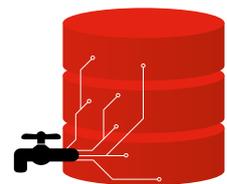


CTI Higher Certificate in Information Systems (Open Source)



Module Descriptions 2015

Higher Certificate in Information Systems (Open Source)

(1 year full-time, 2½ years part-time)

Computer Literacy - Open Office

Module description

This module provides the student with the knowledge of computers and the skills required for working with computers.

We are living an age where it is necessary to be computer literate and an understanding of computers plays a vital role in the world of technology. In this course students will be introduced to and helped to improve their knowledge of computer technology. This knowledge will enable students to excel in the use and understanding of computer concepts. Learning different concepts in regard to the computer will also enable the student to know and use different functions that are provided to computer users. They will learn how to send messages and make use of the Internet and securely use the computer without causing harm to their own or others' computers.

Students will be able to create documents using the Writer program included in the OpenOffice.org suite. This is similar to the Word program in the Microsoft Office suite. The Writer program enables the user to edit any document. The Calc program enables students to produce calculations in tidy, professional spreadsheets.

The Impress program is used to create presentations. On completion of this course a student will be able to create and present their presentation using Impress. Students will acquire skills that will enable them to edit the data and format of the presentations. They will also be able to save information accurately and in a structured format using the Base program.

Processing and Logic Concepts

Module description

This module lays the foundation for understanding the logic concepts on which computer programming is based. The module concentrates on six key areas in particular, namely: number system, logic concepts, decision tables, system flowcharts, program flowcharts, and pseudocode.

The first section will introduce students to different number systems where they will apply their knowledge to convert from one number system to another, as well as perform basic addition and subtraction using numbers from different number systems. They will gain an overview of how the computer performs arithmetic operations, and when to use the one and two's complement.

Logic concepts will give students an understanding of logic symbols and ways that these logic symbols can be incorporated into electronic circuits in the form of logic gates which can be further represented in the form of truth tables. The module also includes Boolean equations and the ability to draw logic diagrams from these equations. De Morgan's Theorem and Karnaugh maps are used for proving and simplifying Boolean expressions. Using these logic concepts students will learn how to construct decision tables, as well as the concept and function of system flowcharts.

The final section of the module focuses on the ability to write and understand the logic of pseudocode as a means of outlining and converting a programming problem into an easily readable solution that can be applied to any high-level programming language.

Program Design

Module description

The aim of this module is to provide students with an understanding of the concepts of a computer program and how to write and analyse the structure of simple sequential programs in pseudocode. Program control statements are identified, explained and implemented in constructing simple programs with the help of one-, two-, and three-dimensional arrays. Simple sort algorithms using arrays are also taught and depicted in pseudocode. The concepts of file handling, or the opening and closing of files and how they are coded in pseudocode specifically, are also explained. The student is given practice in writing pseudocode with the help of exercises before undertaking similar questions in a test environment.

Object Analysis and Design

Module description

The aim of this module is to introduce students to business process modelling, the role of the object analyst, and the different stages in the systems development life cycle. This includes a discussion of the different charts, diagrams (e.g. Gantt charts, context diagrams), and tools described in the Unified Modelling Language (UML) that can be used in the analysis and design of a system.

The students are then given a practical introduction to UML for use as a tool in the systems development process. More specifically, students will familiarise themselves with use cases and scenarios, identify different actors that play a role in a system, and learn how to draw use case diagrams. The module also explores the use of state, sequence, collaboration, activity, and deployment diagrams.

Database Design Concepts

Module description

Database systems are at the core of any business organisation. The demand for more complex data structures is ever increasing as applications become ever more sophisticated. The use of databases is therefore fundamental to the development of any significant information system.

The aim of this module is to provide students with an essential basic knowledge of database systems which will enable them to design and implement effective relational database solutions. These skills will allow students to become efficient database developers or administrators using good practices and techniques. This module focuses on systems analysis, entity relationship diagrams, data normalization, and mapping a database's design to tables.

MySQL Development

Module description

The aim of this course is to show students how to make use of MySQL as an open source database system to create a database and interact with it. MySQL includes the use of a SQL server, client programs for accessing the server, administrative tools, and a programming interface for writing your own programs.

Students will be introduced to core MySQL scripts used for creating a database and how to implement them. Students will make use of MySQL scripts to add tables to the database; these tables are created with certain constraints such as primary keys, foreign keys, etc.

The student will make use of MySQL scripts to insert data into the tables that were created. Detailed explanations are given to demonstrate how to query information from the database, as well as how to update, delete and modify information in a table. Students will understand how the MySQL database functions within various platforms such as PHP, C++ and Python.

MySQL Administration

Module description

The aim of this course is to show students how to make use of MySQL Administration to manage the MySQL open source database. MySQL includes the use of various responsibilities which are used in administering a MySQL installation.

Students will be introduced to various MySQL components to run the MySQL server, general MySQL administration, MySQL data directory for securing the database once it is installed, MySQL maintenance, access control and security of MySQL for maintaining the content of the database.

The student will make use of MySQL Administration responsibilities to ensure the contents of database are secure so that data can be accessed by only those who have the proper authorization. Students will also learn how to handle various problems and how to prevent them from occurring. Creating a database backup, as well as data recovery and server replication will also be taught.

XML Technologies

Module description

The aim of this module is to introduce students to the concepts around which XML is based. It looks at the purpose and origin of eXtensible Markup Language (XML) as well as the practical applications.

Students will understand that XML is a subset of SGML (Standard Generalized Markup Language). It is a 'metalanguage' (a language for describing other languages). XML allows you to define your own markup language for limitless types of documents, hence the name eXtensible Markup Language (XML). XML is a project of the World Wide Web Consortium (W3C). XML has all the power of SGML, but does not use the more complex features. It has a more clearly defined syntax and structure, making it easier to learn and to use. XML is a powerful technology that is used to define your own custom markup language which can be understood by computers and people. It is used as a way to structure, store, and pass information between applications.

Students are shown how XML documents must be well-formed and validated using a Document Type Definition (DTD), an XML Schema, or Relax NG. Since XML is primarily concerned with the structuring of data this module covers how XML is displayed in web pages using Extensible Style Language Transformation (XSLT), Cascading Style Sheets (CSS), and Extensible Stylesheet Language Formatting Objects (XSL-FO). The module also covers the use of asynchronous JavaScript and XML (AJAX), XQuery, Document Object Model (DOM), Really Simple Syndication (RSS), as well as Scalable Vector Graphics (SVG).



Main Programming Language

Module description

Java (JVTAC and JVTBC)
or PHP (PHPAC and PHPBC)

Linux Operating System

Module description

This module is aimed at teaching the basic principles of using the Linux operating system to run applications and manage files.

The module begins with a brief look at the history of Linux and the background of the Ubuntu distribution, to help the student understand the nature and spirit of the operating system, and then introduces the student to using Linux through a Graphical User Interface. Although the interface resembles the Windows desktop in many ways, a look behind the scenes at the underlying Linux file system will uncover some of the main differences between Linux and Windows as an introduction to the Linux command line interface. This is where the true nature and power of Linux is revealed.

Linux Administration

Module description

This module is based on Ubuntu Linux. The growth in use and popularity of the Linux operating system means that Information Technology (IT) engineers need more than a user's knowledge of the Linux operating system.

This module aims to give students a deeper grasp of the administrative issues involved in maintaining a Linux system. This starts with the installation of Linux and many of the basic administrative tasks needed to manage a simple Linux system along with the users of the system. Realising that a Linux machine will usually be connected to a network, the module includes the basic tasks surrounding network connectivity and getting printers connected and working. Connectivity between the Windows and the Linux operating systems, setting up a firewall and writing simple shell scripts will also be covered.

Linux Server Administration

Module description

The aim of this module is to teach the student how to perform various management tasks on the Ubuntu Linux Server operating system. Fast changes in network and server technology and its importance have led to a high demand for skilled server administrators who can manage and maintain network environments of different sizes and levels of complexity. In larger organisations this may be the role of the Information Technology (IT) services department but in smaller and medium-sized organisations, this role may be taken by a single server administrator with a wider set of responsibilities. These responsibilities would include the planning for installation, deployment, monitoring and maintaining the server environment to ensure continuity and high availability for the network.

Server administrators conduct management tasks both remotely and locally by using administration tools. A server administrator's primary tasks include: managing Ubuntu server and client operating systems, managing the network, setting up various network services; profiling and monitoring assigned servers and troubleshooting infrastructure and services.

This hands-on module is designed for individuals with computer hardware and networking experience who wish to further their skills in the installation, configuration and administration of computer networks and the Ubuntu server operating system. It is particularly beneficial to those students who wish to pursue a career in IT positions such as Linux Systems Administrator and Network Administrator.

2nd Programming Language - Basic Python Programming

Module description

This module provides a student with the understanding of how to program using Python. This module is aimed at teaching the student how to create applications using the Python programming language. Students would gain an understanding of Python's interpreter. Variables and constants/literals are also discussed, and the differences between them. The data types are discussed in detail, for example how to define data types, and identifying appropriate data types to use. Operators and their uses are taught with the aim to provide the student an opportunity to manipulate an operator's default function.

The student gains an understanding of regular expressions, and how to use regular expressions to change or find certain criteria. A look at object-orientated programming in Python is also covered in this module. This involves classes, data structures, and exception handling. This guide will also enable a student with the knowledge of web based programming. MySQL is also covered in this study guide. This teaches a student to incorporate MySQL databases into Python programs.

Final Practical Exam - Open Source

Three-day final component may include

- Database – All MySQL concepts are tested, as well as normalisation
- Full Language – Main programming language concepts, covered in modules 1 to 6, are tested
- Linux Final – Covers Linux Operating System, Linux Administration & Linux Server Administration