

POSTGRADUATE INSTITUTE OF SCIENCE UNIVERSITY OF PERADENIYA



POSTGRADUATE DIPLOMA IN INFORMATION TECHNOLOGY (IT) 2010/2011

1. INTRODUCTION

Technology is becoming an essential tool in education. Among many, Information Technology (IT) is playing a vital and significant role in education. As such educators' literacy in IT is of paramount importance for introducing new teaching and learning paradigms.

The programme covers the essential area of IT useful for educators and web designers and focuses on training personnel in the core concepts of IT linked with education technology or web design and development.

2. OBJECTIVES OF THE PROGRAMME

The objective of this programme is to provide a thorough understanding of the information systems and technologies applicable to education and web designing. At the completion of this course, candidates will be able to effectively use IT as a tool in the process of education and web designing as well as other applications.

3. PROGRAMME ELIGIBILITY

Applicants should possess a bachelor's degree from a recognized university preferably in sciences or in a related area or equivalent qualification acceptable to the PGIS. Eligibility of candidates is determined according to the performance at an aptitude test and an interview.

4. PROGRAMME FEE

(N.B. The Programme fees given below may be revised.)

	Programme Fee
Local candidates	Rs. 70,000/-
SAARC countries	US \$ 2300/-
Other countries	US \$ 5600/-

Programme fees shall be paid in two installments (*50% at the registration and the balance 50% within six months from registration*). Other payments including registration fee, medical fee, library subscription, examination fee and deposits (science and library) should be paid according to the procedure stipulated by the PGIS.

5. THE PROGRAMME STRUCTURE AND DURATION

The Postgraduate Diploma in Information Technology (PG. Dip. in IT) programme will be conducted on a course unit basis. This is a full time programme consisting of coursework.

After being admitted to the programme, each student will be assigned to an academic advisor, whose advice should be sought when planning the Diploma Programme. English will be the medium of instruction.

Course work will be conducted over a period of two semesters of 15 – weeks each (*during weekends and/or weekdays*). Satisfactory completion of a minimum of 24 credit units of course work is required to qualify for the Diploma in IT. The programme is structured into three stages as follows.

- I. Beginners who commence with little or no programming experience must successfully complete the three **preliminary courses**.
- II. All students must complete all the five **compulsory core courses**.
- III. Students must complete five approved **elective courses** according to their interest in one of the following specialties:
 - (i.) *IT for Education*
 - (ii.) *IT for Web Design and Development*

Programme Summary

<i>Course Code</i>	<i>Course Title</i>	<i>Lecture hrs.</i>	<i>Practical hrs.</i>	<i>No. of Credits</i>
Preliminary Courses				
SC 404	Introduction to Mathematics	15	0	1
SC 405	Introduction to Computers	10	10	1
SC 406	Introduction to Programming	10	10	1
Semester I (Core Courses)				
SC 561	Computer Application Fundamentals	30	30	3
SC 562	Programming Principles	30	30	3
SC 563	System Analysis and Design	25	10	2
SC 564	Introduction to Database Systems	15	30	2
SC 565	Computer Architecture	30	-	2
Semester II (Elective Courses)				
SC 566	Communication Networks	30	-	2
SC 567	Educational Technologies	30	30	3
SC 568	Research Methodology	20	20	2
SC 569	Advanced Programming Techniques	30	30	3
SC570	Implementation of Database Applications		60	2
SC 571	Document Markup Languages	30		2
SC 572	Web Page Construction		60	2
SC 573	Software Design and Development	30		2
SC 574	Mini Project in Computer Science		90	3
SC 575	Programming Web Applications	30	30	3
SC 576	Web Servers and Web Technologies	20	20	2

6. PROGRAMME CONTENT

SC404 - Introduction to Mathematics

Sets, Set operations, Relations and Functions, Graphs, Recurrence relation, Greatest common divisor, Fibonacci numbers, Counting rules, Pascal's triangle, Binomial theorem, Probability, Boolean algebra.

SC405 - Introduction to Computers

Evolution of computers, Personal computers: basic components, their functionality and assembling a PC, Computer networks: introduction and advantages over PCs, Internet: email, MSM messenger and web browsing.

SC406 - Introduction to Programming

Basic component of a programming language, syntax and semantics, compilers and interpreters, basic data types, operators, identifiers, control structures: sequential, selective and repetitive structures, compiling and executing programs, introduction to object oriented programming.

SC 561 - Computer Application Fundamentals

Introduction to Computer Systems: Basic concepts of computer system, History of computer, Types of computer, Main parts of personal computer and their functions, Software

Word Processing: Overview, Facilities available in word processing software, add remove tool bars, Managing files, Create, open and rename files, Editing and formatting, Cut, copy and paste, font formatting, paragraph formatting and bullets and numbering, Tables, Adding and formatting tables, Page setup and printing, Paper size, orientation and margins, Page numbering and print setup, Tools, Spell checker and mail merge, Help.

Spread Sheet: Overview, Identifying cell, work sheet, name box, formula box and tool bars, Entering Data, Three kinds of data(Text, values and formulae and functions) Working with different formulae and functions, Custom lists, Formatting, Formatting cells, rows and columns, Custom formatting and conditional formatting, Protection, Protecting a work book, work sheet and a part of a work sheet, Charts, Adding and formatting charts, Macros, Creating and storing macros

Presentation: Views and design templates, Identifying various views (Normal, Slide sorter and slide show view). Using various design templates, Drawings and Diagrams, Inserting drawing objects (Auto shapes, curves and lines) and pictures, Charts, animations, slide transition and background formatting Formatting slides, Adding charts to the presentation, Setting animations and slide transition, Present Presenting the slide show, Publishing the show on the web.

Web Page Designing: Web Page Designing, Create a Web page for you. Creating a Web site with banner ads and counting number of hits to the page and periodicity.

References:

1. The Complete Guide to Microsoft Office- Ron Mansfield

SC 562 - Fundamentals of Programming

Basic Concepts: The structure & definition of a HLL such as C, the concept of Data types and operation on data types. Structured Programme Development: Problem definition and specification, top-down design and development, Coding guidelines & standards in developing commercial application systems.

Writing a complete program: Sequential, alternation, and repetition control structure: formatted and unformatted basic input output, Modular structure programme modules in C, functions.

Pointers: Pointers concept, operations on pointers and usage of pointers. Array processing Character and string processing. Simple sorting and searching algorithms Bubble sort, sequential and binary search.

File processing: File Definition; processing logic for sequential and random files. Classification of Data types and Data Structure, scalar and structured data types, static and dynamic structures. Testing of programme via both black box and white box testing techniques and system integration via bottom -up or top-down approach.

References:

1. Programming With C- Byron Gottfried (Schaum's Outline Series, 2nd Ed.)
2. How to Programme (2nd Ed.)- Deitel / Deitel, C (Prentice Hall, 1994)
3. Problem solving and Programming- Barclay, ANSI C (Prentice Hall, 1990)
4. The C Programming Language (2nd Ed.)- Kernighan / Ritchie (Prentice Hall, 1988)
5. Programming in ANSI C- E Balagurusamy

SC 563 - Systems Analysis and Design

Systems planning and the initial investigation. The process and stage of systems design. Define the purpose of each stage of Systems Development Life Cycle (SDLC). Use techniques and tools appropriate to each stage of systems analysis. File organization and data base design. Feasibility study. Cost/Benefit analysis. Describe the controls necessary to ensure the availability, integrity and privacy of computer systems. Implement a computer-based systems and software maintenance. Hardware/Software selection and the computer contract. Project scheduling and software. Security, Disaster/Recovery and Ethics in System Development.

References:

1. System Analysis and Design – Elias M Awad
2. System Analysis and Design : A case study Approach – Robert J. Thierauf

SC 564 - Introduction to Databases

Basic Database Concept; Communication with Database System; Introduction to Database Management System, Relational Database Model; Structured Query Language; Relational Database Design and Normalization; Transaction processing, Database Indexing and sorting.

References:

1. A First Course in Database Systems- Ullman, J.D. & Widom, J. (1997) (Prentice-Hall)
2. Database System Concepts - Korth, H.F & Silberschatz, A (1991) (McGraw -Hill, 2nd ed)

SC 565 - Computer Architecture

Combinational logic networks, Computer arithmetic; arithmetic/logic unit, Sequential logic networks, Memory hierarchy, CPU design, I/O architecture, Instruction sets, addressing modes, linking and loading, Subroutines, ALU design, Basic processor design, Basic pipelining, Memory hierarchy design, Input/output, Parallel processing.

References:

1. Hennessy and Patterson, Computer Organization and Design: the Hardware/Software Interface
2. Morgan Kaufmann. M. M. Mano and C. R. Kime, Logic and Computer Design Fundamentals, 1997, Prentice Hall.

SC 566 - Communication Networks

Network: Definition of network, Importance and types of network, OSI Model of Networking. LAN, MAN, WAN: Definition and Their Features, Topologies (Star, Bus & Ring), Transmission Media & Communication Channels, Communication Techniques. Server, Workstation, File Server, Application Server, Connectors & Cabling Systems, HUB, Switch, Router, Modem, Network Interface Card. Network Operating System, Different Types of Protocol-TCP/IP, IPX/SPX, NetBEUI.

Internet: Introduction and Origin of Internet, Internet Architecture, Client Server Basics, Bridge, Gateway, IP Protocol & IP Address, Internet Control Protocols, Domain Name System (DNS) & Name Servers, TCP/IP, Electronic Mail, Telnet, FTP, Archie, Gopher, Jughead, Veronica, WAIS, WWW, Search Engine, HTTP, HTML, URLs, VSAT Web Page, Browsing.

References:

1. Computer Network- Andrew S. Tanenbaum
2. Data & Computer Communication- William Stallings
3. Local Area Network- S.K. Basandra
4. Computer Networks and Internet- Douglas E. Comer (3rd edition)
5. Mastering Internets – Coleman/Dyson

SC 567 - Educational Technologies

Educational technology in context, the big picture, planning and implementation for effective technology integration, learning theories and integration model, using instructional software in teaching and learning, using productivity software and other software tools in learning and teaching, using multimedia and hypermedia in teaching and learning, distance learning opportunities and options, integrating the Internet into education, a link to the future where is education is going with technology, technology in language arts and foreign language instruction, technology in science and mathematics instruction, technology in social study instructions, technology in art and music instruction, technology in physical education and health, technology in special education

References:

1. M.D. Roblyer and Jack Edwards, “Integrating Educational Technology into Teaching”, Second Edition, Prentice Hall 2000.

SC 568 - Research Methodologies

Resource finding, Statistical/data analysis, Surveys, Semi-structured Interviews, Observations, Case Studies, Ethnographic studies, In-depth Interviews, Focus groups, Content Analysis, Action research, Personal reflections, Participant Observations, Technical writing, Conducting presentations, Interactive methods of teaching science using computer.

SC 569 - Advanced Programming Techniques

Java Basics, Constructor and Visibility, Extending Classes and Arrays, Exceptions and Nested Classes, Input and Output, JFC and Swing, JDBC, XML and Java, Servlets, JSP, and Beans, Web Service.

References:

1. Deitel and Deitel. "Java - How to Program", Addison-Wesley Press, Reading, Mass., 1998,
2. David Flanagan. "Java in a Nutshell (Java 1.1)" , Second Edition, O'Reilly and Associates Publishing, Sebastopol, CA, 1997.
3. David Flanagan. "Java Examples in a Nutshell (Java 1.1)", O'Reilly and Associates Publishing, Sebastopol, CA, 1997.
4. David M. Geary."Java - Mastering the AWT (Java 1.1)", SUN Soft Press Publishing, Mountain View, 1997.
5. <http://www.sun.com>

SC 570 - Implementation of Database Application

RDBMS Programming with ACCESS and MySQL: Introduction to SQL, Benefit of SQL, Running SQL commands, Creating Database and Tables, Adding Data, Deleting Data, Updating Data, Altering Tables, Select Statements, Relational Operators and Constraint, Inner Joins and Outer Joins, Aliases and Synonyms, Built-in Functions, Creating Views, Database Sequences, Clauses, Index, Creating and Altering Table Space, Creating and Altering User, Granting and Revoking System Privileges and roles, Lock Table, Format Model.

Forms: Developer 2000, File Format, Object Navigator, Properties Window and Property Class, Master-Detail Relationship, Event Triggers and PL/SQL Blocks, Description and use of different Forms Items, Alters, Editors and Windows, Record Groups and LOVS, Menus and Transaction Processing, Images, Parameters and Controls, Database Triggers and Libraries. Report: Reports Style, The Reports Wizards, Modifying a Report, Report Templates and Storage, Queries and Groups in the Reports Data Model, Creating Columns in the Report Data Model, The Layout Model.

References:

1. A First Course in Database Systems- Ullman, J.D. & Widom, J. (1997) (Prentice-Hall)
2. Database System Concepts - Korth, H.F & Silberschatz, A (1991) (McGraw -Hill, 2nd ed)
3. An Introduction to Database Systems - C. J. Dates
4. Database Management System – Bernard A. Banet
5. SQL, PL/SQL- The Programming Language of ORACLE -Ivan Bayross (2nd Revised Edition 2001)
6. Developer 2000- The Programming Language of Oracle —Ivan Bayross (2nd Revised Edition 2001)

SC 571 - Document Markup Languages

Introduction to XML, Creation of XML Documents, DTDs, Namespaces and XML Schemas, Simple API for XML (SAX), Document Object Model (DOM), XLinks, Xpointers, Transformation of XML Documents – XSLT, Resource Description Framework – RDF, XML Applications.

References:

1. (IXML) Required/Optional: Inside XML Steven Holzner. New Riders 2001. ISBN: 0-7357-1020-1
2. (JXML) Optional: Java and XML, solutions to real-world problems, Brett Mc Laughlin O'Reilly 2001. ISBN: 0-596-00197-5

SC 572 - Web Page Construction

Introduction to Internet Programming., Client/Server model, Browsers-Graphical and Hypertext Access to the Internet, HTTP – Hyper Text Transfer Protocol, Creating Internet World Wide Web pages, HTML

– Hyper Text Markup Language, headers, body, html tags, tables, Text, graphics, sounds, video clips, multi-media, Client side image mapping, web page counters, HTML resources - html converters and tools, HTML forms programming, Building a form, Text fields and value, size, maxlength, html buttons, radio, checkboxes, prechecked, Selection lists, Introduction to CGI scripting, Action and Method - GET and POST, html form interface with cgi scripts, Automating processing such as info forms and email, Programming cgi interfacing via forms, Creating Interactive Executable Content, Advanced Java Programming, Graphic User Interface with AWT, AWT calls, Windows, dialog boxes, pop-up menus, Graphics, Using a Layout manager, Manipulating Images, Image animation, Threads - Process Management, Socket programming - client-server processing, URL Connections, Java Beans.

References:

1. Deitel and Deitel. "Java - How to Program", Addison-Wesley Press, Reading, Mass., 1998,
2. David Flanagan. "Java in a Nutshell (Java 1.1)" , Second Edition, O'Reilly and Associates Publishing, Sebastopol, CA, 1997.
3. David Flanagan. "Java Examples in a Nutshell (Java 1.1)", O'Reilly and Associates Publishing, Sebastopol, CA, 1997.
4. David M. Geary."Java - Mastering the AWT (Java 1.1)", SUN Soft Press Publishing, Mountain View, 1997.
5. Larry Wall and Randall Scharz. "Programming Perl", O'Reilly and Associates Publishing, Sebastopol, CA, 1994.
6. Scott Oaks and Henry Wong. "Java Threads", O'Reilly and Associates Publishing, Sebastopol, CA, 1997.
7. Gary Cornell, Cay Horstmann. "Core Java", SUN Soft Press Publishing, Mountain View, 1996.
8. S. Gundavaram. "CGI Programming on the World Wide Web", O'Reilly and Associates Publishing, Sebastopol, CA, 1996.

SC 573 - Software Design and Development

Software life cycle, overview of software engineering, classic life cycle model, project planning, requirement analysis, software design fundamentals, design techniques, validation and verification, cost estimation and testing.

References:

1. Pressman R. S. and Ince D, Software engineering: A practitioner's approach, McGraw-Hill, 2000.

SC 574 - Mini Project in Computer Science

Development of an information system by applying software engineering techniques, database concepts and web programming.

SC 575 - Programming Web Applications

Explores the use of scripting languages, such as Java Script, PHP, and Java Applets in web site development. Examines the use of relational databases to create dynamic web sites. Extensive exposure in lecture and lab to web based application development tools. Students will develop a full-featured web based interactive educational application.

References:

1. Benoit Marchal (1999/2001). XML by Example (1st or 2nd Edition). Que Publishers
2. Java 2 with Swing: Deitel and Deitel
3. Internet & World Wide Web How to Programme Second Edition 2002

SC 576 - Web Servers and Technologies

Introduction to Client Side Scripting, **Java Script:** JavaScript syntax, JavaScript object model, JavaScript objects, Static objects, Forms objects, Event handling - Mouse related events, Keyboard events, Document events, Output in JavaScript, Introduction to VB Script. **ASP.net:** Implement ASP.net with VBScript, Use SQL & ADO to Interact with ASP.net Databases, Write Cookies on the Client Using ASP.net, **J2EE - Java Enterprise Edition:** JDBC, JSP, Servlets, **Hypertext Preprocessor:** Program structure, Use php to process html forms, Regular expressions for form validation and other applications, Read and write files, Database applications. **XML:** Understand the role of XML, Write XSL Documents to Describe how XML Documents are to HTML, Create Simple DTD & Schema Files to Describe the Grammar of XML, Differences between DTD's & Schema, Differences between Cascading Style Sheets & XSL, **Other new trends in Web development:** Eg. SOAP, WSDL

References:

1. Java 2 with Swing: Deitel and Deitel
2. Benoit Marchal (1999/2001). XML by Example (2nd Edition) .Que Publisher Internet
3. World Wide Web How to Program Second Edition 2002 ISBN: 0130308978

7. PROGRAMME EVALUATION

1. Programme evaluation will be as stipulated in the PGIS handbook 2002.
2. Students registered for the diploma programme who achieve a GPA of 2.75 or better are eligible for the award of the Postgraduate Diploma in IT.
3. **Candidates whose GPAs are in the range of 2.50 to 2.74 may follow additional courses as recommended by the relevant Board of Study to improve their GPA.** The registration of students who do not show improvement after repeating courses is liable to cancellation.

8. TEACHING PANEL

- Dr. P. M. K. Alahakoon, *Dept. Agric. Eng., Faculty of Agriculture, Univ. Peradeniya*
B.Sc.Eng. (UPDN), M.Sc. (VPI & SU), Ph.D. (UMC)
- Mr. J. Amaarachchi, *Dept. of Statistics and Computer Science, Faculty of Science, University of Peradeniya*
B.Sc. (SJP), M.Sc. (UCMB), PgDipSc (Cant.)
- Prof. H. M. N. Bandara, *Dept. of Chemistry, Faculty of Science, University of Peradeniya*
B.Sc. (Cey.), M.Sc., Ph.D. (Ast.)
- Dr. F. M. R. Corea, *Price Water House Coopers Lanka (PVT.) Ltd., Colombo*
B.Sc.Eng (UPDN), Dip.Com.Sc. (Cambridge), Ph.D. (New Castle, Upon Tyne)
- Prof. M. A. K. L. Dissanayake, *Dept. of Physics, Faculty of Science, University of Peradeniya*
B.Sc. (Cey), M.S., Ph.D.(Indiana)
- Dr. A. U. A. W. Gunawardena, *Dept. Electrical and Electronic Engineering, Faculty of Engineering, Univ. Peradeniya*
B.Sc.Eng.Hons.(UPDN), M.Eng.Sc. (UNSW-AU), Ph.D. (UQ-AU)
- Mr. K. P. Jayasinghe, *Information Technology Center, University of Peradeniya*
B.Sc. (KLN), M.Sc. (U.K.)
- Dr. S. R. Kodituwakku, *Dept. Statistics and Computer Science, University of Peradeniya*
B.Sc. (UPDN), M.Sc. (AIT), Ph.D. (RMIT)
- Dr. K. M. Liyanage, *Dept. Electrical and Electronic Engineering, Faculty of Engineering and Information Technology Center, Univ. Peradeniya*
B.Sc.Eng. (UPDN), M.Eng. (U-Tokyo), D.Eng. (U-Tokyo)
- Dr. A. A. I. Perera, *Dept. Mathematics, Faculty of Science, Univ. of Peradeniya*
B.Sc. (UPDN), M. Sc. (Oslo), Ph.D. (Melb.)
- Mr. L. S. K. Perera, *Information Technology Center, University of Peradeniya*
B.Sc. (UPDN), M.Sc. (UPDN)
- Dr. D. N. D. Ramanayake, *Seylan Bank Ltd., Colombo*
B.Sc. (UPDN), M.Sc. (AIT), Ph.D. (Washington)
- Mr. L. Samaranyake, *Dept. of Electrical and Electronic Engineering, University of Peradeniya*
B.Sc.Eng.Hons. (UPDN), Tech.Lit. (KTH-Sweden)
- Mr. R. Weerasekera, *Dept. of Electrical and Electronic Engineering, University of Peradeniya*
B.Sc.Eng.Hons. (UPDN), M.Sc. (KTH-Sweden)
- Dr. J. Wijekulasooriya, *Dept. Electrical and Electronic Engineering, Faculty of Engineering, Univ. Peradeniya*
B.Sc. (UPDN), Ph.D. (Northumbria, UK).
- Mr. H. G. Wijewansa, *Computing Center, Faculty of Engineering, University of Peradeniya*
B.Sc. (UPDN), M.Sc. (UPDN)

9. PROGRAMME COORDINATOR

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