

CTI Short Learning Programme in Internet Development Specialist

Module Descriptions 2015



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(10 months full-time, 25 months part-time)

Computer Literacy

Module description

Knowing how to use a computer has become a necessity for many people. In order for the student to know how to use a computer, students need to understand some fundamental concepts for example; what contributes to making the computer run and operate correctly. This module introduces the computer and how it functions to students. Students will gain a thorough understanding of information and communication. Students will understand the fundamental principles of the internet and email concepts.

Word processing involves creating and editing text documents. The student will be introduced to the concepts of word processing and will understand and use a spreadsheet to organise data and present information.

Students will understand the concepts of databases and students will discover many ways in which they can, for example, sort data and represent it in a report. Students will be introduced to the concepts of presentations and understand and learn how to create a new presentation, and how to add images, charts and objects to a presentation. Students will also learn how to apply animation and transition effects to make a presentation come to life.

Processing and Logic Concepts

Module description

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

The first section will introduce students to different number systems; they will apply their knowledge to convert from one number system to another and 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's and two's complements.

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, and be introduced to the concept and functions 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 modeling, the role of the object analyst, and the different stages in the systems development lifecycle. This includes a discussion of the different charts, diagrams (Gantt charts, context diagrams) and tools described in the Unified Modeling 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.

Using SQL

Module description

The aim of this module is to introduce students to the basic database concepts as well as a practical approach to data manipulation. The course starts off with the fundamentals of a database. From there on, the concepts of creating a database table are covered as well as populating and implementing functions of a database. These concepts are: Creating and manipulating tables where the student is taught how to create tables from an ER (entity relationship) diagram, as well as how to alter the created tables. These tables are created with certain constraints such as primary keys, foreign keys, check constraints and unique constraints. The module then looks at how to insert data into the tables.

Detailed explanations and exercises are given to demonstrate how to query information (i.e. retrieve information) from a database. Certain data is selected from a table as well as inserting selected data in another table. The module also explains how to update and delete information in a table. The data manipulation is achieved through the use of the INSERT INTO, UPDATE and DELETE FROM statements. There are a few extras including retrieving data, sorting data, data filtering, aggregate functions, and joins which are all used to either retrieve or update data in a database. These are all explained to give the database and functions an edge.

At the end of the course, students will have to incorporate the concepts taught into various exercises and a theoretical exam.

Web Design

Module description

The aim of this module is to show students how to create an entire application that can be deployed over the Web. The Flash authoring environment is used to develop Flash applications. Students will gain knowledge of how the authoring environment and its components function and how to develop dynamic websites. Students will create and use graphics, symbols, text, animation, sound and video, and learn how to add interaction to their Web applications.

Students will also understand how forms are created and how to send information from one page to the next. Flash uses ActionScript to add functionality to Web pages; students will understand and use ActionScript to make their Web pages functional. Students will also understand how Flash applications are loaded, optimised, and published into HTML format. Students will also create a MP3 player that makes use of an XML file and use ActionScript to read in the XML file. Stop, play, and pause functions will also be added to the MP3 player's functionality.

Creating Web Pages

Module description

The aim of this module is to show students how to create an entire application that can be deployed over the Web. Creating web pages makes use of technologies such as Hypertext Markup Language (HTML), Extensible Hypertext Markup Language (XHTML), HTML5, CSS3, and JavaScript to develop dynamic web pages. Students will gain an overview of some of the current technologies used on the internet and the role of the World Wide Web Consortium (W3C). Students will gain knowledge of how HTML and its components combined produces dynamic websites.

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 XML as well as the practical 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 XSL-FO. The module also covers the use of AJAX, XQuery, DOM, RSS, as well as Scalable Vector Graphics (SVG).

JVTAC (Basic Java Programming)

Module description

The first section introduces students to the basic concepts of Java. This section will cover the basic data structures that Java uses and the fundamental concepts of object-oriented programming.

The second section covers the Graphical User Interface in Java and looks at how Swing components in Swing containers using custom layout managers can be used to create Graphical User Interfaces. The ability to attach events to components enables functionality to be added using the Event Delegation Model and AWT Components as well as writing an application in a threaded environment. This section also looks at how to write a basic applet/application that makes use of images and animation, and the HTML code necessary to run an applet in a browser.

The third section covers advanced Java language features such as exceptions and how to handle them, the Collections framework and Collections hierarchy, how to use Sets, Maps, and Lists, regular expressions and what they are used for as well as how to use the various Pattern and Matcher classes. Students will also look at Java packages and classes including how access modifiers work, how they influence programs, and how to use packages and organise programs. The final part of the section looks at Java Beans and what they are used for, and which development tools are used to create Java Beans.

JVTBC (Advanced Java Programming)

Module description

This module builds on the Java Part 1 course. Students will be introduced to two Java Enterprise Edition technologies, namely: JavaServer pages and Web Services. Students will also learn how to develop mobile applications for use on Android mobile devices. In the first part of the course students will combine a wide variety of Web-related technologies to develop dynamic Web-based applications, using Java Servlets, Java Beans, and JavaServer pages. Students will learn all the basic techniques and elements used in JSPs, and will also learn how to write their own JSP custom tags, and how to display records from databases to JSPs.

There has been a big move away from applications that run off one computer, with all the components and resources on that one computer, to a distributed application environment. With the boom of connections to the Internet these applications do not have to be local to your network. The student will be introduced to Web Services. The second part will guide the student towards creating Web Services by using technologies such as JAX-RPC, JAXP, and RESTFUL Web Services.

This final part will focus on using Eclipse to build applications for use on wireless devices. The student will learn how to build graphical wireless applications, implement input and output operations, and how to enable wireless devices to access remote resources such as the Internet.

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 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.

Personal Skills Development

Module description

Personal skills development implies the professional and personal growth in knowledge and skills. Personal skills development embraces a whole range of practical and transferable skills that can be applied within higher education and the workplace. The aim of this module is to allow students to discover their own personal skills and to develop them so that they can be used throughout various tasks or phases in their lives. Students will identify inherent transferable skills and will be able to apply these in different scenarios.

Students will be able to improve their own learning, be involved with team work and be more capable of solving problems through the use of case studies, role-play and real-life activities. This module can be taught traditionally or integrated within other module on the programme. The rationale behind this module is to enable students to have exposure to softer skills that are critical in the work place and higher education. This module attempts to encapsulate a range of key and common skills and deliver this information in a dynamic learning environment.

The concept of group work, or teamwork, will be discussed. Students will become familiar with group dynamics and formal, as well as informal, roles that the individual plays within a group. Problem solving is another topic that will be explored in this module. The steps of solving a problem and the resultant decision making processes will be evaluated and implemented in an assignment. Lastly, students will review their own learning experience and monitor their growth over a period of time. Students are encouraged to research relevant topics to gain a better understanding of this field.

Students will have to incorporate their knowledge into a theory-based examination. The theory will be written at the end of the module. This will test the student on the content of the module. Students may be asked to draw diagrams according to a given scenario.

Internet Development Project

Module description

Students will develop a Web site that will use Java, JSP, HTML, Java Mail, Flash, XML, Delivering Web Services, and a database. An application server namely Tomcat or the Sun Java System Application Server is used to run the project. Through this project, students will incorporate everything that they learned throughout the courses. This project will also require user documentation. The user documentation will consist of author details, installation, design and any extra relevant information.

Final Practical Exam

Two-day final component may include

- 1st Language – Main language concepts, covered in modules 1 to 6, is tested
- Java, Creating Web Pages & XML

