

Department of Information Technology
Central University of Kashmir

B.Tech. CSE

Semester V			
S. No.	Course Code	Course Title	Credits
1	BTCS 501	Computer Organisation & Architecture	4
2	BTCS 507	Computer Graphics	4
3	BTCS 508	Data Communication	4
4	BTCS 509	Operating Systems	4
5	BTCS 504	Java Programming	4
6	BTCS 511 L	Computer Graphics Lab	2
7	BTCS 506 L	Java Programming Lab	2
		Total	24

Central University of Kashmir				
Course Title	Computer Organization & Architecture	Course Code	BTCS 501	
Degree	Bachelor of Technology	Branch	Computer Science & Engg.	
Course Type	Theory	Department	Information Technology	
Credits	4	L	T	P
Semester	5 th	4	0	0
Course Objectives				
<ul style="list-style-type: none"> • Define the concept of architecture and incorporate parameters to evaluate and analyze the performance • Identify the pipelining as a basic technique for increasing CPU performance as well as design, planning and control of pipeline units • Understanding the evolution of the architectures and the differences between CISC and RISC approaches • Explain techniques for improving the performance of memory and input/output system • Recognize the limitations of classical architectures and the importance of parallelism 				
Learning Outcomes				
<ul style="list-style-type: none"> • To apply the knowledge of performance metrics to find the performance of systems. • To identify high performance architecture design. • To identify the problems in components of computer. • To develop independent learning skills and be able to learn more about different computer architectures and hardware. 				
Course Outline / Content				
Unit	Topics			Week
1.	Basics of Computer Architecture and Organization, Stored Program Organization (Von Neumann Architecture), Register Transfer Language, Microoperations(Arithmetic, Logic, Shift), Instruction codes, Registers, Instruction set, Hard wired Control Unit, Instruction cycle, Instruction types: Memory reference, Register Reference and I/O instructions. Interrupt cycle, Computer Organization and Design			4
2.	Instruction Formats, Addressing Modes, Stack Organization, Program Control, Characteristics of RISC and CISC, Introduction to Pipelining. Integer and Floating-Point Representation, Fixed Point Arithmetic: Addition, Subtraction, Multiplication and Division With Flowcharts, Floating Point Arithmetic: Addition and Subtraction.			4
3.	Input-Output Organization, Peripheral Devices, I/O interface, Isolated and Memory Mapped I/O Asynchronous Data transfer: Strobe control , Handshaking, serial transfer, Priority Interrupt: Daisy chaining, Parallel Priority interrupt, Direct Memory Access			3
4.	Memory Hierarchy, Main Memory: RAM, ROM, Auxiliary Memory (Magnetic Disk), Associative Memory, Cache Memory: Mapping Functions, Replacement Algorithm, Virtual Memory Concepts, Virtual Memory Address Translation			4

Text Books	
1.	Moris Mano, Computer system Architecture, PHI
2.	Hamacher, Computer Organization, McGraw Hill.

References	
1.	Parthasarthy, Advanced Computer Architecture, Cengage India.
2.	Tennenbaum A. S., Structured Computer Organization, PHI.
3.	Gear C. W., Computer Organization and Programming, McGraw Hill

Central University of Kashmir				
Course Title	Computer Graphics	Course Code	BTCS 509	
Degree	Bachelor of Technology	Branch	Computer Science & Engg.	
Course Type	Theory	Department	Information Technology	
Credits	04	L	T	P
Semester	5 Th	4	0	0
Course Objectives				
<ul style="list-style-type: none"> To understand the basics of various inputs and output computer graphics hardware devices. Exploration of fundamental concepts in 2D and 3D computer graphics. To know the working of multimedia tools. 				
Learning Outcomes				
<ul style="list-style-type: none"> Students will get the concepts of Graphics display devices, techniques, and different types of graphics drawing algorithms. Students will get the concepts of 2D and 3D Geometrical Transformations Students will get the concepts of Viewing, Curves and surfaces Students will get the concepts of Hidden Line/surface elimination techniques Students will get the concepts of some Scan Conversion algorithms. 				
Course Synopsis				
<p><i>Computer Graphics</i> is a 4 credit course that introduces the concepts and implementation of computer graphics. As one of the important subject areas of the study of computer science and information systems, this course starts with an overview of interactive computer graphics, two dimensional system and mapping, then it presents the most important drawing algorithm, two-dimensional transformation; Clipping, filling, curves and surfaces and an introduction to 3-D graphics.</p>				
Course Outline / Content				
Unit	Topics			Week
1.	Introduction to Computer Graphics: Applications of Computer Graphics. Graphic Display Devices_ Raster and Random. Flat panel display devices, Display Processor, Display Buffer, Concept of Double Buffering and Segmentation of Display Buffer. Color Displays: Shadow Masking and Beam Penetration methods, Use of Lookup tables. Graphics Input and Output Devices_ Description and Applications. Graphic Kernel System, Introduction to GKS, GKS primitives.			04
2.	2-D Graphics: Cartesian and Homogeneous Coordinate Systems. Line drawing algorithms (Bresenham's and DDA). Bresenham's Circle and Ellipse Drawing Algorithms. Character generation, 2-Dimensional Transformations. Concepts of Window & Viewport, Window to Viewport Transformations. Filling, Boundary and Floodfill algorithms.			04
3.	Clipping: Line Clipping Algorithms (Cohen-Sutherland Algorithm), Sutherland Hodgeman Polygon Clipping, Text Clipping, 3-D Graphics, Projections: perspective and parallel projection transformations. 3-Dimensional Transformations. Hidden Surface Removal Techniques, Z-Buffer Algorithm, Back Face Detection. Scan Line Algorithm. Painter's Algorithm			04
4.	Curves and Surfaces: Interpolation, Spline representation, Interpolation & Approximation Splines, Spline Specifications,			04

	Hermite Interpolation. Beizer-Curves & Surfaces, B-Spline Curves surfaces.	
Text Books/References		
1.	Hearn and Baker “ Computer Graphics”, Pearson Education	
2.	W.M.Newman and Sproull. “Principles of interactive Computer Graphics” ,TMH	
3.	Steven Harrington.” Computer Graphics a Programming Approach” McGraw Hill	
4.	James. D. Foley, AVandametal “Computer Graphics” Pearson	
5.	David F Frogers and J Alan Adams. “Procedural Elements of Computer Graphics” McGraw Hill	
6.	David F Rogers and J Alan Adams. “Mathematical Elements of Computer Graphics” McGraw Hill	

Central University of Kashmir				
Course Title	Data Communication	Course Code	BTCS 508	
Degree	Bachelor of Technology	Branch	Computer Science & Engg.	
Course Type	Theory	Department	Information Technology	
Credits	04	L	T	P
Semester	5 th	04	0	0
<i>Course Objectives</i>				
<ul style="list-style-type: none"> • To understand the concept of communication engineering, signals, channels and communication systems. • To understand and analyze the characteristics of various modulation techniques. • To critically analyze various modulation techniques used in modern communication systems • To apply knowledge of computers, software, networking technologies and information assurance to an organization's management, operations, and requirements 				
<i>Learning Outcomes</i>				
<p>By the end of this course, the student will be able to:</p> <ul style="list-style-type: none"> • To Focus on information sharing and networks. • To Introduce flow of data, categories of network, different topologies. • To Focus on different coding schemes. • Brief the students regarding protocols and standards. • To give clear idea of signals, transmission media, errors in data communications and their correction, networks classes and devices, etc. • Identify various components in a data communication system, describe their properties, explain how they work and evaluate their performance. 				
<i>Course Synopsis</i>				
<p>This is a first class on the fundamentals of data communication networks, their architecture, principles of operations, and performance analyses. The goal will be to give some insight into the rationale of why networks are structured the way they are today and to understand the issues facing the designers of next-generation data networks.</p>				
Course Outline / Content				
Unit	Topics			Week
1.	Data and Signals: Data, Signals, Types of Signals, Analog and Digital, Bandwidth, spectrum, Digitization of analog signals, sampling, Nyquist sampling theorem, quantization, quantization noise, Pulse code modulation. Digital modulation Techniques: ASK, FSK, PSK, DPSK, M-ary PSK, QAM. Signal constellation.			4
2.	Line coding techniques: NRZ, RZ, Biphasic, Manchester coding, AMI, HDBn. Transmission media: Guided and un-guided media, twisted wire pair, co-axial cable, optical fibre, microwave links, satellite microwave link, their characteristic features and applications for data transmission, Performance, Wavelength, Shannon Capacity, Media Comparison, PSTN, Switching			4
3.	Data transmission: simplex, half duplex and full duplex, Asynchronous and synchronous data transmission. Carrier, bit and frame synchronization techniques, Phase lock loop. Multiplexing Techniques: Frequency Division Multiplexing, Time Division Multiplexing, Wavelength division Multiplexing and Code Division Multiplexing. Spread Spectrum.			4
4.	Errors in data communication: Types of errors, error detection			4

	and correction techniques, forward error correction, polynomial error detection scheme, computation of CRC. Hardware. Study of DTE-DCE in brief: Digital data transmission, DTE-DCE Interface, Modems, 56K Modems, Cable Modems	
Text Books		
1.	Data communication & Networking by Bahrouz Forouzan	
2.	Sklar, "Digital Communications fundamentals & Applications" Pearson	
References		
1.	Computer Networks by Andrew S. Tanenbaum	
2.	Data and Computer Communications by William Stallings	
3.	Communication Systems by Simon Haykin	
4.	Analog and Digital communication by Sam Shanmugan	

Central University of Kashmir				
Course Title	Operating Systems	Course Code	BTCS 509	
Degree	Bachelor of Technology	Branch	Computer Science & Engg.	
Course Type	Theory / Laboratory	Department	Information Technology	
Credits	4	L	T	P
Semester	5th	4	0	0
Course Objectives				
<p>To understand the services provided by and the design of an operating system.</p> <ul style="list-style-type: none"> • To understand the structure and organization of the file system. • To understand what a process is and how processes are synchronized and scheduled. • To understand different approaches to memory management. • Students should be able to use system calls for managing processes, memory and the file system. • Students should understand the data structures and algorithms used to implement an OS. 				
Learning Outcomes				
<p>On completing this course the students should have acquired the following capabilities:</p> <ul style="list-style-type: none"> • An appreciation of the role of an operating system. • Become aware of the issues in the management of resources like processor, memory and input-output. • Should be able to select appropriate productivity enhancing tools or utilities for specific needs like filters or version control. • Obtain some insight into the design of an operating system. 				
Course Synopsis				
<p>The course will introduce Operating Systems (OS), their design and Implementation. We will discuss the goals of an OS, and some successful and not-so successful OS designs. We will also discuss the following OS services in detail: threadscheduling, security, virtual memory, and file system. In this course we will explore the core principles of operating systems design and implementation, including basic operating system structure; process and thread synchronization and concurrency; file systems and storage servers; memory management techniques; process scheduling and resource management; virtualization; and security.</p>				
Course Outline / Content				
Unit	Topics			Week
1	<p>Introduction: Computer System Overview-Basic Elements, Instruction Execution, Operating system functions and structure, Evolution of Operating System , Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and their functions, Distributed Operating System.</p>			3

2	Process: Process Concept, Process States, Process Description and Process Control, Context switching Interprocess Communication, Processes and Threads, Types of Threads, Multicore and Multithreading, Process Scheduling: Definition , Scheduling objectives ,Types of Schedulers, Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time. Scheduling algorithms : Pre-emptive and Non pre-emptive, FCFS – SJF – RR , Multiprocessor scheduling: Types, Performance evaluation of the scheduling. Interprocess Communication. Principles of Concurrency - Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks – prevention- avoidance – detection.	4
3	Basic Memory Management: Definition, Requirements, Partitioning, Paging and Segmentation, Virtual Memory, Virtual Memory Management , Locality of Refrence, Page Fault , Hardware and Control Structures, Operating System Software, Linux Memory Management, Windows Memory Management. Internal and External Fragmentation .	4
4	I/O Management and Disk Scheduling : I/O devices, organization of I/O functions; OS Design Issues, I/O Buffering, Disk Scheduling, RAID, Disk cache. File management – File Concept, Organization, Directories, File sharing, Access Methods and Record blocking, Secondary Storage Management.	4
Text Books		
1	Silberschatz, Peter Galvin, Greg gagne “Operating System Principles”.	
2	Andrew S. Tannenbaum & Albert S. Woodhull, “Operating System Design and Implementation”, Prentice Hall.	
3	William Stallings, “Operating Systems – internals and design principles”, Prentice Hall.	
References		
1	Andrew S. Tannenbaum, “Modern Operating Systems”, Prentice Hall.	
2	Gary J.Nutt, “Operating Systems”, Pearson/Addison Wesley.	
3	Pramod Chandra P.Bhatt, “An Introduction to Operating Systems Concepts and Practice”.	

Central University of Kashmir				
Course Title	Java Programming	Course Code	BTCS 504	
Degree	Bachelor of Technology	Branch	Computer Science & Engg.	
Course Type	Theory	Department	Information Technology	
Credits	04	L	T	P
Semester	5 th	4	0	0
Course Objectives				
<ul style="list-style-type: none"> • Programming in the Java programming language. • The knowledge of object-oriented paradigm in the Java programming language. • The use of Java in a variety of technologies and on different platforms. 				
Learning Outcomes				
<ul style="list-style-type: none"> • Students will be able to program using Java programming language. • Knowledge of the structure and model of the Java programming language. • Design, analyse and evaluate computer programs using the Java programming language. • To use the Java for various programming technologies. • Develop software in the Java. 				
Course Synopsis				
<ul style="list-style-type: none"> • The course is divided into four units covering appropriate programming concepts related to Java. • Object-oriented concepts-constructors, encapsulation, inheritance and polymorphism. • Java code utilities in applets, packages and classes. • Exception handling in Java programs. 				
Course Outline / Content				
Unit	Topics			Week
1.	<p>Introduction to Java Language: Creation of Java. How Java changed the Internet. Features of Java Language. Evolution of Java. Comparison with other languages like C++.Java Virtual Machine (JVM) and Byte-code.</p> <p>Java Language Overview: Lexical issues – Whitespace, Identifiers, Keywords, Literals, Separators, and Comments. Installing JDK.PATH variable. Java program – Structure, Compilation and Execution. Java Class libraries (System Class).main() method.</p> <p>Data types, Variables and Arrays: Primitive Data-types and Typed-Literals. Variables – Declaration, Initialization, Scope and Lifetime. Arrays – Single and Multidimensional. Type Conversion and Expression Promotion.</p> <p>Operators, Expressions and Control statements: Arithmetic, Bitwise, Relational, Logical, Assignment. Precedence and Associativity. Selection, Iteration and Jump Statements.</p>			4
2.	<p>Class Fundamentals: Class Structure (Variable and Method declaration).Modifiers (Access Modifiers and Other</p>			5

	<p>Modifiers). Components of Class, Variable and Method declaration. Constructor and finalize(). Garbage Collection. Passing parameters to methods. Variable hiding. Method overloading. Constructor overloading and chaining. Use of this keyword. Code blocks - Static and non-static.</p> <p>Inheritance: Mechanism. Role of Access Modifiers. Method Overriding and Shadowing. Use of super keyword.</p> <p>Polymorphism - Early and Late binding. Abstract Class and Interface. Components of Interface declaration. Implementing Interfaces.</p> <p>Exception Handling: Mechanism - Exception-Object, Throwing an Exception, and Exception Handler. Catch or Specify policy. Types of Exception - Checked vs Unchecked, Built-in vs User-defined. Catching an Exception - try-catch-finally. Specifying an Exception - throws. Manually throwing an Exception - throw. Custom Exceptions. Chained Exceptions.</p>	
3.	<p>Packages: Creating and Importing Packages. CLASSPATH variable. static import.</p> <p>Strings: Mutable and Immutable Strings. Creating Strings. Operations on Strings.</p> <p>Threads: Creating Threads in Java. Java Thread Lifecycle. Multithreading in Java: Synchronization and Inter-process communication (IPC) in Threads.</p> <p>Applet: Java Applet class Architecture. Working and Lifecycle of Java Applet. Displaying text and animation, and passing parameters to Applet. Embedding Applets in a web page.</p>	4
4.	<p>Event-Driven Programming: Introducing the AWT: Window Fundamentals, Working with Frame Windows.</p> <p>Using AWT Controls: Control Fundamentals, Labels, Buttons, Applying Check Boxes, Lists, TextField.</p> <p>I/O Streams: Byte, Character, Buffered, Data, and Object Streams. Standard Streams. File I/O Basics, Reading and Writing to Files. Serializing Objects.</p> <p>Networking Classes and Interfaces: TCP/IP Server Sockets in Java, InetAddress, Whois. URL.</p>	3
Text Books		
1.	E. Balagurusamy, Programming with Java: A Primer, 4 th Edition, Tata Mcgraw Hill.	
2.	C.S. Horstmann and G. Cornell, Java 2 Vol-1 Fundamentals, Pearson Education.	
References		
1.	Schildt, Java: The Complete Reference, 9th Edition, Tata McGraw Hill.	
2.	H.M. Dietel and P.J. Dietel, Java: How to Program, Pearson Education.	
3.	K. Sierra, Sun Certified Programmer For Java 5, Wiley India.	

Central University of Kashmir				
Course Title	Computer Graphics Lab	Course Code	BTCS 511 L	
Degree	Bachelor of Technology	Branch	Computer Science & Engg.	
Course Type	Laboratory	Department	Information Technology	
Credits	02	L	T	P
Semester	5 th	0	0	2
Course Objectives				
<ul style="list-style-type: none"> • Understand the need of developing graphics application • Learn algorithmic development of graphics primitives like: line, circle, polygon etc. • Learn the representation and transformation of graphical images and pictures. 				
Learning Outcomes				
<ul style="list-style-type: none"> • Design and implementation of various algorithms to draw a number of shapes • Design and implementation of various algorithms for designing animation graphics and composite objects • Design and simulation of various algorithms using multimedia tools 				
Course Synopsis				
This course provides a broad overview of the basic concepts of computer graphics. Both 2d raster graphics and 3d graphics will be covered. The aim of this course isto provide hands-on exposure to tools, techniques and algorithms in computer graphics				
Course Outline / Content				
Topics				Week
<ol style="list-style-type: none"> 1. To draw a line using DDA Algorithm. 2. To draw a line using Bresenham’s Algorithm. 3. To draw a circle using trigonometric Algorithm. 4. To draw a circle using Bresenham’s Algorithm. 5. To implement polygon boundary fill algorithm. 6. To implement polygon flood fill algorithm. 7. To translate an object with translation parameters in X and Y directions. 8. To scale an object with scaling factors along X and Y directions. 9. To rotate an object with a certain angle. 10. To perform composite transformations of an object. 11. Implementation of simple graphics animation. 				10
Text Books				
1.	Hearn and Baker “ Computer Graphics”, Pearson Education			
2.	W.M.Newman and Sproull. “Principles of interactive Computer Graphics” ,TMH			
3.	Steven Harrington.” Computer Graphics a Programming Approach” McGraw Hill			
4.	James. D. Foley, AVandametal “Computer Graphics” Pearson			
5.	David F Frogers and J Alan Adams. “Procedural Elements of Computer Graphics” McGraw Hill			
6.	David F Rogers and J Alan Adams. “Mathematical Elements of Computer Graphics” McGraw Hill			

Central University of Kashmir				
Course Title	Java Programming Lab	Course Code	BTCS 506 L	
Degree	Bachelor of Technology	Branch	Computer Science & Engg.	
Course Type	Laboratory	Department	Information Technology	
Credits	02	L	T	P
Semester	5th	0	0	2
Course Objectives				
<ul style="list-style-type: none"> • Students will be able to program using Java programming language. • To use the Java in a variety of technologies and on different platforms. • To develop software in the Java programming language 				
Learning Outcomes				
<ul style="list-style-type: none"> • Knowledge of the structure and model of the Java programming language. • Knowledge of object-oriented paradigm in the Java programming language. • Design, analyse and evaluate computer programs using the Java programming language. • Able to implement exception and basic event handling mechanisms in a program. • Able to implement object-oriented concepts-constructors, encapsulation, inheritance and polymorphism 				
Course Synopsis				
<ul style="list-style-type: none"> • Demonstrate the use of loops • Implement programs on strings • Implementation of all math class functions. • Implementation of file management concept. • Implementation of method over-riding and over loading. • Implementation of inheritance. • Multi-threaded programming • Implement programs on exception handling • Implementation of event handling mechanism 				
Course Outline / Content				
Unit	Topics			Week
1.	<ul style="list-style-type: none"> • Program to calculate area and perimeter of the circle • Program on substring removal • Program for overloading functions in java • Program for hierarchical inheritance in java • Program for overriding • Program for abstract class • Program for interface. • Program for pre-defined exception handling • Program for user-defined exception handling • Program for Thread and exceptional handling • Program for thread synchronization • Program for Inter Thread Communication • Program for java utility (calendar class) • Program for string manipulation. • Programs on file streams • Program for applet with mouse listener • Programs for frames and controls 			

	<ul style="list-style-type: none"> • Programs for menus and dialog box • Programs for panel and layout • Programs for incorporating graphics 	
Text Books		
1.	E. Balagurusamy, Programming with Java: A Primer, 4 th Edition, Tata Mcgraw Hill.	
2.	C.S. Horstmann and G. Cornell, Java 2 Vol-1 Fundamentals, Pearson Education.	
References		
1.	Schildt, Java: The Complete Reference, 9th Edition, Tata McGraw Hill.	
2.	H.M. Dietel and P.J. Dietel, Java: How to Program, Pearson Education.	
3.	K. Sierra, Sun Certified Programmer For Java 5, Wiley India.	