, Computer Fundamentals
(BACS01)
Core Course - (CC) Credit:6

Course Objective

This course provides an overview of introductory concepts about computers, number systems and components of computer system. It builds the foundation of the computer application courses that follow.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. handle a computer system for day to day use.
2. enumerate different types of input/ output devices and types of memory.
3. perform basic arithmatic operations using different number systems including binary arithmetic.
4. differentiate between system and application software.
5. prepare documents / spreadsheets.

Unit 1

Introduction to Computers: Characteristics of computers, uses of computers, components of a digital computer, types of computers.

Unit 2

Number Systems: Binary, Octal and Hexadecimal number systems, Binary Coded Decimals (BCD), Binary Coded Octals (BCO), Binary Coded Hexadecimals (BCH), 1's complement, 2's complement, conversion from one number system to another, binary arithmetic (addition, subtraction), binary subtraction using 2’s complement.

Unit 3

Input and Output Devices: Keyboard, mouse, touch screen, joystick, scanner, web camera, MICR, OCR, OMR, bar-code reader, monitor, printer, plotter.

Memory: Primary, secondary, auxiliary memory; RAM, ROM, cache memory, magnetic tape, magnetic disks, hard disk drives, optical disks, CD-R, DVD, flash drives, blue ray disc.

Unit 4

Computer Organization and Architecture: C.P.U., registers, system bus, main memory unit,

processors., motherboard, ports and interfaces, expansion cards, ribbon cables, SMPS, memory chips.

Unit 5

Software: System software, application software, operating system and its functions and types.

Unit 6

Overview of Emerging Technologies: Bluetooth, cloud computing, big data, data mining, mobile computing.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. V. Rajaraman and N. Adabala, Fundamentals of Computers, Prentice Hall of India Pvt. Ltd. New Delhi, 6th Edition, 2015.
2. Anita Goel, Computer Fundamentals, Pearson Education, 2010.

Additional Resources:

1. P.K. Sinha, Computer Fundamentals, BPB Publications New Delhi 6th Edition, 2004.
2. Reema Thareja, Fundamentals of Computers, Oxford University Press, 2014.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Digital computer, Number Systems, Input and Output Devices, Computer Memory

Computer Networks and HTML

(BACS03)

Core Course - (CC) Credit:6

Course Objective

This course provides an overview of the fundamental concepts of computer networks, data communication, network topologies, web technologies and internet applications.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. enumerate various network topologies and identify situations when different network topologies would be useful.
2. distinguish between LAN, MAN, WAN.
3. distinguish between Intranet, Extranet and Internet.
4. describe client-server architecture.
5. enumerate different transmission media and describe the use of each of them.
6. design web pages using HTML.

Unit 1

Overview of Computer Networks: Introduction to computer networks, classification of computer networks: LAN (Local Area Network), MAN (Metropolitan Area Network), WAN (Wide Area Network), WLAN (Wireless LAN), Intranet, Extranet and Internet.

Networks Topology: mesh, tree and star, ring and bus.

Network Devices: Repeater, hub, bridge, switch, gateway, router, Network Interface Card (NIC).

Unit 2

Network Reference Models: ISO-OSI reference model with description of its layers and functionalities, TCP/IP reference model with description of its layers and functionalities, network addressing IPV4, IPV6.

Unit 3

Data Communication Fundamentals: Analog and digital signals.

Transmission Media: Guided Media - twisted pair, coaxial cable, and optical fibre (only their basic properties and differences). Unguided media - radio wave, terrestrial microwave, satellite microwave, transmission impairments.

Unit 4

Web Technology: Introduction to web page, home page, website, domain name system, www, URL, internet browsers, web server, downloading and uploading of files, web page design using HTML, ISP.

Unit 5

Internet Applications: Telnet, ftp, e-mail, search engines, social networks, video conferencing, e-Commerce, m-Commerce, e-wallet.

Unit 6

Network Tools: Ping, ipconfig, ifconfig, tracert, arp. netstat, whois.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. B. A. Forouzan. Data Communication and Networking, 5th Edition, TMH, 2013.
2. T.A. Powell, HTML & CSS: The Complete Reference, 5th Edition, Tata McGraw-Hill, 2010.

Additional Resources:

1. Computer Networks by Andrew S. Tanenbaum, 5th Edition, Pearson Education India, 2013.

2. J. Duckett, HTML and CSS: Design and Build Websites, 1st Edition, Wiley, 2011.

Teaching Learning Process

- Talk and chalk method
- Computer based LCD presentations by teachers
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Networks Topology, Signal and Bandwidth, ISO-OSI reference mode, Web Technology

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Database Management Systems
(BACS02)
Core Course - (CC) Credit:6

Course Objective

The course introduces the students to the fundamentals of database management system and the methods to store and retrieve data. It enables the student to understand how data is organized for efficient storage and retrieval.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. differentiate between database systems and file systems.
2. describe the features of database management systems.
3. analyze the problem and arrive at an information model in the form of an ER diagram.
4. normalize a database.
5. transform an ER model into a relational database schema.
6. use SQL for query and data update operations.

Unit 1

Database: Introduction to database and DBMS, DBMS architecture, data independence, components of database systems, front end tools.

Unit 2

E-R Modeling: Entity types, entity set, attribute and key, relationships, relation types, ER diagrams, Database design using ER diagrams.

Unit 3

Relational Data Model: Relational model concepts, relational constraints, primary key, foreign key, candidate key, alternate key, composite key, super key.

Unit 4

Normalization: Functional dependencies, First, Second and Third normal forms

Unit 5

Introduction to Structured Query Language: Overview of SQL query language, Data definition and manipulation languages, set operations.

Unit 6

SQL: Create database, create table, drop database, drop table, alter table, create relationships between database tables, auto increment, check, Null values, aggregate functions - min, max, count, average, sum, nested sub-queries, insert data into table, modify and manage tables, queries, modify, filter, delete and view data, Join operations - inner, left join, right join, natural join, Cartesian product.group by, having, exists, case, order by.

Practical

Practicals based on the concepts mentioned in theory using relevant software.

References

1. C.J. Date, A. Kanman and S. Swamynathan, An Introduction to Database Systems, 8th edition, Pearson, 2006.
2. Avi Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6th edition, Tata McGraw-Hill Education, 2011.

Additional Resources:

1. R. Elmsasri, S. Navathe, Fundamentals of Database Systems, 7th Edition, Pearson Education, 2017.
2. R. Ramakrishnan, J. Gehrke, Database Management Systems, 3rd edition, Tata McGraw Hill Education, 2014.
3. I. Bayross, SQL, Pl/SQL the Programming Language of Oracle, 4th edition, BPB Publications, 2010.
4. MySQL : Reference Manual.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain selected topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

DBMS architecture, Data Independence, Entity modeling, Relational Data Model, SQL, Normalization

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Multimedia Systems and Applications
(BACS04)
Core Course - (CC) Credit:6

Course Objective

The course provides an overview of fundamentals of multimedia systems. The students will be taught how to represent, process and retrieve multimedia data such as text, images, sound, video and animation.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. enumerate and describe the multimedia components.
2. generate, manipulate and use images in multimedia projects using bitmap, vector and 3-D images.
3. create basic animations.

Unit 1

Multimedia: Introduction to multimedia, multimedia components, uses of multimedia, multimedia applications, virtual reality.

Unit 2

Text: Fonts and faces, using text in multimedia, font editing and design tools, hypermedia and hypertext.

Unit 3

Images: Still images – bitmaps, vector drawing, 3D drawing and rendering, natural light and colors, computerized colors, color palettes, image file formats.

Unit 4

Sound, Video and Animation: Digital audio, MIDI audio, MIDI vs digital audio, audio file formats, how video works, analog video, digital video, video file formats, video shooting and editing, principles of animation, animation techniques, animation file formats.

Unit 5

Internet and Multimedia: WWW and HTML, multimedia on the web – web servers, web browsers, web page makers and site builders.

Unit 6

Making Multimedia: Stages of a multimedia project, requirements to make good multimedia. Hardware peripherals - connections, memory and storage devices, multimedia software and authoring tools.

Practical

Practicals based on the concepts mentioned in theory using relevant software.

References

1. Tay Vaughan, Multimedia: Making It Work, 9th edition, McGraw Hill Education, 2017.

Additional Resources:

1. Ralf Steinmetz and Klara Naharstedt, Multimedia: Computing, Communications Applications, Pearson, 2012.
2. Jessica Keyes, The Ultimate Multimedia Handbook, TMH, 2000.
3. K. Andleigh and K. Thakkar, Multimedia System Design, 1st edition, Pearson Education India, 2015.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Hypermedia, Hypertext, Bitmap, Video, Animation, HTML

Information Security and Cyber Laws
(BACS06A)
Discipline Specific Elective - (DSE) Credit:6

Course Objective

The course aims to introduce the cyber threats, issues in information security and contemporary cyber laws.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. enumerate issues in computer security.·
2. enumerate and describe common forms of attacks.
3. describe the importance of security policy in the security framework.
4. describe security related terms like cryptography, privacy, steganography.
5. describe the need for cyber laws, and important provisions of IT Act.

Unit 1

Introduction: Protection, security, risk, threat, flaw, vulnerability, exploit, attack, confidentiality,integrity, availability, non-repudiation, authentication, authorization, codes, ciphers, substitution cipher (Caesar), transposition cipher (Rail-Fence), public and private key cryptography, cyber forensics.

Unit 2

Risk Analysis and Threat: Risk analysis, key principles of conventional computer security, security policies, authentication, data protection, access control, internal vs external threat, security assurance, passwords, computer forensics and incident response.

Unit 3

Cyber Attacks and Digital Crime: DoS attack, man-in-the-middle attack, phishing attack, spoofing attack, spam attack, drive-by attack, password attack, SQL injection attack, cross-site scripting attack, eavesdropping attack, birthday attack, malware attack, social engineering attack, session hijacking attack, criminology of computer crime, cyber forensics, cyber foot prints.

Unit 4

Safety Tools and Issues: Firewalls, logging and intrusion detection systems, e-mail security, digital signature, electronic signature, digital certificate, security issues in operating systems, ethics of

hacking and cracking.

Unit 5

Cyber laws to be covered as per IT Act:

- [Section 43] Penalty and compensation for damage to computer etc.
- [Section 65] Tampering with computer source documents
- [Section 66A] Punishment for sending offensive messages through communication service etc.
- [Section 66B] Punishments for dishonestly receiving stolen computer resource or communication device
- [Section 66C] Punishment for identity theft
- [Section 66D] Punishment for cheating by personation by using computer resource
- [Section 66E] Punishment for violation of privacy
- [Section 66F] Punishment for cyber terrorism
- [Section 67] Punishment for publishing or transmitting obscene material in electronic form
- [Section 67A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form
- [Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form
- [Section 72] Breach of confidentiality and privacy

Unit 6

Information Security in India: Brief introduction of IT infrastructure for information security in India.

Practicals

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. M. Merkow, J. Breithaupt, Information Security Principles and Practices, 5th Edition, Pearson Education.
2. Michael E. Whitman and Herbert J. Mattod, Priciples of Information Security, 5th Edition, Cengage Learning.
3. G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning, 2010.

Additional Resources:

1. A. Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India, 2008.
2. Anderson, Ross. Security engineering. John Wiley & Sons,

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Hardware and software vulnerability, Cyber forensics, Risk Analysis, Cyber Laws, IT Act

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Programming in Java
(BACS05A)
Discipline Specific Elective - (DSE) Credit:6

Course Objective

This course will introduce students to the fundamentals of computer programming in an object oriented framework using Java as programming language.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. understand the concepts of object-oriented software design.
2. develop, compile and run Java programs using basic programming constructs.
3. use object-oriented software design principles like inheritance and polymorphism .
4. use visibility modifiers (public, private, protected) to implement appropriate abstraction and encapsulation.

Unit 1

Introduction to Java programming: Java development environment, Java program structure.

Unit 2

Java Programming Constructs: Data types, variables, constants, scope and life time of variables, operators, expressions, type conversion and casting, control flow, conditional statements, loops, break and continue statements, arrays, command line arguments, methods.

Unit 3

Classes and Objects: Class, object, constructor, destructor, parameter passing, static fields and methods, access control, this reference, overloading of methods and constructors, garbage collection, accessibility modifiers.

Unit 4

OOPS concepts: Encapsulation, inheritance, polymorphism, dynamic binding, dynamic method dispatch, method overriding, final classes and methods, abstract classes and methods.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. Balagurusamy E., Programming with Java: A primer, Tata Mc Graw Hill, 4th Edition, 2009.
2. Paul Deitel, Harvey Deitel, Java How to Program, 10th Edition, Pearson, 2016..

Additional Resources:

1. C. S. Horstmann, Core Java Volume 1-Fundamentals, 10th Edition, Pearson Education, 2016.
2. Herbert Schildt, Java The Complete reference, 9th Edition, Tata Mc Graw Hill, 2014.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Object Oriented Programming, Overloading, Inheritance, Data abstraction, Encapsulation

Programming in Python
(BACS05B)
Discipline Specific Elective - (DSE) Credit:6

Course Objective

The course introduces programming in Python and develop Python based solutions for simple problems.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. select a suitable programming construct and inbuilt data structure for a situation.
2. develop and document modular python programs.
3. use classes and objects in application programs.

Unit 1

Introduction to Python: Structure of a Python program, Python interpreter/Python shell, identifiers and keywords, literals, strings, basic operators, input, output statements, Python standard libraries, notion of class, object.

Unit 2

Functions: Built in functions, function definition and calls, default parameter values.

Creating Python Programs: Input and output statements, control statements - branching, looping, exit function, break, continue, and pass, mutable and immutable structures, strings, lists, tuples and associated operations.

Unit 3

Control Structures: conditional statements, loops, exit, break and continue statements.

Unit 4

Classes: classes, objects and methods.

Unit 5

List and functions: list comprehension: shorthand notation for creating lists, passing lists as arguments, copying list objects,
Tuples: tuples and associated operations.
Dictionaries

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. O. Charles Severana. Python for Everybody (Exploring Data in Python 3), Shroff Publisher, 2018.
2. Sheetal Taneja, Naveen Kumar. Python Programming- A modular Approach, Pearson, 2017.
3. Allen B. Downey, Think Python–How to think like a Computer Scientist, O'Reilly, 2nd Edition, 2015.

Additional Resources:

1. John V. Guttag, Introduction to computation and programming using Python, MIT Press, 2016.
2. Y. Daniel Liang, Introduction to programming using Python, Pearson, 2013.
3. R. G. Dromey, How to Solve it by Computer, Pearson, 2006.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Problem Solving, Classes, Lists, Tuples,

Project Work
(BACS06B)
Discipline Specific Elective - (DSE) Credit:6

Course Objective

The students will undergo one semester of project work based on the concepts studied in a subject of their choice. The objective is to train the students for the industry by exposing them to

prototype development of real life software.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. develop a project plan based on informal description of the project.
2. implement the project as a team.
3. write a report on the project work carried out by the team and defend the work done by the team collectively.
4. present the work done by the team to the evaluation committee.

Unit 1

The students will work on any project based on the concepts studied in core/elective/ skill based elective courses. Specifically, the project could be a research study, or a software development project.

Unit 2

Project Group Organization/Plan

- Students will initially prepare a synopsis (500 words) and submit it to their respective department.
- For a given project, the group size could be a maximum of four (04) students.
- Each group will be assigned a teacher as a supervisor who will be responsible for their lab classes.
- A maximum of four (04) projects would be assigned to one teacher.

Unit 3

Project Evaluation

- 100 marks for end semester examination comprising Viva/presentation (50 marks) and project report evaluation (50 marks): to be awarded jointly by the external examiner and supervisor / mentor.
- 50 marks for continuous evaluation (to be awarded by the supervisor/mentor). Work carried out in each lab session will be assessed out of five marks (zero for being absent). Finally, the marks obtained will be scaled out of a maximum of 50 marks. For example, if 30 lab sessions are held in a semester, and a student has obtained an aggregate of 110 marks, then he/she will be assigned round (110/(30*5)) i.e. 37 marks.
- The students will submit only the soft copies of the report.
- The reports may be retained by the internal/external examiners.

Practical

Practical/discussion sessions based on the area of the project.

Teaching Learning Process

- Group Discussions
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Software Development, Project planning,

Android Programming
(BACS10B)
Skill-Enhancement Elective Course - (SEC) Credit:4

Course Objective

The course is designed for students to help them learn how to develop android apps. They will also learn android architecture and key principles underlying the design.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. describe various components of an Android application.
2. design user interfaces using various widgets, dialog boxes, menus.
3. design and implement interaction among various activities/applications using intents.
4. develop application(s) that require database handling.

Unit 1

Introduction: Overview of Java programming, Android architecture, Android components including activities, view and view group, services, content providers, broadcast receivers, intents, parcels, instance state. Android development tools like Android virtual device manager, Android SDK manager, Android emulator, Android profiler, Android debug bridge.

Unit 2

User Interface Architecture: application context, intents: explicit intents, returning results from

activities, implicit intents, intent filter, intent resolution, and applications of implicit intents, activity life cycle, activity stack, application's priority and the process' states.

Unit 3

User Interface Design: Layouts, optimizing layout hierarchies, form widgets, text fields, button control, toggle buttons, spinners, auto-complete textview, edittext, images, image buttons, menu, dialog.

Unit 4

Database using SQLite: SQLite, Content Values and Cursors, creating SQLite databases, querying a database, adding, updating, and removing rows.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. Dawn Griffiths and David Griffiths, Head First Android Development, O'reilly, 2015.
2. Reto Meier, Professional Android™ 4 Application Development, John Wiley & Sons, Inc., 2012.

Additional Resources:

1. James C. Sheusi, Android Application Development for Java Programmers. Cengage Learning, 2013.
2. Bill Phillips, Chris Stewart, Brian Hardy and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch, LLC., 2015.
3. Mark L. Murphy, The Busy Coder's Guide to Android Development, CommonsWare, 2018.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Android architecture, Android emulator, User interface design, Database

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Data Handling using Spreadsheet
(BACS08A)
Skill-Enhancement Elective Course - (SEC) Credit:4

Course Objective

The course will help students to learn how to analyse data with spreadsheets. They will learn about referencing, charts, functions and various utilities.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. perform data analysis and manipulation in a spreadsheet.
2. use built-in mathematical functions in a spreadsheet.
3. perform what-if analysis using Goal seek, ASAP utility add-ins in spreadsheets.
4. sort and filter data.
5. protect a spreadsheet

Unit 1

Functions: Relative, absolute and mixed referencing, mathematical and statistical functions, nested functions, VLOOKUP, HLOOKUP and pivot table

Unit 2

Charts: Data visualization using built in charts.

Unit 3

Utilities: What-if scenarios, goal seek, solver, data validation, creating a drop down list from a range of cells, data filtering and sorting, calculating linking sheets, detective tools, using regular expression in functions, add-in in calc.

Unit 4

Protection: using passwords and digital signatures on spreadsheets

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

Relevant user manuals and online resources decided each year by the committee of courses.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Referencing, Charts, Functions, Protection

Data Visualization using R
(BACS10C)
Skill-Enhancement Elective Course - (SEC) Credit:4

Course Objective

This course is oriented to provide students an introduction to R programming language with a focus to visualize and present data through different type of plots.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. import/export small data sets in and out of R environment.
2. draw different types of plots to aid analysis of datasets.
3. identify a suitable technique for analysis data for the given objective.
4. interpret and use the results of analysis.

Unit 1

Introduction to R: installation of R, features of R, applications of R programming, data types in R, scripting in R, data editing, use of R as a calculator, control structures in R

Unit 2

Data Handling in R: importing data in R (loading Tables and CSV files), Reading and writing files in R

Unit 3

Basic data structures in R: Vectors, matrices, array, lists, data frames.

Unit 4

Visualization Tools: Introduction to simple graphics and plots, bar charts, histograms, pie charts, scatter plots (plotting multiple variables), line plots and regression, word clouds, radar charts, waffle charts, box plots, exporting plots as images.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. Thomas Rahlf, Data Visualization with R: 100 Examples, Springer, 2017.

Additional Resources:

1. Joseph Adler, R in a Nutshell: A Desktop Quick Reference, 2nd edition, O'Reilly Media, 2012.
2. Robert Kabacoff, R in Action: Data Analysis and Graphics with R, Manning Publications, 2011.
3. Tilman M. Davies, The book of R, 1st Edition, No Starch Press, 2016.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

R Scripting, Data frames, Data Visualization, Word Cloud

Desktop Publishing
(BACS09B)
Skill-Enhancement Elective Course - (SEC) Credit:4

Course Objective

This is an introductory course that provides students with a basic understanding of the field of desktop publishing including page layout and design.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. write, edit and print documents using word processing and spreadsheet.
2. use tools for Desktop Publishing and would be able to create and design documents with text and graphics like newspaper ads, visiting cards, posters etc.

Unit 1

Introduction: Introduction to desk top publishing, the need and tools.

Unit 2

Master Pages Preparation: Prepare borders dies, first page, left and right pages.

Unit 3

Layout: Skeleton, composition, fonts install, place objects, naming, fill text frame, styles, fit text properly in the frame, link text frames, lists, links .

Unit 4

Image: Transform, flow text around, path and nodes, effects, Glyth to vector graphics.

Unit 5

Cover Design: Design layout, decompose into geometric primitives, layers, levels, multilingual layout.

Unit 6

Publish: Export, store, print.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

http://my-hexagon.com/rep/Scribus_tutorial.pdf

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Open Source Software
(BACS09A)
Skill-Enhancement Elective Course - (SEC) Credit:4

Course Objective

The course defines what open source software is and will cover the history of open source software and its benefits. Students will learn about the linux operating system. They will also learn copyright law and different licensing models.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. install open source software.
2. work on an open source operating system like Linux, Gambas and Gimp.
3. describe common open source licenses and the impact of choosing a license.
4. find open source projects related to a given development problem.
5. identify open source alternatives available for a given proprietary software.
6. participate in a public open source project/ task.

Unit 1

Introduction: History of Open Source Software (OSS), commercial software vs OSS, free software vs freeware, open source software examples - the GNU projects, copy right issues about open source software.

Unit 2

The Linux operating system : Linux installation and hardware configuration – boot process - Linux loader (LILO) – Grand Unified Boot loader (GRUB), user account, accessing, starting and shutting processes, log in and log out, command line, simple commands, Unix file system, Unix files, i-node structure and file system related commands.

Unit 3

Basic principles of copyright law, open source licensing, issues with copyright and patent, warranty, MIT license, BSD License, Apache license, Academic Free License, Mozilla Public License, GPL, LGPL.

Unit 4

Study of commercial application software vs OSS, Open Office.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. M. N. Rao, Fundamentals of Open Source Software, 1st edition, PHI Learning, 2014.
2. Andrew M. St. Laurent, Understanding Open Source and Free Software Licensing, O'Reilly Media, 2004.
3. William E.Shotts, The Linux Command Line: A Complete Introduction , No Starch Press, 2012.

Additional Resources:

1. Jan Smith and Roman Joost, GIMP for Absolute Beginners, Apress, 2012.
2. Olivier Lecarme and Karine Delvare, The Book of GIMP, No Starch Press, 2013
3. https://en.wikibooks.org/wiki/Gambas.
4. Sumitaba Das, Your Unix - The Ultimate Guide, TMH, 2000.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Open Source Software, Free software, LINUX operating system, open source licensing, GPL, LGPL, GIMP, GAMBAS

PHP Programming
(BACS07B)
Skill-Enhancement Elective Course - (SEC) Credit:4

Course Objective

This course is designed as a first course in PHP programming. The course focuses on the principle of server side scripting and building dynamic web applications.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. write PHP scripts to handle HTML forms.
2. write regular expressions including modifiers, operators, and meta-characters.
3. write PHP programs that use various PHP library functions, and that manipulate files and directories.

4. create a dynamic web site employing server side scripting.

Unit 1

Introduction: Introduction to PHP, installation, testing an installation, setting time zone, running PHP with other web servers, embedding PHP within HTML , using comments.

PHP Language Basics:Variables, data types, type casting, operators and expressions, Operator Types, operator precedence, constants

Unit 2

Decisions and Loops : If statement, switch statement, ternary operator, looping, while Statement, do-while loop, for statement, break statement, continue statement, nested loops.

Unit 3

Strings : Introduction to strings in PHP, string functions: calculating string length using strlen(), counting the number of words in a string using str_word_count(), reversing a string using strrev(), search for a specific text using strpos(), replace the text using str_replace(), output one or more string using echo(), converts a string of ASCII characters to hexadecimal values using bin2hex(), converts a string of hexadecimal values to ASCII characters using hex2bin(), removes whitespace or other characters from the left side of a string using ltrim(), removes whitespace or other characters from the right side of a string using rtrim()

Unit 4

Arrays : Create an array in PHP, indexed arrays - arrays with a numeric index, associative arrays - arrays with named keys, multidimensional arrays - arrays containing one or more arrays, get the length of an array using count(), loop through an indexed array using for loop, loop through an associative array using foreach loop, two dimensional array, looping in two dimensional array, sort array in ascending order for array using sort() function, sort array in descending order using rsort(),sort associative arrays in ascending order, as per the value using asort(), sort associative arrays in ascending order, as per the key using ksort(), sort associative arrays in descending order, according to the value using arsort(), sort associative arrays in descending order, as per the key krsort().

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. Steven Holzner, PHP: The Complete Reference, McGraw Hill Education, 2017.

2. Alan Forbes, The Joy of PHP Programming: A Beginner's Guide, Createspace Independent Pub, 2105.

Additional Resources:

1. Luke Welling, Laura Thompson, PHP and MySQL Web Development, Pearson Education, 2016.
2. Robin Nixon, Learning PHP, MySQL & JavaScript with j Query, CSS and HTML5 (Paperback), O'rielly, 2015.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

PHP, Web Server, Strings, Arrays

System Administration and Maintenance
(BACS10A)
Skill-Enhancement Elective Course - (SEC) Credit:4

Course Objective

The course focuses on administration of operating systems(windows, linux/unix), installation and maintenance. The students will also learn the difference between desktop based and server based operating system.

Course Learning Outcomes

On successful completion of the course, a student will be able to:

1. distinguish between features of Linux/Unix and windows operating system.
2. install/uninstall hardware and software.

3. configure system environment.
4. troubleshoot network connectivity issues.
5. examine system performance issues.
6. examine file structure and properties.

Unit 1

Introduction to Operating system: Basics of operating system, services, features and functions of different operating systems, Kernel, API, CLI, GUI, devices and device drivers, IPv4, IPv6.

Unit 2

Exploring different Operating Systems: Introduction to Linux/Unix based operating systems, introduction to Windows based operating systems, difference between Linux/Unix and other operating systems, introduction to server based operating systems, difference between desktop based (Windows 10) and server based operating systems like Windows server 2003/2008.

Unit 3

Linux/Ubuntu System Environment: Configuring desktop environment and desktop settings, installing and configuring software and hardware, exploring file structure, terminal, shell, basic Unix Commands like cat, ls, cd, date, cal, man, echo, pwd, mkdir, rm, rmdir ps, kill etc.

Unit 4

Windows System Environment: Configuring desktop environment and desktop settings, installing and configuring software and hardware, explore system configuration using control panel, creating users, add/ delete users, difference between workgroup and domain, concept of user profiles – creating and roaming, concept of Active Directory, process and disk management, Windows task manager, exploring file structure and file properties, backup and recovery.

Unit 5

Network Administration : Examine network settings using commands like ipconfig/ifconfig, hostname, net, netstat, whoami etc., troubleshoot network connectivity issues using commands like: ipconfig, ping, tracert, route etc., sharing resources (files, printers etc.) on the network, accessing a system remotely using remote desktop.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

Text Books:

1. Garth Snyder, Trent R. Hein, Ben Whaley Evi Nemeth, UNIX and Linux System Administration Handbook, Fifth edition, Pearson, 2018
2. Mark G.Sobell, A Practical Guide to Ubuntu Linux, Fourth edition
3. William Panek, Tylor Wentworth, Mastering Windows 7 administration, 2010, Wiley

Publishing Inc.

Additional Resources:

1. Thomas A. Limoncelli, Christine Hogan, Strata R. Chalup, “The Practice of System and Network Administration”, Addison-Wesley, 2007.
2. Mark Burges, Principles of Network and System Administration, 2003, John Wiley & sons Ltd.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Desktop Operating system, Server Operating system, Shell, Network Administration

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Web Designing
(BACS08B)
Skill-Enhancement Elective Course - (SEC) Credit:4

Course Objective

The course introduces the students to planning and designing effective web pages, implementing web pages by writing HTML and CSS code and producing a functional website.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. define the principle and basics of Web page design
2. visualize the basic concept of HTML.
3. recognize the elements of HTML.
4. apply basic concept of CSS.

5. publish the web pages.

Unit 1

Introduction to HTML: What is HTML, HTML Documents, basic structure of an HTML document, creating an HTML document, markup tags, heading-paragraphs, line breaks, HTML tags.

Unit 2

Elements of HTML: Introduction to elements of HTML, working with Text, working with Lists, tables and frames, working with hyperlinks, images and multimedia, working with forms and controls.

Unit 3

Introduction to Cascading Style Sheets: Concept of CSS, creating style sheet, CSS properties, CSS styling (background, text format, controlling fonts), working with block elements and objects, working with lists and tables, CSS id and class, box model (introduction, border properties, padding properties, margin properties).

Unit 4

CSS Advanced Features: CSS advanced features (grouping, dimension, display, positioning, floating, align, pseudo class, navigation bar, image sprites, attribute sector), CSS color.

Unit 5

JavaScript Fundamentals: Data types and variables, functions, methods and events, controlling program flow, JavaScript object model, built-in objects and operators.

Unit 6

Introduction to Web Publishing or Hosting: Creating website, saving the website, working on the website, creating website structure, creating titles for web pages, themes-publishing websites.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. Anne Boehm and Zak Ruvalcaba, Munarch’s HTML5 and CCS3, 4th Edition, 2018.

Additional Resources:

1. Jessica Minnick, Web Design with HTML5 and CSS3, 8th Edition, Cengage Learning, 2015.

Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Web Design, HTML, CSS, Web Publishing

Word Processing and Presentation Software
(BACS07A)
Skill-Enhancement Elective Course - (SEC) Credit:4

Course Objective

The course introduces the students to word processing and presentation software. The basic features and skills of creating, editing, inserting table, graphics and power point presentation are covered.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. create and refine documents using text formatting, tables and graphics.
2. use mail merge.
3. create macros and templates in documents.
4. protect documents.
5. create presentations containing transitions and animations. learn advanced presentation features like custom slide show, call outs and action buttons.

Unit 1

Word Processing Basics: Creating, opening and saving a document, text formatting, header and footer, creating and editing of tables, importing graphics, insert picture, using word processor's

drawing features, text in drawing.

Unit 2

Advanced Features: Creating macros, watermarks, templates, reviewing documents, comparing and combining documents, protection of documents-using passwords.

Unit 3

Mail Merge: Mail merge concept, main document, data sources, merging data source and main document.

Unit 4

Presentation Tools : Creating presentations, using blank presentation option, using design template option, adding slides, deleting a slide, importing images from the outside world, deleting a slide, numbering a slide, saving presentation transition and animations, adding notes to slides, customize slideshow.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

Relevant user manuals and online resources for free software for word processing

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Teaching Learning Process

- Talk and chalk method
- Computer based presentations by teachers to explain certain topics.
- Group Discussions
- Assignments
- Offline and online Quiz
- Presentations by group of students for enhanced learning.

Assessment Methods

- Assignments, presentations, viva, quiz
- Internal assessment
- End semester exam

Keywords

Word processing, Mail-merge, Macros, Presentation,

IT Fundamentals
(BACS11)
Generic Elective - (GE) Credit:6

Course Objective

The course provides an overview of the concepts of computer systems, storage devices, user interfaces, database, networks and internet applications.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. identify the components of a personal computer system.
2. compose, format and edit a word document.
3. send email messages (with or without attachments).
4. navigate and search through the internet.

Unit 1

Introduction: Introduction to logical organization of computer, input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, monitor, Printer, Plotter.

Unit 2

Storage Devices: Primary memory, secondary memory, auxiliary memory.

Unit 3

User Interface: Operating system as user interface, system tools, control panel settings.

Unit 4

Database: Introduction to database, use of spreadsheet as database, use of functions and database operations in spreadsheet.

Unit 5

Networks: Introduction to communication network, network topologies, LAN, MAN, WAN, distinction among networks, network devices.

Unit 6

Internet Applications: Internet as a global network, Internet utilities – email, online banking, reservations etc. malware and spam, emerging technologies.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. A. Goel, Computer Fundamentals, Pearson Education, 2010.

Additional Resources:

1. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006.
2. P. K. Sinha, Fundamentals of Computers, BPB Publishers, 2007.

Teaching Learning Process

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Assessment Methods

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- Internal assessment
- End semester exam

Keywords

Input and Output devices, Storage devices, Networks, Database

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Multimedia and Web Design
(BACS12)
Generic Elective - (GE) Credit:6

Course Objective

This paper provides a self-paced, comprehensive review of concepts and techniques for designing and developing attractive websites with multimedia components.

Course Learning Outcomes

On successful completion of this course, a student will be able to:

1. create a website that considers audience needs, and various technical issues.
2. describe the terms ownership, permissions, and copyright issues·
3. incorporate text, images, animation, sound, and video into Web pages.
4. edit multimedia objects using multimedia authoring tools.

Unit 1

Introduction: Definition of multimedia, multimedia components, uses, multimedia applications.

Unit 2

Multimedia Input/ Output Devices: Scanner, camera, microphone, speaker, monitors, printers

Unit 3

Multimedia Storage Devices: CD ROMs, DVDs, Blue ray disk

Unit 4

Multimedia tools: Sound editor, video editor, animator, authoring tools

Unit 5

Web Designing: Concept of website, website as a communication resource, Internet, intranet and extranet, basic concepts related to website designing.

Unit 6

HTML: Introduction to hypertext markup language, document type definition, creating web pages, graphical elements, lists, hyperlinks, tables, web forms, inserting images, inserting audio, video and animation; frames, use of CSS.

Practical

Practical exercises based on the concepts mentioned in theory using relevant software.

References

1. Tay Vaughan, Multimedia: Making It Work, McGraw Hill Education(India), Ninth Edition.
2. J. A. Ramalho, Learn Advanced HTML 4.0 with DHTML, BPB Publications, 2007.

Teaching Learning Process

- Talk and chalk method
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Assessment Methods

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Keywords

Multimedia, Website, HTML, CSS