|-----|-----|-----|-----|-----|-----|
| 1. | Name of Course | Computational Science | | | | | | | | |
| 2. | Course Code | TCS2241 | | | | | | | | |
| 3. | Status of Course [Applies to (cohort)] | Specialisation Core for B.IT (Hons) Artificial Intelligence | | | | | | | | |
| 4. | MQF Level/Stage Note : Certificate – MQF Level 3 Diploma – MQF Level 4 Bachelor – MQF Level 6 Masters – MQF Level 7 Doctoral – MQF Level 8 | Bachelor – MQF Level 6 | | | | | | | | |
| 5. | Version (State the date of the Senate approval – history of previous and current approval date) | Date of previous version : - Date of current version : June 2014 | | | | | | | | |
| 6. | Pre-Requisite | TCP1121 Computer Programming | | | | | | | | |
| 7. | Name(s) of academic/teaching staff | Ong Lee Yeng, Tan Shing Chiang | | | | | | | | |
| 8. | Semester and Year offered | Trimester 2, Year 2 | | | | | | | | |
| 9. | Objective of the course in the programme : | The subject is intended to introduce applications and computations in operations research. | | | | | | | | |
| 10. | Justification for including the course in the programme : | Many situations in real life can be formulated as a decision-making problem of which its solution can answer questions such as what are the decision alternatives, under what constraints a decision is made, what is the objective criterion to evaluate the decision alternatives. This subject provides fundamental concepts, knowledge and computational methods of operations research. Students will learn computational aspects of solving a problem. They will analyse requirements for designing a mathematical model for an application. | | | | | | | | |
| 11. | Course Learning Outcomes : | Domain | Level | | | | | | | |
| | LO1: Apply the principles of linear programming modelling and/or sensitivity analysis for an application. | Cognitive | 3 | | | | | | | |
| | LO2: Compute solutions using transportation and/or network models. | Cognitive | 3 | | | | | | | |
| | LO3: Compute solutions using inventory models. | Cognitive | 3 | | | | | | | |
| | LO4: Apply classical optimization theory to solve a problem. | Cognitive | 3 | | | | | | | |
| 12. | Mapping of Learning Outcomes to Programme Outcomes : | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 |
| | Learning Outcomes | | | | | | | | | |
| | LO1 | | X | X | | | | | | |

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|-----|--|--|---|-----|-----|------------------|------------|-----|--|
| | LO2 | | X | X | | | | | |
| | LO3 | | X | X | | | | | |
| | LO4 | | X | X | | | | | |
| 13. | Assessment Methods and Types : | | | | | | | | |
| | Method and Type | | Description/Details | | | | Percentage | | |
| | Quiz | | Written quiz in the class | | | | 10% | | |
| | Assignment | | Written report, group project, with teamwork scores | | | | 15% | | |
| | Test | | Written examination | | | | 25% | | |
| | Final Examination | | Written examination | | | | 50% | | |
| 14. | Mapping of assessment components to learning outcomes (LOs) | | | | | | | | |
| | Assessment Components | | LO1 | LO2 | LO3 | LO4 | | | |
| | Test | | 25 | 25 | 25 | 25 | | | |
| | Assignment | | 15 | 15 | 15 | 15 | | | |
| | Quiz | | 10 | 10 | 10 | 10 | | | |
| | Final Examination | | 50 | 50 | 50 | 50 | | | |
| 15. | Details of Course | | | | | | | | |
| | Topics | | | | | Mode of Delivery | | | |
| | | | | | | Lecture | | Lab | |
| | 1. Introduction Overview of the operations research modeling approaches. | | | | | 1 | | 0 | |
| | 2. Modelling with Linear Programming Two-variable linear programming (LP) model, graphical LP solution, selected LP applications | | | | | 3 | | 4 | |
| | 3. The Simplex Method and Sensitivity Analysis LP model in equation form, transition from graphical to algebraic solution, the Simplex method, artificial starting solution, special cases in the Simplex method, sensitivity analysis | | | | | 6 | | 6 | |
| | 4. Transportation Model and Its Variants Definition of the transportation model, non-traditional transportation models, the transportation algorithm, the assignment model. | | | | | 4 | | 4 | |
| | 5. Network Models Minimal spanning tree algorithm, shortest route problem, maximal flow model, critical path computation, PERT networks. | | | | | 4 | | 4 | |

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| 6. Inventory Models General inventory model, role of demand in the development of inventory models, static economic order quantity (EOQ) models, dynamic EOQ models, stochastic models. | | 4 | 4 |
| 7. Classical Optimization Theory Unconstrained problems, constrained problems, non-linear programming. | | 4 | 2 |
| Total | | 24 | 24 |
| Total Student Learning Time (SLT) | | Face to Face / Guided Learning | |
| | | Independent Learning | |
| Lecture | 24 | 24 | |
| Laboratory/Practical | 24 | 12 | |
| Presentation | 1 | 2 | |
| Assignment | - | 10 | |
| Quiz / Homework (2 times) | - | 2 | |
| Mid Term Test | 1 | 3 | |
| Final Exam | 2 | 15 | |
| Sub Total | 52 | 68 | |
| Total SLT | | 120 | |
| 16. | Credit Value | 3 | |
| 17. | Reading Materials : | | |
| | Textbooks | | |
| | Hamdy A. Taha (2013). Operations Research: An Introduction (9 th ed.). Pearson. | | |
| | Reference Material (including 'Statutes' for Law) | | |
| | 1. Barry Render, Ralph M. Stair Jr., Michael E. Hanna (2012). Quantitative Analysis for Management (11 th ed.). Pearson. | | |
| | 2. Frederick S. Hillier (2014). Introduction to Operations Research (9 th ed.), McGraw-Hill Higher Education. | | |

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Appendix (to be compiled when submitting the complete syllabus for the programme) :

1. Mission and Vision of the University and Faculty
2. Programme Objectives or Programme Educational Objectives
3. Programme Outcomes (POs)
4. Mapping of POs to the 8 MQF domain
5. Summary of the Bloom's Taxonomy's Domain Coverage in all the Los in the format below :

| Subject | Learning Outcomes (please state the learning Outcomes) | Bloom's Taxonomy Domain | | |
|---------|---|-------------------------|-----------|-------------|
| | | Affective | Cognitive | Psychomotor |
| ABC1234 | Learning Outcome 1 | | | |
| | Learning Outcome 2 | | | |
| | Learning Outcome 3 | | | |
| | Learning Outcome 4 | | | |
| DEF5678 | Learning Outcome 1 | | | |
| | Learning Outcome 2 | | | |
| | Learning Outcome 3 | | | |
| | Learning Outcome 4 | | | |

6. Summary of LO to PO measurement
7. Measurement and Tabulation of result for LO achievement
8. Measurement Tabulation of result for PO achievement