CURRICULUM/COURSE SYNOPSES

(i) CURRICULUM/COURSE SYNOPSIS FOR POST GRADUATE DIPLOMA

(a) Course Synopsis

The course is designed to provide the students with practical experience with models, techniques and tools from the forefront of the discipline that drive innovation in the design of software-based systems within this domain. The students will also learn the key skills of research, academic writing and project management required for study at PGD, masters and PHD levels. These skills are further developed and placed in the context of the dissertations. The development of transferable skills is core to the learning strategy of these programmes and is incorporated into work units and assessments.

(b) COURSE STRUCTURE

(i) Post Graduate Diploma in Information Technology - Outline of Course Structure

Course Code	Course Titles	Unit(s)	Status
1st Semester			
CSC 701	Computing Systems	2	C
CSC 703	Logic & Digital Circuit Design	2	C
CSC 705	Introduction to Software Engineering	3	C
CSC 707	Operating Systems	3	C
CSC 709	Database Management Systems	3	C
CSC 711	Research Methods in Computing	3	C
*	Elective	2	E
	Total Credit Units	**18**	
2nd Semester			
CSC 702	Data Structures and Algorithms	3	C
CSC 704	Programming Techniques	3	C
CSC 706	Computer Architecture	2	C

CSC 708	Network Design and Management	3	C
CSC 712	Internet Technologies	3	C
CSC 799	Research Project	6	C
*	Elective	2	E
	Total Credit Units	**22**	

ELECTIVES

Course Code	**Course Titles**	**Unit(s)**	**Status**
1st Semester			
CSC 721	Computer Graphics	2	E
CSC 723	IT Project Management	2	E
CSC 725	Programming in C++	2	E
2nd Semester			
CSC 722	Microprocessor Applications	2	E
CSC 724	Optimization Techniques	2	E
CSC 726	Compiler Design	2	E
CSC 728	IT Security Policies and Procedures	2	E

COURSE DESCRIPTION

FIRST SEMESTER

1st Semester

CSC 701: Computing Systems

This Computing Systems postgraduate degree will give you experience in the analysis, design and development of computing systems solutions relevant to a wide range of applications in industry and business. You will be able to devise multi-tasking software solutions using high-level languages to implement suitable architecture-software constraints for computer applications. You will develop project management skills that will allow you to effectively contribute to the creation and management of large computing projects and to appreciate the techniques employed in managing such projects.

If you're looking to work in computing and technology industries, this is a great fast-track

conversion course for graduates from disciplines unrelated to IT and computing. Throughout the course, you will acquire knowledge of computer technology, architecture and communications as a means to developing computer-based systems in industrial environments. The course offers an excellent combination of theoretical studies and practical experience through coursework assignments, software development and group projects culminating in a significant and practical Masters project individually tailored to meet your career aspirations.

CSC 703: Logic & Digital Circuit Design

Introduction to modern logic, digital circuit design, combinational logic, switch logic and basic gates, Boolean algebra, two-level logic, regular logic structures, multi-level networks and transformations, programmable logic devices, time response. Sequential logic, networks with feedback, basic latches and flip-flops, timing methodologies, registers and counters, programmable logic devices. Finite state machine design, concepts of FSMs, basic design approach, specification methods, state minimization, state encoding, FSM partitioning, implementation of FSMs, programmable logic devices. Elements of computers, arithmetic circuits, arithmetic and logic units, register and bus structures, controllers/ sequencers, microprogramming. Experience with computer-aided design tools for logic design, schematic entry, state diagram entry, hardware description language entry, compilation to logic networks, simulation, mapping to programmable logic devices. Practical topics, non-gate logic, asynchronous inputs and metastability, memories: RAM and ROM, Implementation technologies and mapping problems expressed in words to digital abstractions.

CSC 705: Introduction to Software Engineering

Agile Software Development: Introduction: Introduction and overview of various agile methods, such as eXtreme Programming (XP), Scrum, Feature-Driven Development, and Agile; Agile Development using XP: XP practices and tools. Test driven development (TDD); Tools and frameworks for testing and mocking, Pair Programming. Agile Development using Scrum: Scrum practices and tools, Continuous integration, Using ad extending frameworks, such as Spring, Refactoring, Comparisons of iterative development and architecture-centric/design-driven development methods, Maximizing reusability, extendibility, maintainability. Agile development using a dynamic language: Strengths and weakness of using dynamic languages in agile software development, Importance of TDD in software development using dynamic languages, Test coverage monitoring, Improving performance and quality. Introduction to Software Design: Elements of Software architecture, Fundamentals of Design

Patterns, Object Oriented analysis & Design, Design for re-use. Using APIS: API programming Class browsers and related tools, Introduction to Component-based computing; Software tools and Environment: Requirements analysis and design modelling Tools, Testing tools, Tool integration mech.

fundamentals of software architecture; Software architecture and quality requirements of a software system; Fundamental principles and guidelines for software architecture design, architectural styles, patterns and frameworks; Methods, techniques and tools for describing software architecture; Software architecture design and evaluation processes; Approaches and tools for designing and evaluating software architectures; Software Process Improvement; Fundamentals of software quality management: process; Software pattern; Software process

modelling; Software process improvement and assessment models; SPI and Cultural Change; Statistical process control. Software re-engineering configuration management; Formal specification; the Software Work Breakdown (WBS), Software Maintenance; development effort estimation; Performance Models, Optimal Performance, Sensitivity Analysis, Cost-Effectiveness Models; Software cost – estimation: COCOMO, Software patterns; Introduction to software quality; Software Quality Standards; Software Testing to Measure Software Quality; Software Testing of Web Applications; Software Quality Management; Software Quality Assurance; Software Quality Metrics; Measuring Software Quality; Software Quality System Implementation. Software testing fundamentals, testing types; Software testing techniques; levels of testing; Software testing for web applications; Defect analysis; test documentations, traceability matrices; testing estimation techniques.

CSC 707: Operating Systems

This course examines the important problems in operating system design and implementation. The operating system provides an established, convenient, and efficient interface between user programs and the bare hardware of the computer on which they run. The operating system is responsible for sharing resources (e.g., disks, networks, and processors), providing common services needed by many different programs (e.g., file service, the ability to start or stop processes, and access to the printer), and protecting individual programs from interfering with one another. The course will start with a brief historical perspective of the evolution of operating systems over the last fifty years and then cover the major components of most operating systems. This discussion will cover the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), and file systems; and on operating system support for distributed systems.

You will have an opportunity to learn a lot of practical information about how programming languages, operating systems, and architectures interact and how to use each effectively. This course is the first time you will learn about how concurrency and distributed systems communicate and work correctly.

CSC 709: Database Management Systems

The Database Management System course is designed to address new technologies, advanced theories, and techniques, along with their application, implementation, and integration with legacy systems. The program aims at equipping students with expertise in a range of highly marketable, hands-on skills required in data modelling. Students are also taught to develop advanced skills in designing, managing, monitoring, and administering corporate database systems divisions, information centers, and web-enabled database applications. It focuses on generating professionals in Database Systems to investigate new demands and the utilization of new innovations in the management of data and data assets, and inspect rising technologies forming the way data is presently handled, accessed, recovered, organized, and displayed.

CSC 711:Research Methods in Computing

This course will prepare students for advanced research by examining how to plan, conduct and report on empirical investigations. The course will cover techniques applicable to each of the steps of a research project, including formulating research questions, theory building, data analysis

(using both qualitative and quantitative methods), building evidence, assessing validity, and publishing. It will particularly focus on research involving software, developing statistical tools to measure software performance and the ways in which people interact with software tools.
ELECTIVES

CSC 721: Computer Graphics
The course introduces the basic concepts of computer graphics. It provides the necessary theoretical background and demonstrates the application of computer science to graphics. The course further allows students to develop programming skills in computer graphics through programming assignments. The course covers fundamental topics such as graphics representations and transformations, the viewing pipeline, visibility, lighting, and textures, as well as more advanced areas such as ray tracing and global illumination.

CSC 723: IT Project Management
The IT Project Management module, students will explore the stages of project development and will have the opportunity to learn to use project management tools, such as Gantt charts. They will also discover how deploying the appropriate team management skills can lead to a successful outcome. Finally, students will become familiar with factors that may pose as risks to the project, and quality standards that can be applied

CSC 725: Programming in C++
C++ is one of the most widely used programming languages for developing portable application software. This course introduces students to problem-solving and program development using objectoriented design, structured programming techniques, and the C++ programming language. Specific topics include data types, control statements, functions, argument passing, arrays, and strings. Students will design, construct, and test programs with primarily scientific, mathematical, and business applications.

SECOND SEMESTER

CSC 702: Data Structures and Algorithms
Primitive types, Arrays, Records Strings and String processing, Data representation in memory, Stack and Heap allocation, Queues, TREES. Implementation Strategies for stack, queues, trees. Run time Storage management, Pointers and References, linked structures.

CSC 704: Programming Techniques
The course covers: Fundamental computer concepts. Programming in a modern programming language. Data structures and classes. Problem solving by dividing the problem into sub-problems. Program structuring. Several small programming exercises and one larger, individual programming exercise with emphasis on structuring and specification of the modules being used.

CSC 706: Computer Architecture

Fundamental building blocks, logic expressive immunization, sum of product forms. Register transfer notation, Physical considerations. Data representation, and number bases, Fixed and Floating-point systems, representation memory systems organization and architecture.
Memory system, general; characteristics of memory operation. (Technology-magnetic recording semi-conductor memory, coupled devices, magnetic bubble). Memory addressing, memory hierarchy, virtual memory control systems. Hardware control, micro programmed control, Asynchronous control, i/c control. Introduction to the methodology of faulty tolerant computing.

CSC 708: Network Design and Management

Introduction, wares, Fourier analysis, measure of communication, channel characteristics, transmission media, noise and distortion, modulation and demodulation, multiplexing, TDM FDM and FCM Parallel and serial transmission (synchronous vs asynchronous). Bus structures and loop systems, computer network Examples and design consideration, data switching principles broadcast techniques, network structure for packet switching, protocols, description of network e.g. ARPANET, etc.

CSC 712: Internet Technologies

Networking Protocols, Real-time and Multimedia Application Services, The Global Internet, Measurements and Metrics, Next Generation Internet and Advanced Applications.

CSC 799 Research Project

Students should embark on work that will lead to substantial software development or may embark on any research from any field of computing under the supervision of a staff advisor. The project should be innovative, unique and novel. The project's protocol should be research oriented with some effort to fill discovered gaps and solve practical problems. The project should be characterized by sound critical thinking and a strong literature base and should be reported in a research reporting format, e.g. abstract, keywords, introduction: background, problem statement, study motivation and rationale, research objectives, research questions, research hypotheses (if any), study significance: theoretical and practical significance, study scope, paper organization, literature review: conceptual framework, theoretical frameworks, and review of previous studies; materials and method, results, discussion of findings: major findings, findings corroboration with prior research: compare findings with previous research findings, contribution to knowledge and to the profession (i.e. contributions to theory and practice); conclusion and future work: summary of findings, recommendations, study limitations, future works, beneficiaries and conclusion. Report format: APA.

CSC 722: Microprocessor Applications

Evolution of Microprocessor,CISC Microprocessor,Features of CISC Microprocessor:,RISC Microprocessor:Features of RISC Microprocessor,Special Purpose Microprocessor:Coprocessor,Transputer (Transistor Computer),DSP (Digital Signal Processor),Input/Output Processor (IOP),Graphics Processors,Bit-Slice Microprocessors (BSM),Scalar and Superscalar Microprocessors

CSC 724: Optimization Techniques

What is optimization? Objectives that could be minimized, Objectives that could be maximized, Optimization process steps:Static and dynamic problems, Continuous and discrete variables,Engineering Models in Optimization,Models and Optimization by Trial-and-Error,Optimization with Computer Algorithms:

CSC 726: Compiler Design

Review of compilers assemblers and interpreters, structure and functional aspects of a typical compiler, syntax semantics and, functional relationship between lexical analysis, expression analysis and code generation. Internal form of course programme. Use of a standard compiler (FORTRAN<COBOL/PL) as a working vehicle. Error detection and recovery. Grammars and Languages: the parsing problem. The scanner.

CSC 728: IT Security Policies and Procedures

Acceptable Use Policy (AUP), Access Control Policy (ACP),Change Management Policy,Information Security Policy,Incident Response (IR) Policy,Remote Access Policy Email/Communication Policy,Disaster Recovery Policy,Business Continuity Plan (BCP)