

Course Title: MIS and E-Business

Course Code: CACS301

Year/Semester: III/V

Class Load: 5Hrs. /Week (Theory: 3Hrs, Practical 2Hrs.)

Course Description

This course provides the fundamental knowledge of Management Information System and E-Business and its associated infrastructure, security and protection issues, payment system and ultimately live implementation of any web application in Web server.

Objectives: The general objectives of this course is to know fundamental knowledge of MIS/E-Business and implement the web application in Web Server.

Unit 1:

Introduction to E-Commerce: Definitions and Concepts; Defining E-Business; Pure Versus Partial EC; EC Framework, Classification of EC; Benefits of E-Commerce; Electronic Markets; Role of Internet and Web in E-Commerce; The Limitations and Barriers of EC; Social Networks and Social Network Services; **M-Commerce:** Concept, Scope, Attributes, Benefits; Location-based I-commerce, I-Commerce Infrastructure, Location-Based Services and Applications. 7LH

Unit 2:

The Network Infrastructure for E-Commerce: Introduction to Information Superhighway (I-Way), Components of the I-Way, Internet as a network infrastructure. **Wireless Application Protocol:** Wireless Application Protocol (WAP); Architecture of WAP; Working of WAP; Wireless Technologies: ADSL, WiMAX, WLAN, WMAN Wi-Fi, UMTS (3G), LTE (4G), (5G NR). Security Issues related to Wireless Communications. 8LH

Unit 3: Introduction to Management Information System: Data, information, computer based information system (CBIS), Information System Resources, Management information system, Transaction processing (TPS) system, decision support system (DSS), and executive information system (EIS), **SCM, CRMS and International Systems:** Introduction, Supply Chain Management Systems, Customer Relationships Management Systems, enterprise systems and Challenges of Enterprise Systems Implementations- Managing the implementation, International Information Systems-Outsourcing and off-shoring. 8LH

Unit 4: E-Commerce Security and Fraud Issues and Protections: Basic EC Security Terminology, The Threats, Attacks, and Attackers, **EC Security Requirements:** Confidentiality, Integrity, and Availability, Authentication, Authorization and Nonrepudiation; Technical Malware attack: Viruses, Worms, and Trojan Horses, Heartbleed, Distributed Denial of Service, Cryptoblocker, Page hijacking, Botnets, Malvertising, ransomware, sniffing; Non-Technical Malware attack: Social Phishing, Pharming, Identity

Theft and Identify Fraud, Spam Attacks; EC defense Strategy: access control(Authorization and Authentication, Biometric Systems), encryption and PKI (Symmetric Key Encryption, Asymmetric Key Encryption, Certificate Authority(CA), Secure Socket Layer (SSL). Securing e-commerce networks: Firewalls, Virtual Private Networks, Intrusion Detection Systems (IDS), intrusion prevention System (IPS). **10LH**

Unit 5: E-payment systems:

Online payment cards (credit cards, charge cards, debit cards, smart cards), processing cards in online, credit card payment procedure, e-micropayments, e-checking and its processing in online. Automated clearing house (ACH) network, mobile payments (Digital wallet), mobile payment participants and issues, international payments, emerging EC payment systems and issues: crypto currency, virtual currency. A case study of emerging trends in online payment system in Nepal. **6 LH**

Unit 6: Launching a Successful EC Website:

Planning Online Businesses (Business Plan, The cost-benefit, risk elements of a business case, funding a New Online Business, EC Model selection), The process of building a website, basic hierarchical website structure, website hosting and obtaining a domain name (cPanel management, upload EC site to the web Server), web content creation and management: (Web content, Categories and Types of Content, Content Management and Maintenance, Catalog Content and its Management), Website design criteria, Site Map and Navigation, Web page layout grid, Colors and Graphics, Website Usability, Performance, Website Promotion, implementation of Payments system, Website Promotion, Search Engine Optimization (SEO). **10LH**

Laboratory Works:

32LH

Laboratory works should be done covering all the topics listed above and a project work should be carried out by individually implementing a fully functioning e-commerce web application along with payment system.

Text Book

Efraim Turban, D. K. (2018). *Electronic Commerce: A Managerial and Social Networks Perspective*. New York: Springer

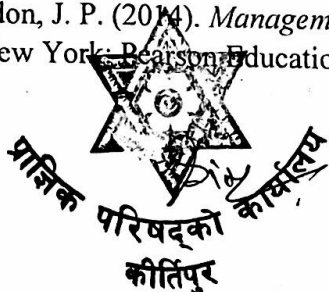
References Book

Chaffey, D. (2009). *E-Business and E-Commerce Management: Strategy, Implementation and Practice (4th Edition)*. Harlow: Prentice Hall.

Kalakota, A. B. (1996). *Frontiers of Electronic Commerce*. Pearson.

Kenneth C. Laudon, C. G. (2014). *E-commerce: business.technology.society*. New York: Pearson Education Limited.

Kenneth C. Laudon, J. P. (2014). *Management Information System: MANAGING THE DIGITAL FIRM*. New York: Pearson Education Limited.



Course Title: **DotNet Technology (3 Cr.)**

Course Code: **CACS302**

Year/Semester: **III/V**

Class Load: **6 Hrs. / Week (Theory: 3 Hrs., Practical: 3 Hrs.)**

Course Description:

This course covers different concepts of .NET framework. It also covers basic to advanced features of C# language including language basics, creating types and inheritance, delegates, events, lambda expressions, LINQ, working with databases, and developing web applications using ASP.NET.

Course Objectives:

The primary objective of this course is to provide concepts of .NET framework and different concepts of C# programming language and make students familiar with their uses and applications.

Course Contents:

Unit 1: Introducing C# and the .NET Framework (7 Hrs.)

Object Orientation; Type Safety; Memory Management; Platform Support; C# and CLR; CLR and .NET Framework; Other Frameworks; Framework Overview; .NET Standard 2.0; Applied Technologies

Unit 2: The C# Language Basics (12 Hrs.)

Writing Console and GUI Applications; Identifiers and Keywords; Writing Comments; Data Types; Expressions and Operators; Strings and Characters; Arrays; Variables and Parameters; Statements (Declaration, Expression, Selection, Iteration, and Jump Statements); Namespaces

Unit 3: Creating Types in C# (12 Hrs.)

Classes; Constructors and Deconstructors; this Reference; Properties; Indexers; Static Constructors and Classes; Finalizers; Dynamic Binding; Operator Overloading; Inheritance; Abstract Classes and Methods; base Keyword; Overloading; Object Type; Structs; Access Modifiers; Interfaces; Enums; Generics

Unit 4: Advanced C# (14 Hrs.)

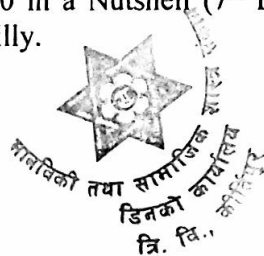
Delegates; Events; Lambda Expressions; Exception Handling; Introduction of LINQ; Working with Databases; Writing Web Applications using ASP.NET

Laboratory Work: The laboratory work includes writing console and/or GUI programs in C#

- To implement basic language features
- To create classes and objects and to implement different object-oriented features
- To implement inheritance
- To implement advanced features like delegates, event handling, lambda expressions, exception handling
- To implement LINQ and database applications

Text Books:

1. C# 7.0 in a Nutshell (7th Edition), the Definitive Reference, Joseph Albahari & Ben Albhari, O'Reilly.



2. Microsoft Visual C# Step by Step (9th Edition), John Sharp, Pearson Education.

Reference Books:

1. C# 7.0 All-in-One For Dummies (1st Edition), John Paul Mueller, Bill Sempf, Chuck Sphar, John Wiley & Sons, Inc.
2. Professional C# 7 and .NET Core 2.0 (7th Edition), Christian Nagel, John Wiley & Sons, Inc.

Teaching Methods:

The teaching faculties are expected to create environment where students can update and upgrade themselves with the current scenario of computing and information technology with the help of topics listed in the syllabus. The general teaching pedagogy that can be followed by teaching faculties for this course includes class lectures, laboratory activity, group discussions, case studies, guest lectures, research work, project work, assignments (Theoretical and Practical), and written and verbal examinations.

Evaluation:

Internal Assessment Format [FM = 20] – Subject Teacher				
Term Examination		Assignment	Attendance	Total
Mid-Term	Pre-Final			
5	5	5	5	20
Practical Assessment Format [FM = 20] – External Examiner will be assigned by Dean Office, FOHSS.				
Practical	Viva	Lab Reports	Total	
10	5	5	20	

Note: Assignment may be subject specific case study, seminar paper preparation, report writing, project work, research work, presentation, problem solving etc.

Final Examination Questions Format [FM = 60, Time = 3 Hrs.]

SN	Question Type	Number of Questions	Marks per Question	Total Marks
1	Group – 'A' Objective Type Questions (Multiple Choice Questions) Attempt all the questions.	10	1	10 x 1 = 10
2	Group – 'B' Short Questions (Attempt any SIX questions.)	7	5	6 x 5 = 30
3	Group – 'C' Long Questions (Attempt any TWO questions.)	3	10	2 x 10 = 20



Course Title: Computer Networking (3 Cr.)

Course Code: CACS303

Year/Semester: III/V

Class Load: 5 Hrs. / Week (Theory: 3Hrs. Practical: 2 Hrs.)

Course Description

This course offers detailed concept and structure of networking standards and principles. It includes introduction, functioning and significance of Physical Layer, Data Link Layer, Network Layer, Transport Layer, Application layer and some security mechanisms. It does not entirely focus on theoretical concept but also strongly focuses on practical skill based learning.

Course objectives

The general objectives of this course are to provide theoretical as well as practical knowledge of computer networking to make students capable of implementing, managing and troubleshooting the issues of computer network in their personal as well professional life.

Course Contents

Unit 1: Introduction

6 Hrs.

- 1.1 Network as an infrastructure for data communication
- 1.2 Applications of Computer network
- 1.3 Network Architecture
- 1.4 Types of computer Networks
- 1.5 Protocols and Standards
- 1.6 The OSI Reference Model
- 1.7 The TCP/IP Protocol Suite
- 1.8 Comparison between OSI and TCP/IP Reference model
- 1.9 Critiques of OSI and TCP/IP Reference model

Unit 2: The Physical Layer

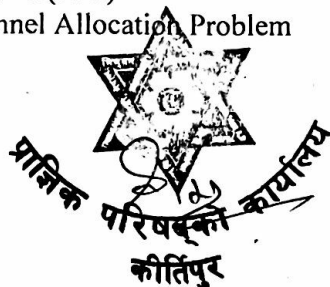
6 Hrs.

- 2.1 Functions of Physical Layer
- 2.2 Data and Signals: Analog and Digital signals, Transmission Impairment, Data Rate Limits, Performance
- 2.3 Data Transmission Media: Guided Media, Unguided Media and Satellites
- 2.4 Bandwidth Utilization: Multiplexing and Spreading
- 2.5 Switching: Circuit switching, Message switching & Packet switching
- 2.6 Telephone, Mobile and Cable network for data Communication

Unit 3: The Data Link Layer

8 Hrs.

- 3.1 Functions of Data Link Layer
- 3.2 Data Link Control: Framing, Flow and Error Control
- 3.3 Error Detection and Correction
- 3.4 High-Level Data Link Control(HDLC) & Point – to – Point protocol(PPP)
- 3.5 Channel Allocation Problem



- 3.6 Multiple Access: Random Access (ALOHA, CSMA, CSMA/CD, CSMA/CA), Controlled Access (Reservation, Polling, Token Passing), Channelization (FDMA, TDMA, CDMA)
- 3.7 Wired LAN: Ethernet Standards and FDDI
- 3.8 Wireless LAN: IEEE 802.11x and Bluetooth Standards
- 3.9 Token Bus, Token Ring and Virtual LAN
- Unit 4: The Network Layer** 8 Hrs.
- 4.1 Functions of Network Layer
- 4.2 Virtual circuits and Datagram Subnets
- 4.3 IPv4 Addresses: Address Space, Notations, Classful addressing, Classless addressing, Subnetting and Network Address Translation (NAT)
- 4.4 IPv4 Datagram format and fragmentation
- 4.5 IPv6 Address Structure and advantages over IPv4
- 4.6 Routing Algorithms: Distance Vector Routing, Link State Routing
- 4.7 Internet Control Protocols: ARP, RARP, ICMP
- 4.8 Routing protocols: OSPF, BGP, Unicast, Multicast and Broadcast
- Unit 5: The Transport Layer** 7 Hrs.
- 5.1 Functions of Transport Layer
- 5.2 Elements of Transport Protocols: Addressing, Establishing and Releasing Connection, Flow Control & Buffering, Error Control, Multiplexing & Demultiplexing, Crash Recovery
- 5.3 User Datagram Protocol (UDP): User Datagram, UDP Operations, Uses of UDP, RPC
- 5.4 Principles of Reliable Data Transfer: Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocol, Go-Back-N (GBN), Selective Repeat (SR)
- 5.5 Transmission Control Protocol (TCP): TCP Services, TCP Features, TCP Segment Header
- 5.6 Principle of Congestion Control
- Unit 6: The Application Layer** 5 Hrs.
- 6.1 Functions of Application layer
- 6.2 Application Layer Protocols: DNS, DHCP, WWW, HTTP, HTTPS, TELNET, FTP, SMTP, POP, IMAP
- 6.3 Concept of traffic analyzer: MRTG, PRTG, SNMP, Packet tracer, Wireshark.
- Unit 7: Network Security** 5 Hrs.
- 7.1 A Model for Network Security
- 7.2 Principles of cryptography: Symmetric Key and Public Key
- 7.3 Public Key Algorithm – RSA
- 7.4 Digital Signature Algorithm
- 7.5 Communication Security: IPsec, VPN, Firewalls, Wireless Security.



Practical

1. Prepare hardware and software specification for basic computer system.
2. Determine the appropriate placement of networking devices on a network.
3. Identify networking cable standards. Create and test cross – over and straight cables.
4. Configure the IP address of the computer.
5. Create a basic network and share file and folders.
6. Install and configure windows server: Active Directory, User and Group Policy Management.
7. Set the file access permissions and quota in windows server.
8. Configure basic DNS and DHCP services in windows server.
9. Install Linux based OS and practice on basic Linux and networking commands.
10. Configure IP address and subnet in Linux Machine.
11. Install packet tracer and identify the features of packet tracer.
12. Implement the LAN topologies.
13. Demonstrate the use of VLAN.
14. Implement the both static and dynamic router configurations.
15. Install and configure DNS, DHCP, FTP and Web Servers in Linux machine.
16. Capture some packets and analyze the header using Wireshark.
17. Implement the firewall.

Teaching Methods

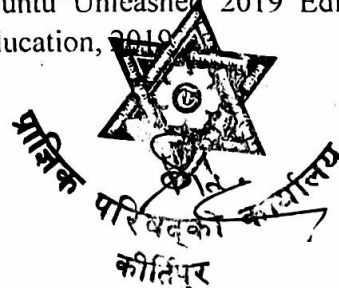
The teaching faculties are expected to create environment where students can update and upgrade themselves with the current scenario of computing and information technology with the help of topics listed in the syllabus. The general teaching pedagogy that can be followed by teaching faculties for this course includes class lectures, laboratory activity, group discussions, case studies, guest lectures, research work, project work, assignments (Theoretical and Practical), and written and verbal examinations.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	

Reference Book

1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks, 5/e", Prentice Hall, 2011.
2. Behrouz A. Forouzan, "Data Communications and networking" Tata McGraw-Hill.
3. Kurose, Ross, "Computer Networking: A Top-Down Approach", Pearson Education Limited, 2017.
4. Larry L. Peterson and Bruce S. Davie, "Computer Network: A System Approach", Morgan Kaufmann, 5/e, 2012.
5. Matthew Helmke, Andrew Hudson, Paul Hudson "Ubuntu Unleashed 2019 Edition_ Covering 18.04, 18.10, 19.04", 13/e, SAMS _ Pearson Education, 2019.



Course Title: **Introduction to Management (3 cr.)**

Course code: **CAMG 304**

Year/Semester: **III /V**

Class load: **3 Hrs./Week (Theory: 3Hrs)**

Course Objectives

This course aims to impart the basic management knowledge, and skills to the students so as to enhance their managerial capabilities and enable them to apply in the practical field.

Course Description

This course contains Introduction to Management, perspectives in management thought, emerging issues and challenges in management, management functions like planning, leading, controlling, organizational change and development, communication, emerging issues in quality management, technology and management.

Course Contents

Unit 1: Introduction

LH 4

Management: concepts, meaning and functions. Types of managers. Managerial roles and skills. Organization and management. Changing perspectives of organization.

Unit 2: Perspectives in Management

LH 7

Classical Perspective: scientific management, administrative management and bureaucracy. Behavioral Perspective: Hawthorne studies, human relations movement, and emergence of organizational behavior. Quantitative Perspective: management science and operations management. Integrating perspectives: systems and contingency perspectives. Emerging management issues and challenges.

Unit 3: Planning and decision making

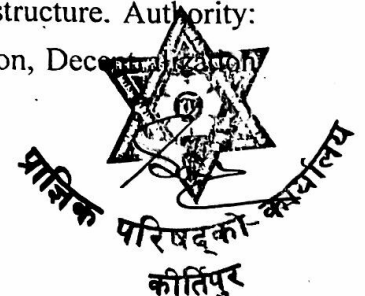
LH 7

Concept of planning, Levels of Planning: Strategic, Tactical and operational. Steps in Planning. Tools for planning. Decision Making: meaning, types and process. Decision making conditions – certainty, risk and uncertainty.

Unit 4: Organizing

LH 9

Concept of organizing, process and principles of organizing. Organization Architecture: vertical differentiation – tall versus flat hierarchies, horizontal differentiation – functional structure, multidivisional structure, geographic structure, and matrix structure. Authority: line authority and staff authority. Delegation of authority. Centralization, Decentralization



and Devolution: meaning, reasons, advantages and disadvantages. Staffing: concept and importance.

Unit 5: Leading and communication

LH 7

Concept and qualities of leadership. Transformational and transactional leadership, Leadership Styles: autocratic, democratic, and participative. Concept of managerial ethics. Motivation: concept, importance, and techniques. Communication: meaning, process, and networks. Types of communication, Barriers to effective communication.

Unit 6: Controlling and total quality management

LH 5

Concept, purpose, Process and types of controls. Essentials of effective control systems. Control tools and techniques. Quality: Concept and importance. Total Quality Management: concept, components, principles, tools and techniques. Emerging issues in quality management.

Unit 7: Organizational Change and Development

LH 5

Concept and nature, forces, paradigm shifts and areas (structure, technology, business process and behaviors) of organizational change. Resistance to change. Overcoming resistance to change. Concept of Organizational Development

Unit 8: Technology, Organization and Management

LH 4

Concept of technology, approaches to technology and organization, social networking, use of technology in people management,

References

Charles W.L. Hill and Steven L. McShane, *Principles of Management*, Tata Mc-Graw-Hill Company, New Delhi.

Griffin, Ricky W., *Management*. AITBS Publishers and Distributors, New Delhi.

Hitt, M.A., J.S. Black and Porter, L.W., *Management*, Pearson Education, New Delhi

Laurie J. M. *Management and organizational Behaviour*, Pearson, New Delhi

Evaluation:

Internal Assessment: 40 marks

External Assessment: 60 marks

Total: 100 marks

Teaching methods: The major teaching methods include the case analysis, project work, term paper, assignments, and quiz. The instructor decides the learning strategies based on the nature of session/class.



Course Title: Computer Graphics and Animation (3 Cr.)

Course Code: CACS305

Year/Semester: III/V

Class Load: 6 Hrs. / Week (Theory: 3Hrs. Tutorial: 1 Hrs., Practical: 2 Hrs.)

Course Description

This course is designed to extend students' knowledge and practice in Graphics hardware, software, and applications. It also provides the knowledge of data structures for graphics, graphics languages, and models for 2D and 3D objects, clipping, hidden surface elimination, depth buffer, raster graphics, shading, and rendering.

Course objectives

Upon completion of this course, students should be able to 1. Explain basic principle of computer graphics. 2. Develop 2D and 3D computer graphics applications. 3. Specify lighting and object's materials in computer graphics programming.

Course Contents

Unit 1: Introduction

6

1.1 Advantage of Computer Graphics and Areas of Applications

1.2 Hardware and Software for Computer Graphics. (Hard Copy, Display Technologies),

1.3 Random Scan Display System, Video Controller, Random Scan Display Processor

1.4 Raster Graphics

1.5 Scan Conversion Algorithms (Line, Circle, Ellipse)

1.6 Area Filling (Rectangle, Ellipse), Clipping (Lines, Circle, Ellipse), Clipping Polygons

Unit 2: Two dimensional and three dimensional transformations

7

2.1 2-Dimensional transformation

2.2 2-D Translation, Rotation, Scaling,

2.3 Homogeneous Coordinates, Reflection, Shear transform

2.4 3-dimensional transformation,

2.5 3-D Translation, Rotation Scaling, Reflection, Shear.

3 Unit 3: Clipping

7

3.1 Window to view port transformation

3.2 Clipping, line clipping,

3.3 Cohen –Sutherland line clipping

3.4 Polygon clipping

3.5 Sutherland and Gary Hodgman polygon clipping algorithm



Unit 4: Visible Surface Determination and computer graphics algorithm

15

- 4.1 Image space and object space techniques
- 4.2 Hidden Surface removal—Depth comparison
- 4.3 Z-Buffer Algorithm
- 4.4 Back-Face Removal
- 4.5 The Painter's Algorithm
- 4.6 Scan-Line Algorithm
- 4.7 Light and Color and different color models (RGB, CMY, YIQ)

Unit 5: Animation and virtual reality

10

- 5.1 Basic Principles of Animation and Types of Animation
- 5.2 Introduction to the flash interface
- 5.3 Setting stage dimensions, working with panels, panel layouts
- 5.4 Layers & Views
- 5.5 Shaping Objects – Overview of shapes, Drawing & Modifying Shapes
- 5.6 Bitmap Images & Sounds
- 5.7 Animation -Principles , Frame by frame animation, tweening, masks
- 5.8 Introduction to virtual reality

Laboratory Work

Laboratory work should be done covering all the topics listed above and a small project work should be carried out using the concept learnt in this course using Open GL.

Reference Books:

1. Foley, J. D., A. V. Dam, S. K. Feiner, J. F. Hughes, Computer Graphics Principle and Practices, Addison Wesley Longman, Singapore Pvt. Ltd.,
2. Hearn Donald, M. P. Baker, Computer Graphics, 2E, Prentice Hall of India Private Limited, New Delhi
3. Robert R & Snow D Flash CS4 Professional Bible, Wiley Publishing



Course Title: **Mobile Programming (3 Cr.)**

Course Code: **CACS351**

Year/Semester: **III/VI**

Class Load: **6Hrs. /Week (Theory: 3Hrs, Practical 3Hrs.)**

Course Description

This course provides the comprehensive knowledge related to the Mobile programming, which encompasses integrated development environment, infrastructure, design, and develop and testing of mobile application, which communicate with database to solve real word problem.

Objectives: The general objectives of this course is to develop mobile application that solve real word problem with use of current mobile technology.

Unit -1

Introduction to Mobile and Mobile Programming [2 HRS]

Mobile Device (Features, Categories, History, Brands, Models and Platforms), Introduction to Mobile Programming.

Unit -2

Introduction to Android Programming [4 HRS]

Android Platform, History of Android, Environment Setup, Creating an android project, Laying out the user interface (The view hierarchy, widget attributes, creating string resources, previewing the layout), Creating a new class, Setting up the project, Running on the Emulator.

Unit -3

Designing the User Interface [5 HRS]

Android layout types (Linear, Relative, Table, Absolute, Constraint), Layout attributes, Android widgets (Textview, Edittext, Checkbox, Radiobutton, Spinner etc.) and its attributes, Event Handling, working with string, string array and colors, working with resources and drawable, adding icon to the project.

Unit -4

Android Activity [4 HRS]

The Activity life cycle, Creating multiple activities, Declaring activities in the manifest, Connecting activities with intents, Passing data between activities, Getting a result back from a child activity, Getting and setting data to/from the layout file.

Unit -5

UI Fragments, Menus and Dialogs [6 HRS]

The need for UI flexibility, Introduction to fragments, Lifecycle of fragment, Creating a UI fragment, Creating a fragment class, Wiring widgets in fragment, Introduction to fragment manager, Difference between Activity and Fragments. Menus (Introduction, Types, Implementing menu in an application) Dialogs (Introduction, Creating a dialog fragment, Setting a dialog's content)



Unit -6

Listview, Gridview and Recyclerview [6 HRS]

Listview (Introduction, Features, Implementing listview in an application)

Gridview (Introduction, Features, Implementing gridview in an application)

Recyclerview (Introduction, Features, Implementing recyclerview in an application)

Unit -7

Advance Android Concepts [10 HRS]

Local database with SQLite (Establishing connection, creating database and tables, data manipulation), Introduction to API, API Types, Introduction to JSON, Retrieving contents from remote server, Sending contents to remote server, Implementing Google Maps in android application, Procedure for publishing application on Google Play Store.

Unit -8

Introduction to ios Programming [8 HRS]

Introduction to ios and ios programming, ios platform, Environment setup, Creating an Xcode project, Building the interface, Making connections, Running on the simulator.

Introduction to Swift language, Views and the view hierarchy, Storyboard and view controllers, working with widgets and its attributes, Creating a simple ios application.

Laboratory Works

Laboratory works should be done covering all the topics listed above and a small project work should be carried out using the concept learnt in this course. Project should be assigned on individual basis.

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

References

1. Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, *Android Programming: The Big Nerd Ranch Guide*, Big Nerd Ranch LLC, 2nd edition, 2015.
2. Christian Keur and Aaron Hillegass, *iOS Programming: The Big Nerd Ranch Guide*, 5th edition, 2015.
3. Brian Fling, *Mobile Design and Development*, O'Reilly Media, Inc., 2009.
4. Maximiliano Firtman, *Programming the Mobile Web*, O'Reilly Media, Inc., 2nd ed., 2013.



Course Title: Distributed Systems (3 Cr.)

Course Code: CACS352

Year/Semester: III/VI

Class Load: 4 Hrs. / Week (Theory: 3Hrs. Tutorial: 1 Hr.)

Course Description

The course introduces basic knowledge to give an understanding how modern distributed systems operate. The focus of the course is on distributed algorithms and on practical aspects that should be considered when designing and implementing real systems. Some topics covered during the course are causality and logical clocks, synchronization and coordination algorithms, transactions and replication, and end-to-end system design. In addition, the course explores recent trends exemplified by current highly available and reliable distributed systems.

Course objectives

The objective of the course is to make familiar with different aspect of the distributed system, middleware, system level support and different issues in designing distributed algorithms and finally systems.

Course Contents

Unit 1. Introduction	4 Hrs.
1.1 Characteristics	
1.2 Design Goals	
1.3 Types of Distributed Systems	
1.4 Case Study: The World Wide Web	
Unit 2. Architecture	4 Hrs.
2.1 Architectural Styles	
2.2 Middleware organization	
2.3 System Architecture	
2.4 Example Architectures	
Unit 3. Processes	6 Hrs.
3.1 Threads	
3.2 Virtualization	
3.3 Clients	
3.4 Servers	
3.5 Code Migration	
Unit 4. Communication	5 Hrs.
4.1 Foundations	
4.2 Remote Procedure Call	
4.3 Message-Oriented Communication	
4.4 Multicast Communication	
4.5 Case Study: Java RMI and Message Passing Interface (MPI)	
Unit 5. Naming	5 Hrs.
5.1 Name Identifiers, and Addresses	
5.2 Structured Naming	



5.3 Attribute-based naming	
5.4 Case Study: The Global Name Service	
Unit 5. Coordination	7 Hrs.
6.1 Clock Synchronization	
6.2 Logical Clocks	
6.3 Mutual Exclusion	
6.4 Election Algorithm	
6.5 Location System	
6.6 Distributed Event Matching	
6.7 Gossip-based coordination	
Unit 7. Consistency and Replication	5 Hrs.
7.1 Introduction	
7.2 Data-centric consistency models	
7.3 Client-centric consistency models	
7.4 Replica management	
7.5 Consistency protocols	
7.6 Caching and Replication in Web	
Unit 8. Fault Tolerance	5 Hrs.
8.1 Introduction to fault tolerance	
8.2 Process resilience	
8.3 Reliable client-server communication	
8.4 Reliable group communication	
8.5 Distributed commit	
8.6 Recovery	
Unit 9. Security	4 Hrs.
9.1 Introduction to security	
9.2 Secure channels	
9.3 Access control	
9.4 Secure naming	
9.5 Security Management	

Teaching Methods

The teaching faculties are expected to create environment where students can update and upgrade themselves with the current scenario of computing and information technology with the help of topics listed in the syllabus. The general teaching pedagogy that can be followed by teaching faculties for this course includes class lectures, laboratory activity, group discussions, case studies, guest lectures, research work, project work, assignments (Theoretical and Practical), and written and verbal examinations.

Evaluation System

Examination Scheme		
Internal Assessment	External Assessment	Total
40%	60% (3 Hrs.)	100%



References:

1. A.S. Tanenbaum, M. VanSteen, "Distributed Systems", Pearson Education.
2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design", Third Edition, Pearson Education.
3. Mukesh Singhal, "Advanced Concepts in Operating Systems", McGraw-Hill Series in Computer Science.
4. Ajay D. Kshemkalyani, Mukesh Singhal, "Distributed Computing: Principles, Algorithms, and Systems", Cambridge University Press
5. Christian Cachin, Rachid Guerraoui, Luís, "Introduction to Reliable and Secure Distributed Programming", Springer



Course Title: Applied Economics (3 Cr.)

Course Code: CAEC353

Year/ Semester: III/VI

Class Load: 3 Hrs./Week (Theory: 3 Hrs.; Tutorial: 1Hr.)

Course Description

This course of Applied Economics consists of the introduction to economic theories and application. It consists of theory of demand and supply, theory of consumer's behavior, theory of production, cost and revenue curves, theory of product pricing and factor pricing as well as contemporary macroeconomics like national income accounting, money banking and international trade with reference to Nepal.

Course Objective

This course of Applied Economics aims to enhance understanding of the economic theories and application to develop skills of students in personal and professional decision making related to business, IT and management.

Unit 1: Introduction

6 Hrs.

- a. Concept and types of microeconomics and macroeconomics
- b. Distinction between microeconomics and macroeconomics
- c. Goals and instruments of macroeconomics

Unit 2: Elasticity of Demand and Supply

6 Hrs.

- a. Concept and types of price, income and cross elasticity of demand
- b. Measurement of price, income and cross elasticity of demand: Total outlay method and Point method
- c. Uses of price, income and cross elasticity
- d. Concept of elasticity of supply and its measurement
(Numerical exercise using excel)

Unit 3: Theory of Consumer Behavior

6 Hrs.

- a. Concept of cardinal and ordinal utility analysis
- b. Cardinal utility analysis: assumptions, consumer's equilibrium, criticisms and derivation of demand curve
- c. Ordinal utility Analysis: Concept, properties of Indifference curve, marginal rate of substitution, Price Line and consumer's equilibrium, Price effect: Derivation of PCC, Income effect: Derivation of ICC, Substitution effect, Decomposition of price effect into income and substitution effect, Derivation of demand curve (Hicksian approach)
(Numerical exercise)

Unit 4: Cost and Revenue Curves

6 Hrs.

- a. Concept of cost: actual cost and opportunity cost, implicit cost and explicit cost, accounting and economic cost.
- b. Derivation of short run and long run cost curves (total, average, marginal) and shape of short run and long run average cost curves.
- c. Relationship between short run and long run AC and MC curves



- d. Concept of revenue: total revenue, average revenue, and marginal revenue, revenue curves under perfect and imperfect competition, relation between average and marginal revenue
(Numerical exercise using excel)

Unit 5: Market Structure

9 Hrs.

- Perfect competition-** meaning and characteristics of perfect competition, short run and long run equilibrium of the firm and industry (TR-TC approach and MC-MR approach), derivation of short run and long run supply curve of a firm and industry.
- Monopoly:** Meaning and characteristic of monopoly; pricing under monopoly: equilibrium of firm in short run and long run (TR-TC approach and MC-MR approach); Price discrimination and degree of price discrimination.
- Monopolistic Competition:** Meaning and characteristics of monopolistic competition; Pricing under monopolistic competition: equilibrium of firm in short run and long run; equilibrium of firm under product variation and selling expenses
- Oligopoly:** Meaning and characteristic of oligopoly; Pricing under cartel (aiming at joint profit maximization)

(Numerical exercise using excel)

Unit 6: National Income Accounting

6 Hrs.

- Circular flow of income and expenditure in two sector, three sector and four sector economy
- Meaning and different concept of national income: GDP, NDP, GNP, NNP, national income at factor cost (NI), personal income (PI), disposable personal income (DI), per capita income (PCI)
- Real and nominal GDP, GDP deflator
- Computation of National income: Product, Income and Expenditure method

(Numerical exercise using excel)

Unit 7: Money, Banking and International Trade

6 Hrs.

- Concept and functions of money- value of money-money supply –components of money supply (M_1 , M_2 , etc.)
- Inflation : Types, causes and effects of inflation
- Banking: role and functions of commercial banks , role and functions of central bank with reference to Nepal Rastra Bank
- International Trade: Distinction between internal and international trade, balance of trade and balance of payment.



Reference Books

Ackley, Gardener. (1978). *Macroeconomics: Theory and Policy*. New York: Mac Milan Publishing Co.

Caves, Frankel, Jones, *World Trades and Payments: (9th Ed.)* Pearson Education

Dominick Salvatore, *International Economics: (8th Ed.)* . Wiley India.

Dwivedi, D.N. (2001). *Macroeconomic Theory and Policy*. Tata McGraw-Hill Publishing Company Limited, New Delhi

G, Mankiw. (2007). *Economics: Principles and Applications*. South Western of Cengage Learning.

Gupta, S.B. *Monetary Economics*, S.Chand & Co;New Delhi.

Koutsoyianis, A. (1991). *Modern Microeconomics*. Hongkong: ELBS

Lipsey and Chrystal. *Economics*. Oxford University Press. (eleventh edition or latest one).

Mankiw, N. Gregory. (2009). *Principles of Microeconomics*. Cengage Learning India Private Limited, New Delhi (4th edition)

P. Samuelson and W. Nordhaus. *Economics*, Mc GrawHill International Editions. (14th edition or latest one)

Paul R. Krugman, Maurice Obstfeld, *International Economics: (8th Ed.)* Pearson Education

Pindyck, Robert S. and Daniel, Rubinfeld. (2001). *Microeconomics*. New Delhi: Prentice Hall of India

Salvatore, Dominic. (2009). *Principles of Microeconomics*. Publish in India Oxford University Press, New Delhi

Shapiro, Edward. (2004). *Macroeconomic Analysis*. New Delhi: Galgotia Publication (P) Ltd.

Practical Works

Excel or other relevant statistical software should be used to compute numerical exercise.

Teaching Methods:

The general teaching pedagogy includes class lectures, presentations, group works, case studies, guest lectures research works, project works, assignments (Theoretical and practical). The teaching faculty will determine the choice of teaching pedagogy and statistical tools as per the requirements of topics.



Evaluation

Examination Scheme				Total
Internal Assessment (40)		External Assessment (60)		100
Theory	Practical	Theory	Practical	
30	10	40	20	



Course Title: **Advanced Java Programming (3 Cr.)**

Course Code: **CACS354**

Year/Semester: **III/VI**

Class Load: **6 Hrs. / Week (Theory: 3 Hrs., Practical: 3 Hrs.)**

Course Description:

This course covers advanced features of Java programming language including, GUI programming, database programming, JavaBeans, JSP, Servlet, and Remote Method Invocation (RMI).

Course Objectives:

The primary objective of this course is to provide concepts of advanced features of Java programming and make students familiar with their uses and applications.

Course Contents:

Unit 1: GUI Programming (12 Hrs.)

Introducing Swing; Creating a Frame; Displaying Information in a Component; Working with 2D Shapes; Using Color; Using Special Fonts for Text; Displaying Images; Event Handling: Event Handling Basics, Event Classes, Event Listeners and Adapter Classes; Swing and the MVC Design Pattern; Layout Management; Basic Swing Components

Unit 2: Database Programming (7 Hrs.)

The Design of JDBC: JDBC Driver Types and Typical Uses of JDBC; the Structured Query Language; JDBC Configuration; Working with JDBC Statements; Query Execution; Scrollable and Updatable Result Sets; Row Sets

Unit 3: JavaBeans (7 Hrs.)

What Is a Java Bean? Advantages of Java Beans; Introspection; Properties, Events, and Methods Design Patterns; Using BeanInfo Interface; Bound and Constrained Properties; Persistence; Customizers; the Java Beans API; Writing JavaBeans

Unit 4: Servlets and JSP (14 Hrs.)

Background; The Life Cycle of a Servlet; A Simple Servlet; The Servlet API; The javax.servlet Package; Reading Servlet Parameters; The javax.servlet.http Package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking; Introduction to JSP; Using JSP; Comparing JSP with Servlet; Java Web Frameworks

Unit 5: RMI (5 Hrs.)

What is RMI? The Roles of Client and Server; Remote Method Calls; Stubs and Parameter Marshalling; the RMI Programming Model; Interfaces and Implementations; the RMI Registry; Parameters and Return Values in Remote Methods; Remote Object Activation; Simple Client/Server Application using RMI; Comparing RMI with CORBA

Laboratory Work: The laboratory work includes writing Java programs

- To create GUI applications using swing, event handling, and layout management
- To create applications to work with databases
- To create JavaBeans



- To create server side web programs using Servlet and JSP
- To create distributed applications using RMI

Text Books:

1. Core java Volume I – Fundamentals, Tenth Edition, Cary S. Horstmann, Prentice Hall
2. Core java Volume II – Advanced Features, Tenth Edition, Cary S. Horstmann, Prentice Hall
3. Java: The Complete Reference, 10th, Herbert Schildt, McGraw-Hill

Reference Books:

1. Advanced Java Programming, Uttam K. Roy, Oxford University Press
2. Java: Advanced Features and Programming Techniques, Nathan Clark

Teaching Methods:

The teaching faculties are expected to create environment where students can update and upgrade themselves with the current scenario of computing and information technology with the help of topics listed in the syllabus. The general teaching pedagogy that can be followed by teaching faculties for this course includes class lectures, laboratory activity, group discussions, case studies, guest lectures, research work, project work, assignments (Theoretical and Practical), and written and verbal examinations.

Evaluation:

Internal Assessment Format [FM = 20] – Subject Teacher				
Term Examination		Assignment	Attendance	Total
Mid-Term	Pre-Final			
5	5	5	5	20

Practical Assessment Format [FM = 20] – External Examiner will be assigned by Dean Office, FOHSS.				
Practical	Viva	Lab Reports	Total	
10	5	5	20	

Note: Assignment may be subject specific case study, seminar paper preparation, report writing, project work, research work, presentation, problem solving etc.

Final Examination Questions Format [FM = 60, Time = 3 Hrs.]

SN	Question Type	Number of Questions	Marks per Question	Total Marks
1	Group – 'A' Objective Type Questions (Multiple Choice Questions) Attempt all the questions.	10	1	10 x 1 = 10
2	Group – 'B' Short Questions (Attempt any SIX questions.)	7	5	6 x 5 = 30
3	Group – 'C' Long Questions (Attempt any TWO questions.)	3	10	2 x 10 = 20



Course Title: Network Programming (3 Cr.)

Course Code: CACS355

Year/Semester: III/VI

Class Load: 5 Hrs. / Week (Theory: 3Hrs. Practical: 2 Hrs.)

Course Description

This course is designed to extend students' knowledge and practice in analysis and design of computer networks by focusing on computer network programming. It includes introduction, Internet Address, URLs and URIs, HTTP, URLConnections, Socket Programming, IP Multicast and RMI. The JAVA programming language will be used throughout the course. It does not entirely focus on theoretical concept but also strongly focuses on practical skill based knowledge.

Course objectives

The general objectives of this course are to provide theoretical as well as practical knowledge of network programming to make students capable of developing, implementing, managing and troubleshooting the issues of network programming in their personal as well professional life.

Course Contents

- | | |
|---|---------------|
| Unit 1: Introduction | 3 Hrs. |
| 1.1 Network Programing Features and Scope | |
| 1.2 Network Programming Language, Tools & Platforms | |
| 1.3 Client and Server Applications | |
| 1.4 Client server model and software design | |
| Unit 2: Internet Addresses | 4 Hrs. |
| 2.1 The InetAddress Class: Creating New InetAddress Objects, Getter | |
| 2.2 Methods, Address Types, Testing Reachability and Object Methods | |
| 2.3 Inet4Address and Inet6Address | |
| 2.4 The Network Interface Class: Factory Method & Getter Method | |
| 2.5 Some Useful Programs: SpamCheck, Processing Web Server Logfiles | |
| Unit 3: URLs and URIs | 5 Hrs. |
| 3.1 URIs: URLs and Relative URLs | |
| 3.2 The URL Class: Creating New URLs, Retrieving Data From a URL, Splitting a URL into Pieces, Equality & Comparison and Conversion | |
| 3.3 The URI Class: Constructing a URI, The Parts of the URI, Resolving Relative URIs, Equality & Comparison and String Representation | |
| 3.4 x-www-form-urlencoded: URL Encoder and URL Decoder | |
| 3.5 Proxies: System Properties, The ProxyClass and The ProxySelector Class | |
| 3.6 Communicating with Server-Side Programs Through GET | |
| 3.7 Accessing Password-Protected Sites: The Authenticator Class, The PasswordAuthentication Class and The JPasswordField Class | |
| Unit 4: HTTP | 2 Hrs. |
| 4.1 The protocol: Keep-Alive | |
| 4.2 HTTP Methods | |
| 4.3 The Request Body | |



4.4 Cookies: CookieManager and CookiesStore	
Unit 5: URLConnections	5 Hrs.
5.1 Opening URLConnections	
5.2 Reading Data from Server	
5.3 Reading Header: Retrieving specific Header Fields and Retrieving Arbitrary Header Fields	
5.4 Cache: Web Cache for Java	
5.5 Configuring the Connection: protected URL url, protected boolean connected, protected boolean allowUserInteraction, protected boolean doInput, protected boolean doOutput, protected boolean ifModificationSince, protected boolean useCaches and Timeouts	
5.6 Configuring the Client Request HTTP Header	
5.7 Security Considerations for URLConnections	
5.8 Guessing MIME Media Types	
5.9 HttpURLConnection: The Request Methods, Disconnecting from the Server, Handling Server Responses, Proxies and Streaming Mode	
Unit 6: Socket for Clients	5 Hrs.
6.1 Introduction to Socket	
6.2 Using Sockets: Investigating Protocols with telnet, Reading from Servers with Sockets, Writing to Servers with Sockets	
6.3 Constructing and connecting Sockets: Basic Constructors, Picking a Local Interface to Connect From, Constructing Without Connecting, Socket Addresses and Proxy Servers	
6.4 Getting Information about a Socket: Closed or Connected?, toString()	
6.5 Setting Socket Options: TCP_NODELAY, SO_LINGER, SO_TIMEOUT, SO_RCVBUF and SO_SNDBUF, SO_KEEPALIVE, OOBINLINE, SO_REUSEADDR and IP_TOS Class of Services	
6.6 Socket in GUI Applications: Whois and A Network Client Library	
Unit 7: Socket for Servers	5 Hrs.
7.1 Using ServerSockets: Serving Binary Data, Multithreaded Servers, Writing to Servers with Sockets and Closing Server Sockets	
7.2 Logging: What to Log and How to Log	
7.3 Constructing Server Sockets: Constructing Without Binding	
7.4 Getting Information about Server Socket	
7.5 Socket Options: SO_TIMEOUT, SO_RCVBUF, SO_REUSEADDR and Class of Service	
7.6 HTTP Servers: A Single File Server, A Redirector and A Full-Fledged HTTP Server	
Unit 8: Secure Socket	4 Hrs.
8.1 Secure Communication	
8.2 Creating Secure Client Sockets	
8.3 Event Handlers	
8.4 Session Management	
8.5 Client Mode	
8.6 Creating Secure Server Socket	



8.7 Configure SSLServerSockets: Choosing the Cipher Suits, Session Management and Client Mode

Unit 9: Nonblocking I/O

3 Hrs.

9.1 An Example Client and Server

9.2 Buffers: Creating Buffers, Filling and Draining, Bulk Methods, Data Conversion, View Buffers, Compacting Buffers, Duplicating Buffers, Slicing Buffers, Marking and Resetting, Object Methods

9.3 Channels: SocketChannel, ServerSocketChannel, The Channels Class, Asynchronous Channels, Socket Options

9.4 Readiness Selection: The Selector Class, The SelectionKey Class

Unit 10: UDP

5 Hrs.

10.1 UDP Protocol

10.2 UDP Clients

10.3 UDP Servers

10.4 The DatagramPacket Class: The Constructor, The get Methods, The setter Methods

10.5 The DatagramSocket Class: The Constructor, Sending and Receiving Datagrams, Managing Connections

10.6 Socket Options: SO_TIMEOUT, SO_RCVBUF, SO_SNDBUF, SO_RUMEMADDR, SO_BROADCAST and IP_TOS

10.7 UDP Applications: Simple UDP Clients, UDP Server and A UDP Echo Client

10.8 DatagramChannel: Using DatagramChannel

Unit 11: IP Multicast

2 Hrs.

11.1 Multicasting: Multicast Address and Groups, Clients and Servers, Routers and Routing

11.2 Working with Multicast Sockets: The Constructor, Communicating with a Group

Unit 12: Remote Method Invocation (RMI)

2 Hrs.

12.1 Defining and Implementing RMI Service Interface

12.2 Creating an RMI Server and Client

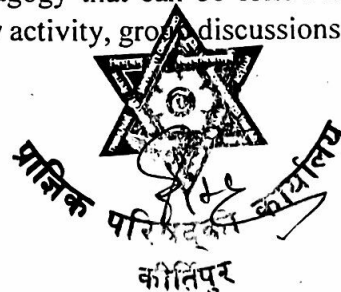
12.3 Running the RMI System

Laboratory Work

Laboratory work should be done covering all the topics listed above and a small project work should be carried out using the concept learnt in this course using Java programming Language.

Teaching Methods

The teaching faculties are expected to create environment where students can update and upgrade themselves with the current scenario of computing and information technology with the help of topics listed in the syllabus. The general teaching pedagogy that can be followed by teaching faculties for this course includes class lectures, laboratory activity, group discussions, case studies,



guest lectures, research work, project work, assignments (Theoretical and Practical), and written and verbal examinations.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	

Reference Books:

1. Elliott Rusty Harold, "Java Network Programming", O'Reilly, 2014.
2. Douglas E. Comer, David L. Stevens, "Internetworking with TCP_IP, Vol. III_ Client-Server Programming and Applications, Linux_Posix Sockets Version" Addison-Wesley, 2000.
3. David Reilly, Michael Reilly, "Java Network Programming and Distributed Computing", Addison-Wesley Professional, 2002
4. Kenneth L. Calvert, Michael J. Donahoo, "TCP-IP Sockets in Java. Practical Guide for Programmers", Morgan Kaufmann, 2008.
5. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks, 5/e", Prentice Hall, 2011.
6. Kurose, Ross, "Computer Networking: A Top-Down Approach", Pearson Education Limited, 2017.



Course Title: Project II (2 Cr.)
Course Code: CAPJ356
Year/Semester: III/VI
Class Load: 4 Hrs. / Week (Practical: 4 Hrs.)

Course Description

To develop small scale project based on the application development platforms and tools (JAVA, visual c++, PHP , Python or plate form of any current trend. This course provides practical skill based knowledge.

Course objectives

The objectives of this course are to provide project management skills (developing, implementing, managing collaboration) and to learn working as a team. The student will also learn about formulating project documentation.

Course Contents

Unit 1: Project Ideas and proposal guidance	4
1.1 Project concept and Scope	
1.2 Proposal writing techniques	
Unit 2: Application Development	8
2.1 Object oriented programming	
2.2 Frameworks and APIs	
2.3 Programming design patterns	
2.4 Data collection for project	
2.5 Application of GPUS	
Unit 3: Project management, team work and collaboration	8
3.1 Project management techniques	
3.1.1 Develop project management plan	
3.1.2 Project implementation, monitor and control	
3.2 Collaborative development environment	
3.2.1 Communications planning process	
3.2.2 Organizing and conducting effective meeting,	
Unit 4: Project Guidance	5
Unit 5: Project work	30



Unit 6: Project documentation guidance

5

- 4.1 documentation format
- 4.2 Table writing format
- 4.3 Figure writing format
- 4.4 Writing equation
- 4.5 References and citation techniques
- 4.6 Abstract writing

Reference Books:

1. The Project Manager's Guide to Software Engineering's Best Practices, M. C. Christensen and R.H. Thayer, IEEE computer Society
2. Angelika H. Hofmann, " Scientific Writing and Communication: Papers, Proposals, and Presentations Oxford University Press; 3 edition (November 17, 2016)

