Pre-Requisite Modules code(s)	*Co-Requisite Modules code(s)*	*ECTS Credits*	*Module Code*	*Module Title*
Mathematics I		*5*	*CMPU2012*	*Mathematics II*

8.2.1. Mathematics II

Module author: Shane Mulligan.

Module Description:

This is a second module in mathematics, to give the student a broad range of basic mathematical skills, and a good knowledge of how they are applied in various areas of computing and computer science. Their application to various areas in computing such as data security, computer networks and artificial intelligence will be demonstrated.

Module aim

The aim of this module is to give the student the necessary knowledge and competence to deal with mathematical concepts and problems that arise in computer science.

An emphasis will be given to relating the mathematical concepts to their particular application areas.

It will give the student an understanding of discrete mathematics, and demonstrate the applicability of the various branches of discrete mathematics to computing. It will present mathematics as an exact science, and train the student to think logically, and express themselves clearly.

Learning Outcomes

On completion of this module, the student will be able to:

- Perform number theory calculations, and relate them to data security techniques.
- Demonstrate the application periodic functions in data communication.
- Use predicate logic to represent real-life situations, e.g. represent sentences, and draw logical conclusions.
- Define functions and demonstrate their applications in computing.
- Calculate probabilities of events, end expectations of random variables. Apply the tools of probability to solve problems in computing, e.g. analysis of algorithms.
- Describe queuing theory and its application to networks.
- Define graphs, their properties and their various applications in computing.

Learning and Teaching Methods:

The learning and teaching methods will consist of lectures and tutorials. Exercises and continuous assessments will be given to ensure that the student understands and masters the material, and to give them practice at representing and solving simple problems. Tutorials will give the student the opportunity to consider particular problems, or to clarify difficult concepts. Computer based methods may also be used for assessment.

Pre-Requisite Modules code(s)	*Co-Requisite Modules code(s)*	*ECTS Credits*	*Module Code*	*Module Title*
Mathematics I		*5*	*CMPU2012*	*Mathematics II*

Module content:

More Number Theory : Modular arithmetic, discrete logarithms, application to encryption.

Predicate logic. Predicates, quantifiers, use in data representation and deductive reasoning.

Functions: Hash functions, random numbers, iteration.

Periodic functions: maths for networks, waves, frequency domain, Fourier components.

Probability and statistics. Probability spaces, independence and dependence, repeated trials, random variables, expectation, probability distribution.

Queuing theory. Principles and application to networks.

Graph theory. Paths, cycles, special graphs, graph algorithms.

Module Assessment

The Module assessment will be by written Examination (70%), and Continuous Assessment (30%).

Essential Reading: (author, date, title, publisher).

Seymour Lipschutz, Marc Lipson, 1997, Schaum's outlines Discrete Mathematics 2nd Edition, McGraw-Hill.

Kenneth H. Rosen, 2003, Discrete Mathematics and its Applications, 5th Edition, McGraw-Hill.

Supplemental Reading

Murray R Spiegel, Larry J Stephens, 1999, Schaum's outlines Statistics 3rd Edition, McGraw-Hill.

Web references:

http://webcourses.dit.ie

and Lecturer's web page.

Further Details:

4 contact hours per week. To be delivered in one semester.

2 hours lecture and 1 hour tutorial.

Date of Academic Council approval ……